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A Profile of Fatal Two Wheeler Accidents in North Karnataka

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ABSTRACT

Road traffic accidents (RTAs) are important causes of mortality and morbidity due to the increasing number of vehicles, changes in lifestyle and the risk behaviors among general population. With the aim of exploring various characteristics of fatal two wheeler RTAs, this retrospective analysis of medico-legal autopsies was conducted between January 2012 and December 2014 in a tertiary care hospital of north Karnataka. The information was collected from retrospective analysis of post-mortem registers and inquest documents received from the investigating officers. The collected information was analyzed using SPSS version 17.0. Among the 100 autopsies conducted on fatal two wheeler accidental deaths during the study period, 85 were males and 15 were females. Majority of the male victims belonged to the age group 21–30 years. Bike riders (40) were the most common victims of two wheeler RTAs. The head injuries were responsible for more than half of deaths. Majority of victims died on the spot of accident. Based on results of our study we conclude that fatal two wheeler RTAs are important public health hazards and should be addressed through strengthening of emergency healthcare, stricter enforcement of traffic laws and public awareness.

Keywords: Road traffic accidents; Medico-legal autopsy; Two wheeler accidents; Karnataka.

INTRODUCTION

Road Traffic Accident (RTA) is the leading cause of unnatural death worldwide, every day about 3400 people die due to RTA. According to Global Status Report on Road Safety-2009, over 1.2 million people die each year on the world’s roads, and between 20 and 50 million suffer non-fatal injuries. Majority (90%) of world’s RTA fatalities are occurring in underdeveloped and developing countries, whereas developed countries contribute very little though they have over 60% of world’s vehicles. India being a developing country is experiencing a double burden from already existing communicable diseases and increasing burden of non-communicable diseases including road traffic accidents. RTAs are the sixth leading cause of death in India (over 1, 30, 000 deaths / year) and responsible for huge share of emergency hospitalization, socio-economic burden, disabilities and deaths of young population. It is well known that enormous growth in the number of motor vehicles, increase in population and poor infrastructure in the form of inadequate access to healthcare and bad roads are some of the important factors in deaths due to road traffic accidents. At present two wheelers are major component of road traffic, preferred family vehicle and they have taken mega share of road accidents. Motorcycle users, pedestrians and pedal cyclists are vulnerable road users. They are directly exposed to impacting vehicle or hard objects during collision and likely to get injured severely. Majority of the RTAs are shared by two wheelers but there is little research in this field related to two wheeler accidents in this part of Karnataka. Hence this study is aimed at exploring various factors in two wheeler accidental deaths. The present study reveals the analysis of fatal two wheeler accidents in north Karnataka region and provides insights on the cause of death of victims, period of survival, status of victims, offending vehicles and type of roads involved in fatal two wheeler accidents along with age and sex distribution of the victims during the study period.
MATERIALS AND METHOD

The present study is a retrospective analysis of medicolegal autopsies conducted at district government hospital between 1st January 2012 and 30th December 2014. All two wheeler related accidental deaths were included in the study. Deaths due to other accidents other than two wheelers were excluded from the study. The details regarding fatal two wheeler accidents were obtained by autopsy files and inquest documents provided by the investigating officer were studied in detail. The information obtained from the autopsy case files and information furnished by the police was registered in a database with respect to the age, sex, type of vehicle, type of road, time since death, cause of death etc. The data analyzed using the statistical software (SPSS version 17.0). The following results were obtained.

RESULTS

A total of 100 medico-legal autopsies were conducted during the study period (2012–2014) due to two wheeler accidents. Age and gender distribution of death due to two wheeler road traffic fatalities during the study period is shown in Table 1. 85 victims were males and 15 females, male-female ratio in two wheeler fatalities being 6:1. Age of the victims ranged from 1 to 83 years. On analyzing the trend of cases in each decade of life, it was observed that most of the victims were in the 3rd decade of life (27) followed by 4th decade (20), 2nd decade (19) and 5th decade (13). The 1st decade of life showed the least (2) number of deaths due to two wheeler accidents followed by the 7th and 8th decade (3). Maximum numbers of males (22) were aged between 21 and 30 years. While the male fatality pattern varied during the different age groups, the distribution of female cases was fairly uniform throughout each decade of life. (Table. 1)

Majority of the fatal two wheeler accident victims are bike riders (40) followed by pillion riders (21), pedestrians (20) and bicycle riders (12). Motor cycle with gear was used in maximum (65) no of two wheeler fatalities followed by motorcycle without gear (18) and bicycle (9). Majority (33) of fatal two wheeler accidents took place on city road followed by state highway (28), national highway (26), and village roads (10). (Table 2)

Maximum (41) victims were brought dead to hospital or found dead at the spot of the accident. The rest (24) of them died within one hour of the hospitalization. Nearly one-fourth of victims were died within first 12 hours of hospitalization and only four cases have been survived for more than a week. The cause of death in majority of victims was traumatic fracture of skull with intracranial hemorrhage (56) followed by Hemorrhagic (hypovolemic) shock (22). (Table 2)

DISCUSSIONS

Two wheelers are preferred transportation vehicles for majority Indian families as they are cheaper, gives better mileage, carry at least 2 to 3 passengers, easy to park & ride in town/city roads and traffic congestion. Two wheeler accidents have contributed for nearly half of total RTA deaths, two wheeler users and pedestrians have the highest rates of morbidity and mortality. Many factors contribute to the high mortality of two wheeler accidents. Poor and ill maintained roads, poor and ill maintained illumination, not following the road safety rules and traffic rules, not taking personal safety measures, non-availability of 24X7 emergency treatment are the important ones.

Majority (85) of the two wheeler victims were males, this may be because males spend lot of time in traveling and various outdoor activities, so more prone for fatalities due to accidents, the finding are similar to the previous studies. Most of the victims belong to 21-30 years age group (3rd decade of life) and these findings are similar to the various studies conducted across the India. Mortality to this productive age group may cause huge social and financial burden to the family and in turn to the nation.

Bike riders have high (40) risk of fatality compared to the pillion rider (21) or the pedestrian (20). This may be attributed to the speed of the vehicle and high exposure to the impacting object/surface. Motor cycle with gear is involved in majority (65) of fatal deaths. This may be due to their high number among the two wheeler population and the most used vehicle by males.

City roads are more (33) vulnerable to fatal two wheeler accidents compare to state (28) and national highways (26). This may be due to narrow roads, Lack of footpaths & subways, low traffic sense and road safety knowledge among rider and pedestrians makes them vulnerable for road traffic accidents on city roads.
Most (41) of the victims died on the accident spot or within one hour (24) of the accident. The reason behind the spot death or death within one hour is high impact leading to more severe injuries to head and neck region and unavailability of emergency treatment on the spot and emergency transportation to the nearest emergency department. One more prime reason behind this is unavailability of the emergency depart at the rural area. Hence the timely availability of quality emergency medical services to the injured will play a crucial role in preventing mortalities and disabilities.

Head injury was the most common cause of death following a two wheeler accident. More than half of the victims in our study died of head injury and its complications. Findings of the present study are consistent with other studies.\textsuperscript{10-14} Our observation highlights the need for dedicated neuro-surgical care in every tertiary care hospital, as head injuries are very often fatal or otherwise disabling unless immediate, high quality intervention is provided.

Hence the timely availability of quality emergency medical services to the injured will play a crucial role in preventing mortalities and disabilities. Many factors (human, vehicular and roadways) contribute for causation of two wheeler accidents, and human errors are responsible for many fatalities. Though certainly know the fact that helmets reduce head, facial and brain injuries significantly, still most of the motorcycle occupants were found not-worn helmet at the time of accident. Driving a vehicle under intoxication is a crime, because alcohol intoxication impairs driving ability of a person and level of impairment is directly related to blood alcohol concentration.\textsuperscript{15} Use of mobile phones while driving a vehicle is associated with a high chance of accidents and hence traffic laws prohibit the use of these gadgets by the rider while driving.

Many countries have imposed restrictions on the high speeding, legal age for driving license, graduate driver licensing, increase in fine & withdrawal of Driver’s license and speed control interventions have led to significant reduction in two wheeler accidents.\textsuperscript{16}

| Table 1. Age and Gender Distribution of Fatal Two wheeler Accidents |
|------------------------|---------|-------|---------|
| Age (Y)     | Male | Female | Total |
| 0-10        | 1    | 1      | 2      |
| 11-20       | 16   | 3      | 19     |
| 21-30       | 22   | 5      | 27     |
| 31-40       | 18   | 2      | 20     |
| 41-50       | 10   | 3      | 13     |
| 51-60       | 9    | 1      | 10     |
| 61-70       | 6    | 0      | 6      |
| >70         | 3    | 0      | 3      |
| Total       | 85   | 15     | 100    |

| Table 2. Factors in Fatal Two Wheeler Accidents |
|------------------------|---------|
| Factor                      | Cases  |
| Type of victim              |        |
| Rider                       | 40     |
| Pillion rider               | 21     |
| Pedestrian                  | 20     |
| Bicycle rider               | 12     |
| Unknown                     | 7      |
| Total                       | 100    |
| Type of vehicle             |        |
| Motorcycle with gear        | 65     |
| Motorcycle without gear     | 18     |
| Bicycle                     | 9      |
| Unknown                     | 8      |
| Total                       | 100    |
| Types of Road               |        |
| National highway            | 26     |
| State highway               | 28     |
| City road                   | 33     |
| Village road                | 10     |
| Unknown                     | 3      |
| Total                       | 100    |
| Time since death            |        |
| Spot death                  | 41     |
| 0-1 hour                    | 24     |
| 1-6 hour                    | 16     |
| 6-12 hour                   | 9      |
| 12 hour-1 day               | 5      |
| 2-6 day                     | 1      |
| >1 week                     | 4      |
| Total                       | 100    |
| Cause of death              |        |
| Traumatic fracture of skull with intracranial hemorrhage (Head injury) | 56     |
| Hemorrhagic (hypovolemic) shock | 22     |
| Multiple fractures/injuries | 13     |
| Spinal injury               | 6      |
| Septicemia                  | 3      |
| Total                       | 100    |
CONCLUSION

The present study shows that the fatal two wheeler RTAs are on the rise and continue to be an important public health problem in the north Karnataka region. Head injuries are responsible for death in majority of victims. Males belonging to third decade of life are most commonly involved victims, majority of them are bike riders. Most of the fatal accidents took place on the city roads with high incidence of spot death where head injury was the major component of cause of death. The health system needs to be strengthened especially for the provision of emergency services to the fatal accident victims. Steps should be taken to protect the vulnerable road users like pedestrians and two wheeler occupants from sustaining the injuries. Health education through mass media and posters regarding adequate road safety measures, coupled with stricter enforcement of traffic laws especially in relation to compulsory helmet wearing, speed limits etc. This may prevent fatal two wheeler road traffic accident deaths in the future.

Conflict of Interest: None

Source of Funding: Self

Ethical Clearance: The study was approved ethically by the Institutional Ethical Committee

REFERENCES


Suicidal Deaths – A Study in Kalaburagi

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ABSTRACT

Suicide is a global phenomenon in all regions of the world: in fact 75% of global suicide occurred in low and middle income countries in 2012. Suicide accounted for 1.4% of all deaths worldwide making it the 15th leading cause of death in 2012. Suicide committed by an individual will be burden on whole family. The present study is conducted to know the incidence of suicide in Kalaburagi, risked age group, sex and the different methods employed for committing suicide. Total of 659 medico legal post mortem cases conducted at District hospital, Kalaburagi between 1st January 2015 to 31st December 2015 were analysed. In this 220 cases were alleged suicidal deaths. Incidence rate of suicide is 33.38% in this region. Males outnumbered females (137 cases in males and 83 cases in females). Age group 21 to 30 is most commonly involved (77 cases 35%). Burning was the most common method of committing suicide (92 cases 41.8%), followed by poisoning (70 cases 31.8%). However in the males poisoning was the preferred method of committing suicide (54 cases 39.42% out of 137 suicides in males).Suicidal deaths are preventable by combined efforts of Government agencies, stringent law and by changing the mindset of the people to adopt to all difficult situations.

Keywords: Suicide, Burns, Poisoning, Incidence, Kalaburagi

INTRODUCTION

According to the section 2 (b) of Registration of Births and deaths Act death is defined as permanent disappearance of all the evidences of life at any time after live birth has taken place.

The manner of death is defined as the fashion in which the cause of death came out. There are mainly four manners of the death namely natural, accidental, suicidal and homicidal. Suicidal manner of the deaths are the one in which the deceased took the action of trauma himself or herself to be killed.

Suicide is a global phenomenon in all regions of the world: in fact 75% of global suicide occurred in low and middle income countries in 2012. Suicide accounted for 1.4% of all deaths worldwide making it the 15th leading cause of death in 2012.

About 800000 people commit suicide worldwide every year of these 135000 (17%) are residents of India. Statistics about suicide in India may not be accurate as many of the cases are not reported. In India suicide is considered as an offence. Many of the deaths in the rural areas are not reported partly because of lack of knowledge and partly because the family members of the deceased fear of social and legal consequences associated with suicide.

The present study is carried out to know, different ways of suicide and their distribution in different age groups and sex. All the cases of medico legal autopsies conducted from January 2015 to Dec 2015 at Gulbarga Institute of Medical Sciences, Kalaburagi were analysed.

MATERIAL AND METHOD

The present study is conducted in the Forensic Medicine Department at Gulbarga Institute of Medical Sciences, Kalaburagi. The cases included in the study were the autopsy cases conducted from January 2015 to December 2015 with alleged history suicidal death. The particulars of the deceased were collected from...
interrogation with police, relatives, friends, inquest report, post mortem findings and death notes if any.

RESULTS

During the study period total of 659 medico legal post mortem examination were performed in the mortuary of GIMS, Kalaburagi out of which 220 were alleged suicidal deaths. Maximum number of suicide was seen in the age group of 21 to 30 and least at the age more than 50. There were no cases of suicides in the age group less than 10 years. Most of the cases of suicide were seen in men 137 (62.27%) and in females it was 83 (37.7%).

If we consider the total number of cases, burning (92 cases 41.8%) was the most common method of committing suicide followed by poisoning (70 cases 31.8%), hanging (30 cases 13.6%), Railway injury (20 cases 9.1%) and drowning (8 cases 3.64%).

In males the common method of committing suicide was poisoning (54 cases 24.55%) followed by burning (39 cases 17.7%), hanging (19 cases 8.64%), railway accident (19 cases 8.64%) and drowning (6 cases 2.73%). And in females burning was the common method of suicide (53 cases 24.1%) followed by poisoning (16 cases 7.27%), hanging (11 cases 5%), drowning (2 cases 0.9%) and railway injury (1 case 0.45%).

During the study period we did not encounter with a single case of other method of suicide like stabbing, cut throat, fire arm injury, fall from height etc.

DISCUSSION

Determination of whether death was the result of suicide or homicide is extremely important in the initial phase of investigation. Usually the decision is based on an evaluation of the injuries that resulted in the death and other factors about deceased’s mental and emotional state prior to death. The main objective of the present study is to see the different methods of suicide in males and females and risk age group for the same in this locality and to compare the data with that of national and international studies.

Out of 659 post mortem examinations conducted between 1st January 2015 to 31st December 2015 in District Hospital, Kalaburagi, 220 are the alleged cases of suicide. Incidence of suicide is 33.38%. Subedi et al found incidence of suicide 36.2%, Sharma B R et al 38.55%, Santosh et al 44.04% Dhattarwal et al 46.9%. However in a study by Singh P et al incidence of suicide was noted to be 10% of all autopsies which is in contrast with the present study.

Highest number of suicidal deaths were seen in the age group of 21 to 30 (77 cases 35%) followed by 31 to 40 years (59 cases 26.82%). This is the most active and productive age group. These findings are consistent with the findings of Chavan KD et al, Rajesh S et al, Dhattarwal et al, Singh et al, Behera et al.

In the present study we noticed that rate of suicide is more in males than females (137 cases 62.3%) of males and 83 (37.7%) females. Similar observations were made by Rajesh S et al, Shinde et al, Chavan KD et al, Santosh et al. However a study by Hawtoon states that the suicide rates of most countries are higher among males than females except China where suicide rates are higher in females. A study by Kadu and Asawa most of the suicides are seen females ( 58.23%) than males (42.77%). Mohanty et al in their study observed that there is no significant difference in the rates of suicide in males and females.

We observed that most common method for committing suicide is by burning (92 cases 42%). Similar observations were made by Kadu et al (43.67%). However Kumar et al, Sharma et al, Dhattarwal et al observed poisoning as most preferred method for committing suicide. Rajesh et al state that hanging is the common method of committing suicide.

In our study most of the suicidal deaths were seen in married individuals. This finding is similar to the observations made by Rajesh et al, Shinde et al, Kadu et al.

Table No 1: Suicidal cases in relation to age and method employed

<table>
<thead>
<tr>
<th>AGE</th>
<th>POISONING</th>
<th>BURNS</th>
<th>HANGING</th>
<th>DROWNING</th>
<th>RAILWAY</th>
<th>TOTAL</th>
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<td></td>
<td>TOTAL CASES</td>
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<td>8</td>
<td>3.64</td>
<td>4</td>
<td>1.82</td>
</tr>
<tr>
<td>Total</td>
<td>70</td>
<td>31.8</td>
<td>92</td>
<td>41.8</td>
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### Table 2: Suicidal deaths in male

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<th>DROWNING</th>
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<td>% in male suicides</td>
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<td>5</td>
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<td>Total</td>
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### Table 3: Suicidal deaths in female

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<th>DROWNING</th>
<th>RAILWAY ACCIDENT</th>
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<td>% in female suicides</td>
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<td>% in female suicides</td>
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<td>19.28</td>
<td>53</td>
<td>24.09</td>
<td>63.86</td>
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CONCLUSION

1. Incidence rate of suicide is 33.38% in this region.
2. Suicidal deaths are common in younger age group.
3. Males outnumbered females in suicide
4. Burning is the common method of committing suicide. However in males poisoning is most preferred method.

Ethical Clearance – Taken
Source of Funding – Self
Conflict of Interest - Nil

REFERENCES

A Prospective Study of Fracture of Hyoid Bone in Hanging Cases

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ABSTRACT

Hanging is one of the most common method of suicide in India. Whenever we get a case of hanging for medico-legal autopsy the investigating authority including judiciary expect a positive note about the fracture of hyoid bone from us. Lot of studies have been done to get the exact incidence of the fracture as the current picture varies from nil to as high as 70%. Most of the previous studies are retrospective (based on the autopsy report) in nature and all of them suggest for prospective one. Keeping above things in mind the current study has been done in a prospective manner at Government Hospital, Davangere, Karnataka, India during the period of September 2008 to February 2010. Out of 84 cases studied during the period of eighteen months only one case showed fracture of hyoid bone.

Keywords: Hanging, hyoid bone fracture, thyroid cartilage, hemorrhage.

INTRODUCTION

A violent asphyxial death is one of the most important cause for unnatural deaths amongst which hanging is commonly encountered in day to day autopsy. Hanging cause asphyxia by compressing vital structures within the neck. But the presence of hyoid bone fracture is given much importance in diagnosing it as a case of hanging.

Among the asphyxial deaths hanging is the commonly used method of committing suicide and strangulation is the commonly used for homicidal purpose. Fractures of the throat skeleton with haemorrhages at the height of the osseous injuries are regarded as a typical vital reaction after neck compression in hanging or strangulation but can also occur as a result of intubation or falls.

Lot of studies in this regard have been done so far but a prospective study with fracture associated haemorrhage are negligible. Hence the study was undertaken to focus on the fracture of hyoid bone in relation with hanging cases in a prospective manner.

AIMS AND OBJECTIVES

1. To study the pattern of hanging cases, with regard to age and sex.

2. To get the incidence of hyoid bone fracture in hanging cases.

MATERIALS AND METHOD

All the cases of fatal neck compression autopsied during the period of September 2008 to February 2010 at Government Hospital, Davangere, and Karnataka, India were included in the study. The findings of the cases were entered in the proforma and analysed meticulously. Bloodless dissection technique was employed for neck in all the cases after opening the three body cavities. The throat skeleton was removed from the neck after palpating there in situ and dissected individually to look for the fracture of hyoid bone and its pattern.
The fractures were considered as ante mortem if it is associated with haemorrhage macroscopically. All the cases of fatal neck compression were included except the decomposed bodies.

**OBSERVATIONS AND DISCUSSION**

During the study period we got total of 84 cases of hanging, out of which 37 (44.04%) were male and 47 (55.96%) were female (Table 1) with female sex preponderance. This frequency is consistent with only one study by Naik SKK et al ³ and most of the other studies state male preponderance. As the majority of our study population were agriculturist by occupation males had chosen poisoning as a common method of suicide because of easy availability of poison.

The youngest victim in this study was 11 year old female and the eldest was 78 year male. Majority of the cases, 33 (39.28%) out of 84 fall in to the age group 21 to 30, followed by 11 to 20years 20 (23.80%), 31 to 40 years 19 (22.62%)& 41 to 50 years 8 (9.52%) cases. Sixth and eight decade had only one case (1.19%) each and two cases (2.38%) in seventh decade (Table 1). These results are similar with the study conducted by Meel BL ³, Saini OP et al⁵, Sharma BR et al⁶.

Complete hanging accounts for only 25 (29.76%) cases, rest of the 59 (70.24%) cases were partial hanging (Table 2) in the present study. Similar findings were observed by Uzun I et al⁷. The reason for the predominant partial hanging is low socioeconomic status leads to low ceiling house.

Out of 84 cases studied only one case (1.19%) showed fracture of right greater horn of hyoid bone (Fig-1 & Table 3) with adjacent bleeding. The fracture of neck structure observed in only one case that too it was a triple fracture. That is fracture of one side greater horn of hyoid bone and superior horns of the thyroid cartilage (Fig-2).

The fracture results (1.19%) of our study is consistent (1.19%) with study by Elfawal MA et al⁸, Pollanen MS et al⁹, Feigin G¹⁰, Subrahmanyam B.V¹¹, Mohanty MK et al¹², Naik SKK et al³, Saini OP et al⁵, Narayan AK.¹³ Studies mentions neck structure fractures ranging from 0 to 75% but the present study reports lower fracture rate of 1.19%. The reason for this kind of high incidence in the literature may be inadequate knowledge about throat skeleton, improper dissection technique, retrospective studies by various autopsy surgeons, prolonged suspension leads to postmortem fracture, and lack of uniformity in interpreting the fracture. Thus retrospective studies in this respect are not at all reliable.

Superior horns of the thyroid cartilage are more vulnerable than the hyoid bone as it underlies the ligature material most of the time. At the same time postmortem fracture, artifact and the presence of small cartilage named ‘triticea’ between the hyoid bone and thyroid cartilage in the thyrohyoid membrane should not be forgotten. Studies by Betz P et al², NikolicSet al¹⁴, Uzun I et al⁷, Suarez-Penaranda JM et al¹⁵ have reported high incidence of throat skeleton fractures.

In respect to the fracture of the throat skeleton the following studies stress the need of haemorrhage at the site of fracture Moar JJ¹⁶, Betz P et al², Sauko P et al¹⁷. Studies by Di Maio DJ¹⁸, Sauko P¹⁷ mention that even detection of blood by microscopy alone is insufficient to say it as antemortem fracture.

**CONCLUSION**

Our study confirms the view of few recent and old prospective studies as the fracture of hyoid bone is rare. Retrospective studies in this regard are not advisable as we cannot interpret the fracture and can only go through the records.

The incidence of fracture of hyoid bone observed in (1 case out of 84 hanging cases) this study suggest that the fracture of hyoid bone may be present in hanging cases and it is not a necessary a feature of death due to hanging. If they are fractured, it should be mentioned. The fracture itself is not a life threatening one; it indicates the amount of constricting force inflicted to the neck. But this is highly misunderstood by the investigating authority that the fracture of hyoid bone is must in hanging.
Fig-1: Inward compression fracture of right greater horn of hyoid bone with hemorrhage

Fig-2: Fracture of right superior horn of thyroid cartilage with hemorrhage

Table 1: Age and sex wise distribution of cases:

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Age group</th>
<th>11to20</th>
<th>21to30</th>
<th>31to40</th>
<th>41to50</th>
<th>51to60</th>
<th>61to70</th>
<th>71to80</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>4</td>
<td>9</td>
<td>14</td>
<td>6</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>16</td>
<td>24</td>
<td>5</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>33</td>
<td>19</td>
<td>8</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Type of hanging

<table>
<thead>
<tr>
<th>Type of suspension</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete</td>
<td>25</td>
<td>29.76%</td>
</tr>
<tr>
<td>Partial</td>
<td>59</td>
<td>70.24%</td>
</tr>
<tr>
<td>Total</td>
<td>84</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 3: Fracture incidence

<table>
<thead>
<tr>
<th>Neck structure</th>
<th>Number of fracture</th>
<th>Total Number of cases</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyoid bone</td>
<td>1</td>
<td>84</td>
<td>1.19%</td>
</tr>
<tr>
<td>Thyroid cartilage</td>
<td>1</td>
<td>84</td>
<td>1.19%</td>
</tr>
<tr>
<td>Cricod cartilage</td>
<td>0</td>
<td>84</td>
<td>0%</td>
</tr>
<tr>
<td>Cervical spine</td>
<td>0</td>
<td>84</td>
<td>0%</td>
</tr>
</tbody>
</table>

Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: Obtained and submitted as M.D Dissertation to RGUHS, Karnataka, India.

REFERENCES


Organo-phosphorous Poisoning Cases in Different Persons in Different Circumstances

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2Associate Professor, Department of Forensic Medicine, Deccan College of Medical Sciences, Hyderabad, Telangana, India

ABSTRACT

Organo-phosphorus insecticides are one of the most predominant insecticides used today and is a major clinical and public health problem across much of rural Asia for self poisoning. In the present study the circumstances leading to poisoning and the survival period of the victims have been discussed. It is observed from the present study that more cases are seen on Monday and Thursday followed by the weekend days Friday, Saturday and Sunday and least is seen on Tuesday and Wednesday. Home is the ideal place to consume poison preferred by many victims.

Keywords: Organo-phosphorous, poisoning.

INTRODUCTION

Organo-phosphorus self-poisoning is a major clinical and public health problem across much of rural Asia. Of the estimated 500,000 deaths from self-harm in the region each year, about 60% are due to pesticide poisoning. Many studies estimate that Organo-phosphorus pesticides are responsible for around two-thirds of these deaths—a total of 200,000 a year. Deaths from unintentional Organo-phosphorus poisoning are less common than those from intentional poisoning and seem to be more common in regions where highly toxic Organo-phosphorus pesticides (WHO Class I toxicity) are available.

Although extensive data is available regarding the pattern of OP poisoning in India, there is only little information regarding the victim profiles and the factors which influence mortality in Southern India. The present study aims to analyze the trends of Organo-phosphorus poisoning in this region and also to reveals the circumstances that leads to poisoning.

Liao Z.G et al (1998) reveals that of the 248 cases of poisoning autopsied at the Institute of Legal Medicine of Lausanne, China poisoning cases was predominant in men (71%) and more frequent in the age group of 20 to 39 years and more number of deaths resulted from consumption of Organo-phosphorus compound having rural background. Among the death in urban community, Polyintoxication (25%) (Eg. Herion and methadone or opiates with benzodiazepines) accounted more which was due to narcotic over dosage and the manner of death being suicidal, followed by accidental and 6 cases (3.36%) were homicidal, the route of administration was intravenous rote (54.4%) followed by oral consumption (25.8%) and nasal inhalation (5.7%) amongst the victims of polyintoxication.

As per the retrospective study observed by Vine Vasawi and Patil V.D., (1998) at District Hospital and KLE Society Hospital, Belgaum from 1993 to 1997, showed that of the 136 cases of Childhood poisoning, age group of 10-15 years (7.33%) comprised all poisoning cases and 0-12 years accounted for (1.5%) with a mean age of (8.1 years) and boys outnumbered the girls by a ratio of 1.3 (78/58) with highest mortality amongst 11-15 years of age group, the reasons being having a bet with siblings, loosing money, scolding from parents. Accidental poisoning was common in the young children (0-5 years and 6-10 years) and deliberate self-poisoning was noticed in the older age group (11-15 years). The most frequently encountered poison
was of organophosphorus compound 37 cases (27.21%) followed by kerosene and other petroleum products 26 cases (19.12%) and the drugs like anti hypertensives, anticonvulsants (16.17%) that were of accidental in nature.²

Retrospective study by Rahul Jain et al (2001) showed that incidence of poisoning was more among males (69%) and married individuals (56%), Suicide (66%) was the commonest mode of poisoning amongst the age group of 21 to 30 years as farming being the main occupation followed by accidental (33.75%) in 1 to 10 years and homicidal (0.25%). Of the number of deaths, rural community predominated more (38%) followed by students (29%) and low socio-economic group (60.75%) with exposure to poison at their residence (52%) followed by in fields (28%). Maximum number of fatalities were due to Organo-phosphorus and carbamate (62.2%) followed by ethyl alcohol (24.4%) and the route of administration was through oral route (78.75%) followed by parental route (21.25%) due to snake bite accounting for (91.76%) followed by scorpion bite (08.24%). Among the victims (71.5%) were admitted within 06 hours of exposure to poison. The rate of detection of poison by chemical analysis varied from (50% to 88.9%) with Nuvan poisoning being highest (88.9%) followed by Roger (75%) carbamate (71.5%) ethyl alcohol (66.7%) and malathion (50%).³

A retrospective study conducted by Anil Kohli and Banerjee (2003) on fatal unintentional poisoning cases during the year 1997-2001 at UCMS and GTBH, Delhi, reveal that out of the total 433 fatalities cases 229 cases were of suicidal in nature and 58 cases (13.4%) were due to accidental causes with slight preponderance amongst urban community as compared to rural community, more in the age group between 13-24 years, in both males and females. In 29.4% cases the specific poison could not be ascertained. Among the accidental poisoning ethyl alcohol (20.7%) predominated more. the most preferred poison for suicidal purpose was aluminum phospide (15.6%), Organo-phosphorus (10.3%), carbamates (3.4%). The intake of poison was maximum in the night time (between 8pm to 6am) and least in afternoon time, among the sex distribution maximum number of males consumed poison at night times (42.5%) and females consumed during evening and morning time (38.9%).⁴

On the scenario of poisoning in rural India Sharma S.K. reveals that increased consumption of pesticide poison in various states of India, indicating a sharp rise in the number of poisoning cases due to consumption of aluminum phosphide. The facilities of analytical toxicology in most states was scarce with a delay in issuing the chemical analysis report were observed and clinicians handling poisoning cases feared legal scrutiny leading to maximum number of casualties among poisoning cases.⁵

A comparative study on common poisoning in India by Praveen Aggarwal and Rohini (1998) showed that more incidence of death was due to poisoning with a changing pattern when compared with different states. In North India poisoning due to Aluminum phosphide followed by Organo-phosphorus was more followed by barbiturates and copper sulphates whereas in South India Organo-phosphorus accounted more. Among children accidental kerosene poisoning continues to be the commonest cause. Incidence of poisoning was; more among the low socio-economic group compared to upper socio-economic. He said that if general knowledge of the pattern of poisoning in a particular region is well known it may help in early diagnosis and treatment resulting in reduction of morbidity and mortality due to poisoning.⁶

According to WHO report, 2,20,000 death occurs annually and this figure could be just the tip of the iceberg since most cases of poisoning actually go unreported, especially in the third world countries, and more than 90% of fatal poisoning occurs in developing countries. As per the rough estimate, more than 50,000 people die, that is about 5 to 6 persons per lakh of population die due to poisoning every year in India. The exact incidence of poisoning in India is uncertain due to the lack of data at the central level and mortality data are a poor indicator of incidence of poisoning. The pattern of poisoning in a region depends on variety of factors, such as availability of poisons, socio-economic status of the population, religious and cultural influences and availability of drugs. The commonest types of poisoning in India are insecticides and pesticides, the reason being agriculture based economics, poverty and easy availability of highly toxic pesticides. Among children, the manner of death was accidental while in adults it was mainly suicidal, as revealed by Pillai V.V. (2004).⁷

In poisoning cases opinion expressed by the experts differ from center to center and at times it may also
differ in the same center due to subjectivity. There are about 70,000 chemicals and pharmaceutical substances, which can act as poisons and may not be tested by the laboratory with the introduction of new substances adding to the turmoil for which our system are not yet well equipped to deal with. He suggests the technique of collecting the suitable samples for analysis and interpretation of diagnosis in the light of the history, clinical features and autopsy findings so as to expect best results from toxicological laboratories. The causes for negative autopsy may be due to inadequate history taking, inadequate external and internal examination, insufficient sampling and laboratory examination, inexperience and lack of training of the doctor-conducting postmortem. A “negative screening” does not necessarily mean that a toxin is not present; it implies that none on the list of those that were screened has been found. The samples that were not properly preserved and sent for analysis after a lapse of time, showed every possibility of postmortem production of ethyl alcohol, cyanide etc which gave false positive results so care has to be taken before finalizing such reports, as mentioned by murthy OP (2003). Naik R.S. et al (1999) stressed upon the need for the poison information centres or clinical toxicological laboratories, which are lacking in most countries which can provide immediate information on the diagnosis, management, antidotes, investigations required and laboratory services for the analysis of the toxicants or poisons in cases of acute poisoning.

MATERIALS AND METHOD

The present study has been carried out in the Department of Forensic Medicine, Gandhi Medical College/Hospital, Secunderabad. All the cases brought to the department for medico legal autopsy with history of Organo-phosphorus poisoning and cases that were diagnosed as Organo-phosphorus poisoning after post mortem examination were selected. Permission of the ethical committee on the use of human material for research purpose was obtained.

Detailed information of the deceased pertaining to the case was collected form the concerned police and relatives of the deceased by a questionnaire, post mortem findings were analyzed with the chemical analysis reports.

Information was acquired by perusal of hospital records. In cases of allegations, information was supplemented by either visit to the scene of crime or from the photographs of the scene of crime.

The routine viscera and body fluids that were sent to Forensic Science Laboratory for Chemical analysis were:

1. Entire stomach with its Contents. 2. The upper part of Small Intestine (about 30 cm length). 3. Liver not less than 500 grams. 4. One Kidney or half of each kidney. 5. Blood 10-30 ml.

The preservatives used for: Viscera-saturated solution of Sodium Chloride Blood-10mg/ml of Sodium of Potassium fluoride and 3mg of Potassium oxalate.

INCLUSION CRITERIA:

1. All cases with the alleged history of Organo-phosphorus poisoning. 2. Cases diagnosed as poisoning after complete Post Mortem examination. 3. Perusal of chemical analysis reports.

It is observed from the table.1 that more cases were seen on Monday and Thursday (20% each) followed by the weekend days Friday, Saturday and Sunday (15%) and least is seen on Tuesday and Wednesday (7% each).

<table>
<thead>
<tr>
<th>TABLE 1. DAY OF CONSUMPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day of consumption</td>
</tr>
<tr>
<td>Monday</td>
</tr>
<tr>
<td>Tuesday</td>
</tr>
<tr>
<td>Wednesday</td>
</tr>
<tr>
<td>Thursday</td>
</tr>
<tr>
<td>Friday</td>
</tr>
<tr>
<td>Saturday</td>
</tr>
<tr>
<td>Sunday</td>
</tr>
<tr>
<td>Unknown</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Table.1. Distribution of the study population according to the day of consumption:

The consumption of poison is maximum at Night (8pm-6am) hours (27%) followed by afternoon (noon-4pm) time (26%) and morning (6am-noon) hours (22%). The least were seen at evening (4pm-8pm) hours (21%). In 4% of the cases the hour of consumption of poison could not be ascertained, as it seen in table.2.
Table 2. Time of Consumption

<table>
<thead>
<tr>
<th>Time</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morning (6 am to noon)</td>
<td>22</td>
<td>22.00</td>
</tr>
<tr>
<td>Afternoon (noon to 4 pm)</td>
<td>26</td>
<td>26.00</td>
</tr>
<tr>
<td>Evening (4 pm to 8 pm)</td>
<td>21</td>
<td>21.00</td>
</tr>
<tr>
<td>Night (8 pm to 6 am)</td>
<td>27</td>
<td>27.00</td>
</tr>
<tr>
<td>Unascertained</td>
<td>4</td>
<td>4.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

Table 2. Distribution of the study population according to the time of consumption:

Table 3. Place of Consumption

<table>
<thead>
<tr>
<th>Place of consumption</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home</td>
<td>64</td>
<td>64.00</td>
</tr>
<tr>
<td>Work place</td>
<td>27</td>
<td>27.00</td>
</tr>
<tr>
<td>Remote area</td>
<td>5</td>
<td>5.00</td>
</tr>
<tr>
<td>Other places</td>
<td>4</td>
<td>4.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

Table 3. Distribution of the study population according to the place of consumption:

11% of the victims survived only for 12-24 hours, 22% of the victims for 0-6 hours, 34% for 1-3 days, and 13% for 4-7 days and the least in 5% of the victims, who survived for more than 7 days, of which the highest period of survival is 18 days by a 30 year old male, as mentioned in table 4.

Table 4. Period of Survival

<table>
<thead>
<tr>
<th>Period of Survival</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 6 hours</td>
<td>22</td>
<td>22.00</td>
</tr>
<tr>
<td>6 – 12 hours</td>
<td>8</td>
<td>8.00</td>
</tr>
<tr>
<td>12 – 24 hours</td>
<td>11</td>
<td>11.00</td>
</tr>
<tr>
<td>1 – 3 days</td>
<td>34</td>
<td>34.00</td>
</tr>
<tr>
<td>4 – 7 days</td>
<td>13</td>
<td>13.00</td>
</tr>
</tbody>
</table>

Table 4. Distribution of the study population according to Survival period:

Organophosphates continue to be the most commonly used agrochemicals in southern and western part of the country because of its easy availability and low cost as mentioned by Kumar TS et al (2006) however, the pattern of poisoning observed in the western studies revealed, prescription related drugs to be the most preferred poison, as reveals by Lawson AA and Mitchell (1972) and Wynee H et al (1987).

As medical men, it is our duty to prevent this rise of morbidity and mortality due to poisoning cases. The present study was undertaken to study the organophosphorous poisoning so as to reduce the morbidity and mortality.

Distribution of the study population according to the Day of consumption.

In this study it is observed that more cases were seen on Monday and Thursday (20% each) followed by the weekend days Friday, Saturday and Sunday (15%) and least is seen on Tuesday and Wednesday (7% each).

From the study it is observed that majority of the victims were daily wagers. On Saturday and Sunday, they are without work and money and also being a holiday gave them ample time to think of their future, which they concluded as very bleak and fruitless and this might have immersed them in the thoughts of putting an end to this long suffering misery.

Distribution of the study population according to the Time of consumption.

The consumption of poison is maximum at Night (8pm-6am) hours (27%) followed by Afternoon (noon-4pm) time (26%) and Morning (6am-noon) hours (22%). The least were seen at evening (4pm-8pm) hours (21%). In 4% of the cases the hour of consumption of poison could not be ascertained.

The reasons are due to the toxic nature of the poison consumed, individual’s response to the poison taken, shortcomings in treatment, and pre-existing diseases among the victims.
It is in disagreement with the studies of Anil Kohli.

Distribution of the study population according to the place of consumption.

In this study, home is the ideal place preferred by many victims to consume poison and the least is observed at work place. The rest of the preferred places were other places (5%) and remote areas (4%).

It is in contrast with the studies of Rahul Jain.

Most of the poisoning cases took place in the victims own home. High incidence at home can be attributed to the preference of the victims for a confined home environment.

Distribution of the study population according to Survival period

11% of the victims survived only for 12-24 hours, 22% of the victims for 0-6 hours, 34% for 1-3 days, 13% for 4-7 days and the least in 5% of the victims, who survived for more than 7 days.

It is in disagreement with the studies of Anil Kohli and Benerjee (2003).

The reasons are due to the toxic nature of the poison consumed, individual response to the poison taken, shortcomings in treatment, and pre-existing diseases among the victims.

Source of Funding: Self
Conflict of Interest: Nil

REFERENCES

Recent Trends in Asphyxial Deaths in Central Maharashtra: A Four Year Retrospective Study

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1Assistant Professor, 2Professor and Head, 3Junior Resident, Department of Forensic Medicine and Toxicology, GMCH, Aurangabad, Maharashtra, India

ABSTRACT

Asphyxia is best described as an interference with respiration due to any cause – Mechanical, Environmental, or Toxic. Violent deaths resulting chiefly from asphyxia includes death due to hanging, strangulation, suffocation and drowning. The purpose of this study was to analyze recent trends related to asphyxial deaths in the Aurangabad region of central Maharashtra and to compare them with other studies. In the present study, 9910 medicolegal autopsies conducted at Government Medical College and Hospital, Aurangabad, Maharashtra, India were analysed retrospectively from October 2016 to October 2012; in that in total 802 (8.10%) were asphyxial deaths with males (76.30%) were more commonly affected than females. Highest number of deceased belonged to age group of 21 to 30 years. Hanging was most common type of asphyxial death with 69.5 % of cases, followed by Drowning with 24.2 % of cases. This analysis will provide a better understanding of epidemiology and burden of violent asphyxial deaths in society and will help to formulate comprehensive programmes and strategies to prevent same.

Keywords: Asphyxial Deaths, Hanging, Drowning, Central Maharashtra, Aurangabad region, recent trends.

INTRODUCTION

Asphyxia is best described as an interference with respiration due to any cause – Mechanical, Environmental, or Toxic. Violent deaths resulting chiefly from asphyxia includes death due to hanging, strangulation, suffocation and drowning.1

Hanging is form of asphyxia caused by suspension of body by a ligature which encircles neck, the constricting force being weight of the body; while Strangulation is constriction of neck without suspending body and Drowning is form of asphyxia due to aspiration of fluid into air passages. Violent asphyxial deaths have contributed considerably to unnatural homicidal, suicidal and accidental deaths.2

It is essential to diagnose and differentiate between different asphyxial deaths, especially between hanging and strangulation by ligature. In addition to the cause of death, the careful examination can also help the investigator to arrive at a conclusion about manner of death.3

Due to population explosion, poverty and increasing stress and strain in our daily life, we frequently come across cases of suicides, homicides and accidents. Males and females are both exposed to such stresses but it seem that ours being a male dominated society, they have more exposure to external environment, so such cases are commonly seen in males.4 Males predominate both in hanging and drowning as these are not as commonly opted method of suicide by females as compared to poison intake and burning.5

The purpose of this study was to analyze recent trends related to asphyxial deaths in the Aurangabad region of central Maharashtra and to compare them with other studies.
MATERIAL AND METHOD

In the present study, the medicolegal autopsies conducted at Government Medical College and Hospital, Aurangabad were analysed retrospectively from October 2012 to October 2016. Necessary information for the study was gathered from Police inquest report, hospital treatment records and discussion with the relatives, friends, and neighbors of the victims. In few cases additional information was gathered by a visit to the scene of crime or by reviewing the photographs. The cases were studied to know the incidence of asphyxial deaths with respect to age group, sex, type of asphyxial deaths.

OBSERVATIONS AND DISCUSSION

Table 1: Prevalence of asphyxial deaths in medicolegal autopsies

<table>
<thead>
<tr>
<th>Total deaths</th>
<th>9910</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asphyxial deaths</td>
<td>802</td>
<td>8.10%</td>
</tr>
</tbody>
</table>

During the study period total 9910 medicolegal autopsies were conducted at Government Medical College and Hospital, Aurangabad, in that in total 802 were asphyxial deaths i.e. 8.10%; these findings are more or less consistent with studies conducted by, Bhagora L et al\(^6\) (10.7%), Patel A et al\(^3\) (5.63%), Amandeep Singh et al\(^4\) (5.26%) but does not with Srinivasa Reddy P et al\(^7\) (19.14 %) and Azmak D\(^8\) (15.7%), this might be due to higher sample size in present study.

Table 2: Sex wise distribution of asphyxial deaths

<table>
<thead>
<tr>
<th>Sex of deceased</th>
<th>Asphyxial deaths</th>
<th>Percentage (n = 802)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>612</td>
<td>76.30%</td>
</tr>
<tr>
<td>Female</td>
<td>190</td>
<td>23.70%</td>
</tr>
<tr>
<td>Total deaths</td>
<td>802</td>
<td>100%</td>
</tr>
</tbody>
</table>

In the present study, Male to Female ratio was 3.2 indicating, males (76.30%) were more commonly affected than females (Table 2); similar male preponderance in asphyxial deaths was observed by Patel A et al\(^3\), Amandeep Singh et al\(^4\), Kulshrestha P et al\(^5\), Bhagora L et al\(^6\), Srinivasa Reddy P et al\(^7\), Azmak D\(^8\) and Zanjad N et al\(^9\) and this correlates with the observation stressed by Amandeep Singh et al\(^4\) and Kulshrestha P et al\(^5\) that male preponderance is due to ours being a male dominated society males are more exposed to stress environment and both hanging and drowning are not as commonly opted method of suicide by females as compared to poison intake and burning.

Table 3: Age wise distribution of asphyxial deaths

<table>
<thead>
<tr>
<th>Age group of deceased</th>
<th>Asphyxial deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 10 year</td>
<td>38</td>
</tr>
<tr>
<td>11 to 20 years</td>
<td>196</td>
</tr>
<tr>
<td>21 to 30 years</td>
<td>274</td>
</tr>
<tr>
<td>31 to 40 years</td>
<td>174</td>
</tr>
<tr>
<td>41 to 50 years</td>
<td>62</td>
</tr>
<tr>
<td>51 to 60 years</td>
<td>40</td>
</tr>
<tr>
<td>61 to 70 years</td>
<td>12</td>
</tr>
<tr>
<td>71 to 80 years</td>
<td>04</td>
</tr>
<tr>
<td>More than 80 years</td>
<td>02</td>
</tr>
<tr>
<td>Total deaths</td>
<td>802</td>
</tr>
</tbody>
</table>

In the present study, highest number of deceased belonged to age group of 21 to 30 years, followed by 11 to 20 years and 31 to 40 years (Table 3). These findings are consistent with studies conducted by Patel A et al\(^3\), Amandeep Singh et al\(^4\), Kulshrestha P et al\(^5\), Bhagora L et al\(^6\), Srinivasa Reddy P et al\(^7\), Azmak D\(^8\) and Zanjad N et al\(^9\) as this young adult age group is most active group of population and more exposed to external environment and stress and strain of life.

Table 4: Types of Asphyxial deaths

<table>
<thead>
<tr>
<th>Types of Asphyxial deaths</th>
<th>Total deaths</th>
<th>Percentage (n = 802)</th>
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<tbody>
<tr>
<td>Hanging</td>
<td>558</td>
<td>69.5 %</td>
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<tr>
<td>Drowning</td>
<td>194</td>
<td>24.2 %</td>
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<tr>
<td>Ligature Strangulation</td>
<td>28</td>
<td>3.5 %</td>
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<tr>
<td>Smothering</td>
<td>10</td>
<td>1.3 %</td>
</tr>
<tr>
<td>Throttling</td>
<td>04</td>
<td>0.5 %</td>
</tr>
<tr>
<td>Choking</td>
<td>05</td>
<td>0.6 %</td>
</tr>
<tr>
<td>Traumatic asphyxia</td>
<td>02</td>
<td>0.3 %</td>
</tr>
<tr>
<td>Gagging</td>
<td>01</td>
<td>0.1 %</td>
</tr>
<tr>
<td>Total asphyxial deaths</td>
<td>802</td>
<td>100 %</td>
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</tbody>
</table>

In the present study, Hanging was most common type of asphyxial death with 69.5 % of cases,
followed by Drowning with 24.2% of cases. Ligature Strangulation accounted for 3.5% of asphyxial deaths, while Smothering for 1.3%. Throttling was found in 0.5% of cases, choking in 0.6% and Gagging was present in 0.1% of cases (Table 4). Drowning was found to be commonest asphyxial death followed by hanging by study conducted by Amandeep Singh et al4 and Zanjad N et al8; while studies conducted by Patel A et al3, Kulshrestha P et al5, Bhagora L et al6, Srinivasa Reddy P et al7 and Azmak D8 showed findings consistent with present study. The difference with studies conducted by Amandeep Singh et al4 and Zanjad N et al8 might be due to geographical variation as mentioned in these studies that their study regions had nearby water sources like rivers n canals.

Table 5: Age and sex wise distribution of types of Asphyxial deaths

<table>
<thead>
<tr>
<th>Types of asphyxial deaths</th>
<th>Most common age group affected</th>
<th>Male deaths</th>
<th>Female deaths</th>
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<tr>
<td>Hanging</td>
<td>21 to 30 years</td>
<td>451 (81%)</td>
<td>107 (19%)</td>
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<tr>
<td>Drowning</td>
<td>11 to 20 years</td>
<td>138 (71%)</td>
<td>56 (29%)</td>
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<tr>
<td>Ligature Strangulation</td>
<td>21 to 30 years</td>
<td>13 (46%)</td>
<td>15 (54%)</td>
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<td>Smothering</td>
<td>0 to 10 years</td>
<td>02 (20%)</td>
<td>08 (80%)</td>
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<tr>
<td>Throttling</td>
<td>21 to 30 years</td>
<td>02 (50%)</td>
<td>02 (50%)</td>
</tr>
<tr>
<td>Choking</td>
<td>0 to 10 years</td>
<td>04 (80%)</td>
<td>01 (20%)</td>
</tr>
<tr>
<td>Traumatic asphyxia</td>
<td>31 to 40 years</td>
<td>02 (100%)</td>
<td>00 (00%)</td>
</tr>
<tr>
<td>Gagging</td>
<td>11 to 20 years</td>
<td>00 (00%)</td>
<td>01 (100%)</td>
</tr>
</tbody>
</table>

In the present study, in Hanging 21 to 30 years was most common age group affected with Male preponderance (81%), in Drowning 11 to 20 years was most common age group affected with Male preponderance (71%), in Ligature strangulation 21 to 30 years was most common age group affected with Female preponderance (54%); while in Throttling 21 to 30 years was most common age group affected with similar incidence in both males and females. In Smothering and Choking 0 to 10 years was most common age group affected with female preponderance (80%) in former type and male preponderance (80%) in later type of asphyxial death (Table 5). These findings are consistent with studies conducted by Amandeep Singh et al4, Srinivasa Reddy P et al7, Azmak D8 and Zanjad N et al8.

**SUMMARY AND CONCLUSION**

The present study can be summarized and concluded as, asphyxial deaths are presented in significant number in day to day medicolegal autopsies. Among asphyxial deaths, Hanging is most common type of asphyxial death followed by Drowning. Highest number of deceased belonged to age group of 21 to 30 years, followed by 11 to 20 years i.e. most active young adult age group of population. In asphyxial deaths males were more commonly affected than females and similar male preponderance was seen in hanging and drowning; while females are more affected in asphyxial deaths due to ligature strangulation and smothering. This analysis will provide a better understanding of epidemiology and burden of violent asphyxial deaths in society and will help to formulate comprehensive programmes and strategies to prevent same.

**Source of Funding:** None  
**Ethical Clearance:** None  
**Conflict of Interest:** Nil

**REFERENCES**


Lead Toxicity among Oral Opium Addicts with Abdominal Pain: A Case Series of 17 Cases

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ABSTRACT

Objective: Lead toxicity is a common health problem worldwide. It is usually occupational but sometime non-occupational toxicities are reported. Opium-related lead toxicity has been reported in recent years. Here we evaluated common clinical findings among oral opium addicts with proven lead toxicity.

Methods: We evaluated 17 cases of opium addict male patients (mean age of 49.82±11.52 years) with abdominal pain and anemia visiting Imam Khomeini Hospital, Ardabil, Iran during April and May 2016. Clinical manifestations, laboratory findings and treatment outcome were studied.

Results: The duration of addiction was 14.58±7.46 years. Mean lead level was 93.36±27.84 μg/dL (48.4-144 μg/dL). All patients had anemia, abdominal pain and reduced appetite. Common manifestations were irritability and sleep disturbance (76.5%), fatigue (70.6%), Constipation (64.7%), vomiting (58.8%), abdominal cramp (52.9%) and muscle weakness (29.4%). Basophilic stippling was seen in 11 out of 17 cases. All patients were treated with D-Penicillamine 250 mg three times a day and significant improvement of symptoms was observed during the first week of treatment.

Conclusion: In conclusion, Lead poisoning should be considered in patients with a history of opium abuse who present with abdominal pain and anemia. Proper treatment should be initiated for these patients.

Keywords: Lead toxicity, Opium, Addiction, Abdominal pain, Treatment.

INTRODUCTION

Lead is available in the environment widely. Lead poisoning is a medical condition caused by occupational or environmental exposure to sources of inorganic lead. The most common sources are lead-containing paint, water, leaded pipes from public water supply, Asian herbal remedies, lead-glazed ceramics, and lead shot game.

Opium addiction is one of the most prevalent forms of addiction in Iran. It has been shown that adulteration of lead in opioids could result in severe lead toxicities. There are various case reports and case series regarding lead poisoning due to opium use.

Lead is toxic to multiple organ systems and can have a variety of presentations including abdominal pain, constipation, irritability, and anemia. Fatigue, myalgia, arthralgia, renal failure, and neurologic deficits may also be seen.

Lead exposure occurs mainly through the respiratory and gastrointestinal systems. It is reported that lead is available in opioids used in Iran. It is still unknown whether it is added to it during the process of opium preparation or it is added to increase the opium weight during opium trading. Most reports regarding
opium related lead toxicity were before 2010. There was a rise in the cases of acute persistent abdominal pain among oral opioid users in our region. We hypothesized possible lead toxicity and here we report a case series of opioid related lead toxicity.

**MATERIAL AND METHOD**

In this case study, we evaluated all oral opioid users presenting with acute and persistent abdominal pain visiting Imam Khomeini Hospital, Ardabil, Iran during April and May 2016. Patients who had noted GI pathologies as a cause of abdominal pain, and patients who were occupationally placed at the setting of increased lead level were excluded. We also included only those cases with admitted oral opioid use. The protocol of study was approved by the Ethics Committee of Ardabil University of Medical Sciences. Authors adhered to Helsinki declarations during the study period.

Demographic data, duration of opioid use, lead toxicity manifestations or symptoms including constitutional, gastrointestinal and musculoskeletal as well as laboratory findings were recorded. Results were reported using descriptive analysis.

**FINDINGS**

Here we report 17 cases of lead toxicity presented with abdominal pain. All cases were male and oral opium addict. Eight patients were first evaluated by surgeons and gastroenterologist for acute abdominal pain causes and even 3 cases had undergone laparatomy with normal findings. The duration of addiction was 14.58±7.46 years. Patients’ laboratory and clinical presentation findings are shown in table 1. Their mean age was 49.82±11.52 years. Mean lead level was 93.36±27.84 μg/dL with the minimum and highest level of 48.4 and 144 μg/dL. All patients had anemia, abdominal pain and reduced appetite. Common manifestations were irritability and sleep disturbance (76.5%), fatigue (70.6%), Constipation (64.7%), vomiting (58.8%), abdominal cramp (52.9%) and muscle weakness (29.4%). Other manifestations included aggressiveness and headache each in 17.8% and HTN crisis, numbness and memory loss in 11.8%. Peripheral blood smear were evaluated for all patients and basophilic stippling was reported in 11 out of 17 cases.

With the presumption of lead toxicity as the possible cause of abdominal pain in these patients, all were treated with d-Penicillamine 250 mg three times a day and during the first three days of treatment the symptoms were improved and after 1 week patients were free of pain. Patients continued treatment for 14 days. Patients were advised to either quit their habit or change the source of opium supply.

**DISCUSSION**

In recent years occupational lead poisoning as the main cause of lead toxicity has decreased, but new non-occupational causes have emerged. In Iran opioids adverse effects is a major concern in recent decades. Meanwhile, opium related lead toxicity has been reported in several case reports.

Lead is toxic to multiple organ systems and can have a variety of presentations. Common signs and symptoms of lead toxicity are mostly gastrointestinal-related including colicky abdominal pain (lead colic), constipation, anorexia, nausea as well as other organ related symptoms of joint pain, muscle aches, headaches, decreased libido, sleep disturbance, irritability, fatigue, anemia, nephropathy, confusion, encephalopathy, and seizures.

Opium related lead toxicity is usually present with abdominal pain and anemia. Opium addicts usually have constipation. Acute abdominal pain has a broad differential diagnosis and in addict patients presenting with abdominal pain along with main possible diagnosis, lead poisoning should be considered as another differential diagnosis.

In the last few months there was increased rate of acute and persistent abdominal pain among addicts in our region which increased the possibility of lead poisoning. We evaluated clinical and laboratory findings of 17 opium addict patients with the presentation of abdominal pain and with proven lead toxicity.

Unrecognized lead poisoning can be misdiagnosed and may lead to unnecessary gastrointestinal evaluations and even abdominal surgery. Among our cases, few patients had undergone laparatomy or other aggressive gastrointestinal evaluations, but the pain was still persistent.

The diagnosis is made with a blood lead level. However, we begun the treatment before preparation of laboratory results and due to the clinical symptoms. All
our patients had abdominal pain and anemia indicative of possible lead toxicity. Also, basophilic stippling was reported in almost half our patients. It is reported that basophilic stippling of erythrocytes may be seen on peripheral blood smear, but this is not always present.

Blood Lead levels in our patients ranged between 48.4 and 144 μg/dL (mean level of 93.36±27.84 μg/dL). A variety of symptoms were observed in our case series. Previous studies have mentioned that presentation of the symptoms is not related to the blood lead level. The appearance of clinical manifestations of lead poisoning is dependent on the acuity, age and individual variations.

Many of the toxic effects of lead are reversible if lead poisoning is identified early and exposure to the source of contamination removed. Elimination of the source of exposure should be the first step in the treatment of lead poisoning. Then, chelators are used to facilitate the excretion of lead from the body. It is reported that oral chelator therapy should be initiated in cases with blood lead levels < 40 μg/dL, cases with 40-79 μg/dL should be referred for prompt medical evaluation and in cases with blood lead levels more than 100 μg/dL parental chelator therapy should be started in the hospital. We advised all patients to stop using opioids during the treatment and they were given methadone 5 mg three times a day to prevent withdrawal effects. All patients received d-Penicillamine three times a day and all symptoms were improved following the treatment. The results of blood lead levels were came during the treatment and due to the observed response to treatment, it was not changed.

**CONCLUSION**

In conclusion, lead poisoning should be considered in any adult with a history of opium abuse who present with abdominal pain or altered mental status and anemia.

**Declaration of Interest:** The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

**Source of Funding:** Ardabil University of Medical Sciences

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<th>Constipation</th>
<th>Reduced appetite</th>
<th>Vomiting</th>
<th>Headache</th>
<th>HTN crisis</th>
<th>Irritability</th>
<th>Muscle weakness</th>
<th>Memory loss</th>
<th>Basophilic stippling</th>
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REFERENCES


A Socio-demographic Study of Sexual Assault Survivors in a Tertiary Hospital in Bangalore

Daniel Manoj¹, Marilyn Delighta¹, PS Varghese², Asma Kausar³, Shashikanth Naik CR⁴
¹Post Graduate, ²Professor and Head of Department, ³Associate Professor, ⁴Assistant Professor, Forensic Medicine, St. John’s Medical College, Bangalore

ABSTRACT

In India, rape is as much a social problem as it’s criminal. There is deeply entrenched patriarchy and widespread misogyny in the vast expanses of our country. Women continue to face horrendous acts of violence. This study aims to provide awareness to the extent of sexual violence in Bangalore.

The most vulnerable group of sexual violence survivors are those aged between 16 and 20 years. They are predominantly from a poor socioeconomic background. Astonishingly, more than 80% of the assaults involve individuals known to the survivor. Many crimes against women are not reported to the police due to the social stigma attached to rape and molestation. A myriad of measures need to be adopted by the government to tackle violent crimes against women.

Keywords: Survivors, Victim-assailant relationship, Place of incident, Socio-demographic study.

INTRODUCTION

There has been a lifelong neglect of women in India. Rape is still a subject shrouded in shame and stigma in our country, whose moral compass is dictated by deep rooted patriarchy. This means women who have suffered sexual assault still hesitate to report it to the authorities for fear of retaliation or social ostracism¹. But the barbaric gang rape and murder of a young woman on a Delhi bus in December 2012, has seemed to snap India out of denial about its rampant, endemic sexual violence problem².

Rape is the fourth most common crime against women in India³. According to recent figures released by the National Crime Records Bureau (NCRB), 92 women are raped on average every day in India. The total number of rape cases reported in India has gone up to 33,707 in 2013 from 24,923 in 2012⁴. This sudden surge in rape cases does not necessarily mean that the actual numbers of rapes have gone up drastically, it just means more cases are being reported and highlighted.

In 2013, 15,556 rape survivors were aged between 18 and 30 years. The data also revealed that 13,304 cases were minors. This study also unveiled a disturbing trend that in the majority of cases, i.e., in 94% of the reported incidents, the assailant was known to the victim⁵. These offenders included parents and relatives in 9% of the cases, neighbours in 34% of the cases and other known persons in 57% of such cases reported over the year.

In this study, we use the term “survivor” as it recognises that the person is capable of comprehending the situation and making decisions despite being traumatised by the assault⁶. Use of this term by all those providing services encourages them to believe the person and not pity her. It is now vital that we scrutinise the incidence of these acts of violence against women and children, in order to establish means of prevention and rehabilitation.

AIMS AND OBJECTIVES

The aim of this study is to analyse factors such as age of the survivor, relationship between the survivor and the assailant, place of incident, socioeconomic status of the survivor, and the number of assailants, as to ascertain the epidemiology of sexual violence around St. John’s Medical College and Hospital, a tertiary care centre in Bangalore.

MATERIALS AND METHOD

This retrospective study is conducted on sexual
assault survivors referred to the Department of Forensic from police stations within its jurisdiction and neighbouring districts. This study spans over a period of 2 years, i.e., between 1st January 2014 to 31st December 2015. Survivors from both urban and rural settings have been examined. Survivors who refused medical examination have not been included in this study.

**OBSERVATIONS AND RESULTS**

A total of 95 cases were examined during the study period, of which 94 cases were females and 1 case was male.

![Fig. 1. Age wise distribution of sexual assault survivors](image1)

![Fig. 2. Relationship between the assailants and the sexual assault survivors](image2)

![Fig. 3. Place of occurrence of the sexual assault](image3)

<table>
<thead>
<tr>
<th>Table 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AGE GROUP (in years)</strong></td>
</tr>
<tr>
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</tr>
<tr>
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</tr>
<tr>
<td>Multiple</td>
</tr>
<tr>
<td><strong>Socio Economic Status</strong></td>
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<tr>
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<tr>
<td>Middle</td>
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<td>Rich</td>
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<td>Intimate</td>
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<tr>
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<td>People from work / school</td>
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<td>Acquaintance</td>
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<td>Stranger</td>
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As observed in Fig. 1, nearly half of survivors were those aged between 11 and 20 years, constituting of 44.2% of the reported cases. Those between the ages of 0 and 10 years constituted of 32.62% of the cases, while those between 21 and 30 years of age constituted of 23.15% of the cases. None of the survivors examined during this period were older than 30 years of age.

More than half of the survivors were from a low socioeconomic background, consisting of 53.68% of the reported cases. Those from a middle class socioeconomic background were observed in 44.21% of the cases. Survivors from a rich socioeconomic background were only observed in 2.1% of the cases.

It is evident from Fig. 2 that an overwhelming number of assailants were known to the survivors prior to the assault, constituting 82.11% of the cases. For the purpose of this study, we have divided the relationship between the survivor and assailant into six categories: Relatives which includes parents and other family members; Intimate which includes husbands, boyfriends, etc; Friends which includes friends and neighbours; People from workplace/school which consists of colleagues, superiors, teachers, school help, etc; Acquaintances and Strangers. 32.63% of the reported assaults involve the Intimate category. Only 17.89% of the cases involved Strangers.

Taking Fig. 3 into consideration, we have also divided the place of incident into six categories. Namely, Victim’s residence, Assailant’s residence, other Private places, Public places, Workplace/school and Vehicle. Most of the assaults were perpetrated at the victim’s residence, involving 31.57% of the cases recorded.

The highest numbers of assaults were observed during the months of July and September, with 13.68% of the cases each. While the lowest number of assaults were reported during the months of January and August, with 3.15% of the cases each. In 13.68% of the reported cases, there was more than one assailant involved.

DISCUSSION

After much deliberation, we could conclude there are multiple factors common in each case of sexual violence. We have compared our findings with previous studies done by like-minded peers, namely Aditya MB et al⁷, Tamuli RP et al⁸, Chowdhury UB et al⁹, Bhowmick K et al⁹, Memchoubi P et al¹¹, Sukul B et al¹² and the existing National Crime Records Bureau data⁴.

We have observed that most of these heinous acts of violence are concentrated during the months of July and September. This finding is quite similar to those observed by Aditya et al⁷, Tamuli RP et al⁸ and Memchoubi et al¹¹. However the study done by Sukul et al¹² has established that the highest number of cases occurs during the months of April to August.

Like many of our above mentioned colleagues, we were able to conclude that the most vulnerable group of sexual assault survivors were aged between 11 and 20 years. A staggering majority of them are between 16 and 17 years of age. Almost all of the survivors in this particular age group are those who eloped from home with their significant other, only to be sexually assaulted. This grim fact indicates that this group of survivors are significantly susceptible to statutory rape¹³, owing to their lack of maturity; they are frequently the victims of deception. However the study done by Sukul¹² et al indicated that the most vulnerable age group are those between 18 and 30 years.

If we take the above into consideration, the largest number of assailants falls into the Intimate category. This is considered as “confidence rape” or rape by a
known individual. As mentioned earlier, this type of sexual assaults constitutes the majority of reported cases. Rape by strangers or “blitz rape” is not as common as one would assume. This finding also coincides with the finding in the studies done by Aditya MB et al, Tamuli RP et al, Chowdhury UB et al, Bhowmick K et al, Memchoubi P et al, Sukul B et al and the National Crime Records Bureau data.

Distressingly, the most common place of sexual violence is the victim’s residence. This is distinctly true in the case of minors. Most cases of sexual depravities committed on children by known individuals, is done by “opportunistic paedophiles.” Opportunistic paedophiles may not have a primary sexual preference for children, but may prey on minors only in an environment or circumstance which permits or encourages such acts. Most assailants who meet the criteria of a true paedophile are strangers, who commit their perverted acts in public places.

Alarmingly, in cases involving minors, the assailants are almost 20 to 30 years older than their victims. But all survivors older than 18 years of age are assaulted by assailants of a similar age group. This may allude to the fact that children are easy targets for these predators.

As mentioned earlier, most of the sexual assault survivors are from a poor socioeconomic background. But oddly, most the survivors aged between 21 and 25 years are from a middle class socioeconomic background. This may reflect on the fact that more women are now self-sufficient in terms of employment. But unfortunately, these women are also being preyed on by depraved individuals. It can also be observed that this age group is most affected by multiple assailants when compared to other age groups.

**CONCLUSION**

The status of women in India has been subjected to a decline over the past few millennia. India is now ranked as the worst G20 country to be born as a woman. Women continue to face atrocious acts of violence including victimisation through rape, acid throwing, dowry killings and the forced prostitution of young girls. The lack of access to toilets in homes, which forces women to venture out at odd hours, makes them vulnerable to sexual crimes.

Indian law was expanded to consider rape as any acts like penetration by penis, or any object or any part of body to any extent, into the vagina, mouth, urethra or anus of a woman or making her to do so with another person or applying of mouth to sexual organs without the consent or will of the woman constitutes the offence of rape. Tough steps like criminalizing stalking and voyeurism, and making acid attacks punishable up to 10 years or life are welcome steps. In fact, early last year, India banned the invasive “two finger test” to medically examine rape survivors.

In order to eradicate this blight from our society, we first need to uproot problems such as, lack of female police officers, blaming provocative clothing, the acceptance of domestic violence, a lack of public safety, stigmatizing the victim, encouraging rape victims to compromise, a sluggish court system and the low status of women in India.

**Ethical Clearance:** Not applicable

**Source of Funding:** Self funded

**Conflict of Interest:** None

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Study of Lip Prints as a Tool for Identification: An Assessment on 200 Subjects in South India

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ABSTRACT

Background: In forensic identification, the mouth allows for a myriad of possibilities. Dental data is vastly used for positive identification of person, but nowadays other oral data such as palatal prints and lip prints are used for the process of identification, the object of which is to identify and register individuals for both civil and criminal purposes.

Aim and Objective: To check whether there are any peculiar / common lip patterns among males and females and to establish lip prints as a tool for identification.

Study Design: It’s a cross sectional Prospective study.

Method: It was conducted on the children who are studying in fourth standard to Tenth standard in the Government school at Pathancheru. 200 subjects were selected irrespective of their caste, religion, dietary habits & socio-economic status.

Observation: Among males, it was found that intersected pattern was most common in compartments 1, 3 and 4, while the least common pattern in lip compartments 1, 2, was Undetermined. On evaluation of the lip prints of the females, compartments 1, 2 exhibited intersected pattern predominantly. However, in compartment 3 and 4, branched pattern was commonest.

Conclusion: Lip prints are useful in personal identification and they differ from person to person even not similar in uniovular twins. Study showed that cellophane tape and lipstick can be easily used to retrieve lip prints. Lip print analysis is a process that can provides both qualitative and quantitative results.

Keywords: Forensic identification, Cheiloscopy, Lip Prints.

INTRODUCTION

In India, as well as all over the world today, crimes of diverse nature are on the rise. Both educated elite of the society and criminals are using sophisticated techniques while committing their crimes, to put the forensic, police, and the public off the scene. Hence, the role of crime detectives has become tough than ever in this sophisticated modern world. As crime scene investigation procedures are becoming more systematic and scientific, criminals are coming up with novel techniques to beat them\(^\text{[1-3]}\).

The wrinkles and grooves on the labial mucosa (called sulci-labiorum) form a characteristic pattern called “lip prints,” the study of which is referred to as Cheiloscopy\(^\text{[4-9]}\). Cheiloscopy is a new and less recognized forensic investigation technique that deals with the identification of humans based on lip prints. The significance of Cheiloscopy is linked to the fact that lip prints are inherent, once developed at the 6th month of intrauterine life they are permanent, unalterable even after death, and unique to each person except for
monozygotic twins. It has also been confirmed that lip prints recover after undergoing alterations such as inflammation, trauma, and diseases like herpes and that the disposition and form of the furrows does not vary with environmental factors\textsuperscript{[12]}.

The present study was aimed to study the lip prints of different individuals in different parts of the lip and find out the incidence of any particular pattern in the given age group in relation to specific gender.

Historical Perspectives

Use of lip prints in personal identification and criminalization was first recommended in France by Edmond Locard \textsuperscript{[13]}. In 1950, Snyder was the first person who suggested the idea of using lip print for identification. LeMoyne Snyder in his book Homicide Investigation, written as early as 1950, mentions the possible use of lip prints in the identification of individuals \textsuperscript{[14]}.

In the period 1968-1971, two Japanese scientists, Y. Tsuchihashi and T. Suzuki, \textsuperscript{[15]} examined 1364 persons at the Department of Forensic Odontology at Tokyo University. Based on this research, it was established that the arrangement of lines on the red part of human lips is individual and unique for each human being. In Poland, the interest in lip prints started in 1966 when a lip print was revealed on window glass at the scene of a burglary\textsuperscript{[16]}.

Classification by Suzuki and Tsuchihashi 1970 \textsuperscript{[15]}.

Type I: Clear-cut vertical grooves that run across the entire lips.

Type I': Similar to Type I, but do not cover the entire lip.

Type II: Branched grooves (branching Y-shaped pattern).

Type III: Criss-cross pattern.

Type IV: Reticular, typical checkered pattern, fence like.

Type V: Undetermined, grooves do not fall into any of the types and cannot be differentiated morphologically

MATERIAL AND METHOD

The present study was conducted to assess the quadrant wise and gender wise predilection of Lip print patterns among males and females. It’s a cross sectional prospective study, it was carried by the Department of Forensic Medicine, Maheshwara Medical College and Hospital, Pathancheru., Telangana, on the children who are studying in Fourth standard to Tenth standard in the Government school at Pathancheru. 200 subjects were selected irrespective of their caste, religion, dietary habits & socio-economic status. Sufficient permissions and consents were procured before the study from the school authorities and children; as well clearance from the Institutional Ethical committee is obtained in advance. Investigators were trained for recording and analyzing lip prints. Calibration was done by recording lip prints of 10 students initially successively. Each student was examined twice and the results were compared, to know the diagnostic variability agreement.

Materials used: Dark shaded lip stick, Ear buds, Cellophane tape, White paper (Proforma for recording lip prints), Scissors, Magnifying lens and sanitary tissues (to wipe the lip stick).

Technique: The subjects were made to sit comfortably in an erect position. Lips of all the subjects were cleaned and wiped dry with tissue paper before the procedure. Dark colored lipstick was applied with a single stroke evenly on the lips. The subjects were asked to rub both the lips to evenly spread the applied lipstick. A neat strip of transparent cellophane about 20 cm was cut and the glued portion of cellophane tape strip was placed over the lipstick. The lip impression was made in the normal rest position of the lips by dabbing in the center first and then pressing it uniformly toward the corner of the lips. The subjects were asked to relax and then the cellophane strip was removed from the lips in a single stroke and then stuck to a white paper for permanent record purpose. The lip print procured was examined using a magnifying lens to confirm whether the print has been properly reproduced. These prints were examined using magnifying glass, classified, and analyzed. While studying the various types of lip prints, each individual lips were divided into four equal compartments, i.e., two compartments on each lip, and were allotted the digits 1 to 4 in a clock-wise sequence starting from the subjects upper right.
Statistical Analysis: The collected data were analyzed using SPSS version 18 (SPSS Inc., Chicago).

Inclusion criteria
Subjects willing to participate in the study.
Subjects free from any active or passive lesions on their lips.

Exclusion Criteria
Gross deformities of lips like cleft lip, ulcers, and traumatic injuries on lips.
Known allergy to the lip stick used.

Observation
Total 200 children were included in the study, comprising in various age groups starting from 10 years to 16 years who are school going children. Girls 100 and Boys were 100 among them.

As per table no1 when the overall pattern was evaluated among all the lip compartments of the study subjects, it was found that intersecting pattern was most common among both males and females having 33.5% and 28% respectively. However, the least common was the undetermined pattern seen in 12.25% males and 9.75% females. The intersecting pattern was found to be most common among upper and lower lips of both males and females. The analysis of lip print type in each compartment was done. Among males, it was found that intersected pattern was most common in compartments 1, 3 and 4 having 29, 44 and 34 %, respectively, while the least common pattern in lip compartments 1, 2, was Undetermined with 9% and 11% respectively while in 3rd compartment Branched pattern was least common with 6% and in 4th compartment Vertical pattern was least common with 7%. On evaluation of the lip prints of the females, compartments 1, 2 exhibited intersected pattern predominantly having 23.0% and 45.0% respectively. However, in compartment 3 and 4, branched pattern was commonest with 42% and 34% respectively. Lip compartments 1 of the females showed the reticular pattern as the least common having 5%, while compartment 2, 3 and 4 had poor quality lip prints least in number.

DISCUSSION
Different lip print classifications available are martin S antos, S uzuki And Tsuchihaschi, Renaud, Afchar-bayat, and Jose Maria Dominguez[17]. Manipady (2002) in his study found that among the Indian population highest incidence was of type II (62%), followed by type I (15.9%). The lowest incidence was shown by type III (3.4%)[18]. Dr. N Umamaheshwari (2005) has done her study on lip prints in Chennai found that, no one has got single type of lip prints in all the compartments and no two individual or more than two individuals have similar type of lip prints[19]. It is known that due to their special features, both lip grooves and palatal rugae can be used successfully in human identification [20-24]. Among males, it was found that intersected pattern was most common in compartments 1, 3 and 4, while the least common pattern in lip compartments 1, 2, was Undetermined. On evaluation of the lip prints of the females, compartments 1, 2 exhibited intersected pattern predominantly. However, in compartment 3 and 4, branched pattern was commonest. These results of our study do not coincide with that by Vahanwala and...
Parekh who showed the Y-pattern dominant in females in third and fourth quadrants and end-to-end pattern common among males in second quadrant. A detailed study of each lip print showed that each print is unique. This supports the findings of the earlier studies regarding the uniqueness of lip prints. Thus, lip prints can be effectively used for personal identification. Hence Lip prints can be used to verify the presence or absence of a person from the crime, provided there has been consumption of beverage, drinks, usage of cloth, tissue/napkin etc. at the crime scene. Smears can also be found in other places, such as glasses, cups, spoons or cigarette butts, therefore indicating some kind of relationship between a suspect and the crime scene. Lip marks can be observed on ordinary drinking glass by an individual, even without lipstick being applied. Hence taking lip prints of all the suspected individuals and comparing with any such item found at the scene of crime could give conclusive evidence. Dr. Anil Aggarwal has proved beyond doubt that lip prints are as good as finger prints in criminal identification and can be definitely used when no other means of traditional methods of identification are available.

Hereditity and lip print

In our study we had a pair of twin, uniovular type were studied in details in all 04 quadrants. It was similar to in few quadrants, but one or the other give different pattern, it was consistent with the study of McDonell who reported that two identical twins seemed to be indistinguishable by every other means but their lip prints were not identical. This was different from study by Tsuchihashi et al. in which they found similar lip prints in twins and their parents. Though the size of samples for twin in our study was small but even one case of uniovular twins showing different pattern creates doubts for heredity in lip print identification.

CONCLUSION

When individual identification is concerned, Lip prints can be used as an aid, where other commonly used identification sources are not available. Lip prints are useful in personal identification and they differ from person to person even not similar in uniovular twins. Study showed that cellophane tape and lipstick can be easily used to retrieve lip prints. Lip print analysis is a process that can provides both qualitative and quantitative results. Research suggests the conclusive evidence that lip prints are suitable for the successful comparison, analysis, and identification of a person to a crime. In fact, there have been convictions of perpetrators who were positively identified via the analysis of their known lip prints to those found at the crime scene. There is a need to develop one cohesive Cheiloscopy system. However, as far as the legal matters in Indian judicial system are concerned, this technique needs to be used more frequently in routine civil and criminal litigations.

**Source of Funding**: Nil

**Conflicts of Interest**: Nil

**REFERENCES**


Retrospective Analysis of Suicidal Deaths in North Karnataka

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ABSTRACT

Suicide is serious public health problem and is a leading cause of death world wide¹. Moreover, according to the data obtained from the World Health Organization, suicide is one of the leading causes of death in developed countries².

Suicidal behavior is a leading contributor to the burden of disease worldwide and varies widely between countries. Indian figures are amongst the highest in the world, with recent trends indicating a disturbing rise, especially amongst the younger age groups, across all races.

The present retrospective study has been conducted for the period of 2 consecutive years in all cases of suicidal deaths at District hospital Gulbarga (North Karnataka) from June 2014 to May 2016.

Among 286 autopsied, males 179(62.58%) predominated females 107(37.41%) in the age group 21-30 years was the most vulnerable for committing suicide. The majority of the suicides occurred in married unemployed persons, men and younger age groups.

Organophosphorus poisoning 92(32.16%) was the most common poison consumed followed by hanging 71(24.82%), drowning 50(17.48%), burns 41(14.33%), railway accidents 20(6.99%) and drugs 12(4.19%).

Keywords: Suicides, Poisoning, Hanging, Organophosphorus

INTRODUCTION

Killing oneself to end his or her existence in this world has increased globally over the last decade and has been identified as being one of the major contributors to the high disease and healthcare burden in many low-to middle-income countries¹.

According to the World Health Organization (WHO), approximately 1.53 million people will die annually from suicide by 2020, compared with the 0.88 million suicides that occurred in 2002⁴.

Suicide rates are higher amongst men (with male to female ratio up to 3:1) throughout the world except in China, where female rates are consistently higher than those for men, particularly in rural areas⁵,⁶. Globally, the majority of suicides occur in people aged group 35-44 years in both sexes and the ratio of suicide attempts to suicide varies from 20-40:1⁷.

The main factors which contribute to commit suicide are depression, work related stress, chronic illnesses, marital problems, failure in love, poverty, debt and unemployment.

AIMS & OBJECTIVES

1. To collect data to find out information related to age & sex.
2. Marital status (Single, married, & Divorced/widowed).
3. Methods used to commit suicide in both sex.

MATERIALS AND METHOD

Present retrospective study was carried out at District hospital Gulbarga between June 2014 – May 2016.

Study data was collected from autopsied record...
register for the duration from 1st June 2014 to 31st May 2016.

Detailed history of the case was obtained from the deceased’s close relatives, friends, police and the other available persons who were present at the time of incidence and those accompanying the victims, with special reference to general information like Name, Age, Sex, Address, Marital status, Education, Socio-economic status and occupation etc. And other information like date & time of the incidence, period of hospitalization, police inquest & details of autopsy examination was recorded.

Total 286 cases of Suicidal deaths were recorded. The information was compiled, tabulated and analyzed. Findings of Post-mortem examination were compared with history and circumstances to know whether they are consistent or not. Conclusions were drawn after comparing and discussing it with similar type of the work carried out by the other authors.

RESULTS

Out of total 286 autopsies which were conducted at District Hospital Gulbarga during the study period from 1st June 2014 to 31st May 2016, 286 were Suicidal deaths.

The present study revealed that, the total number of suicidal deaths was 286, which were autopsied, and it was found that 179(62.58%) were males and 107(37.41%) females. Males clearly outnumbered females thereby constituting a male to female ratio of 3:1(Table No-2).

Maximum number of suicidal deaths victim were married 159(55.59%) giving a married-unmarried ratio of 2.2:1(Table No-3).

It was observed that maximum number of cases were in the age group of 21-30 years, and minimum number of cases were found in the age group of >71 years, and no cases were found above the age of 81 years. More male and female victims were present in the age group 21-30 years and followed by 31-40 years & 41-50 years. (Table No-2).

(Table-no 4) shows the commonest method employed to commit suicide among both sexes are as follows poisoning with Organophosphorus compound 92(32.16%) followed by hanging 71(24.82%), drowning 50(17.48%), burns 41(14.33%), railway accidents 20(6.99%) and drug intake 12(4.19%).

DISCUSSION

Suicide is an important public health problem in our country, and it attracts attention with its increasing frequency, particularly in the young age group.

The main factors which contribute to commit suicide are depression, work related stress, chronic illnesses, marital problems, failure in love, poverty, debt and unemployment.

In the present study, a total of 286 cases of suicidal deaths of all age group and both sex were studied for duration of 24 months, In both developed and developing countries the suicide rate among young people appears to be rising.

Highest incidence of suicidal deaths occurred in the age group 21-30 years 112(39.16%%) followed by 31-40 years 77 (26.92%). Since the age group 20-40 years is the most active phase of life and there are great fluctuations of emotions in this age group. Besides the age group 21-30 yrs, young people get frustration due to various reasons such as unemployment, family acceptance, poverty, anxiety, stress, alcohol addiction and love failure etc so most of the cases were below 40 years of age. All these causes form the motivational factors to terminate their lives. Similar findings were observed by other researchers.

In the present study, male comprised a majority and constituted 179(62.58%) of 286 cases compared to females 107(37.41%). Men prefer to commit suicide by hanging than women who prefer to commit suicide by other means like burning, drowning and poisoning.

A male preponderance almost in consistence with the study reported.

Organophosphorus poisoning was the commonest method 92(32.16%) used for committing suicide in our study. Similar findings was also reported by Adarsh Kumar, Mizanur Rahman et al.

In our present study it was found that the commonest method employed by females was burns followed by hanging and poisoning with organophosphorous compound. This study was similar to other studies.

Poisoning with organophosphorus compound is more
because of its easy availability in the house hold as insecticide sprays or for its use in agriculture purpose.

Chronic diseases, isolation from social life, and increases in chronic pains because of getting older increases the chance of committing suicide.

The fact that the majority of suicides in both years were committed by the men is consistent with those found in other studies. At least two-thirds of the suicide victims in our research were married. Similar findings have been reported in other studies with some reporting that separated men were at higher risk of committing suicide compared with separated women.

Table No.(1) Distribution of Suicidal deaths by Age group

<table>
<thead>
<tr>
<th>Age ranges(Years)</th>
<th>No of deaths</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 - 20</td>
<td>05</td>
<td>1.74%</td>
</tr>
<tr>
<td>21 - 30</td>
<td>112</td>
<td>39.16%</td>
</tr>
<tr>
<td>31 - 40</td>
<td>77</td>
<td>26.92%</td>
</tr>
<tr>
<td>41 - 50</td>
<td>53</td>
<td>18.53%</td>
</tr>
<tr>
<td>51 - 60</td>
<td>26</td>
<td>9.09%</td>
</tr>
<tr>
<td>61 - 70</td>
<td>11</td>
<td>3.84%</td>
</tr>
<tr>
<td>&gt;71</td>
<td>02</td>
<td>0.69%</td>
</tr>
<tr>
<td>Total</td>
<td>286</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table No.(2) Age & sex wise distribution of victims of suicidal deaths

<table>
<thead>
<tr>
<th>Age group (Years)</th>
<th>Males</th>
<th>Females</th>
<th>Total no of cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>11-20</td>
<td>02</td>
<td>03</td>
<td>05</td>
<td>1.74%</td>
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<tr>
<td>21-30</td>
<td>71</td>
<td>41</td>
<td>112</td>
<td>39.16%</td>
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<td>31-40</td>
<td>48</td>
<td>29</td>
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<td>41-50</td>
<td>36</td>
<td>17</td>
<td>53</td>
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<tr>
<td>51-60</td>
<td>15</td>
<td>11</td>
<td>26</td>
<td>9.09%</td>
</tr>
<tr>
<td>61 -70</td>
<td>06</td>
<td>05</td>
<td>11</td>
<td>3.84%</td>
</tr>
<tr>
<td>&gt;71</td>
<td>01</td>
<td>01</td>
<td>02</td>
<td>0.69%</td>
</tr>
<tr>
<td>Total</td>
<td>179</td>
<td>107</td>
<td>286</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table No.(3) Marital status of suicidal death cases

<table>
<thead>
<tr>
<th>Marital status</th>
<th>No of deaths</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married</td>
<td>159</td>
<td>55.59%</td>
</tr>
<tr>
<td>Single</td>
<td>115</td>
<td>40.20%</td>
</tr>
<tr>
<td>Divorced/widowed</td>
<td>12</td>
<td>4.19%</td>
</tr>
<tr>
<td>Total</td>
<td>286</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table No.(4) Methods used to commit suicide in both sexes.

<table>
<thead>
<tr>
<th>Suicide Methods</th>
<th>Males</th>
<th>Females</th>
<th>Total no of cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poisoning</td>
<td>53</td>
<td>39</td>
<td>92</td>
<td>32.16%</td>
</tr>
<tr>
<td>Hanging</td>
<td>44</td>
<td>27</td>
<td>71</td>
<td>24.82%</td>
</tr>
<tr>
<td>Drowning</td>
<td>31</td>
<td>19</td>
<td>50</td>
<td>17.48%</td>
</tr>
<tr>
<td>Burns</td>
<td>26</td>
<td>15</td>
<td>41</td>
<td>14.33%</td>
</tr>
<tr>
<td>Railway accidents</td>
<td>15</td>
<td>05</td>
<td>20</td>
<td>6.99%</td>
</tr>
<tr>
<td>Drugs</td>
<td>10</td>
<td>02</td>
<td>12</td>
<td>4.19%</td>
</tr>
<tr>
<td>Total</td>
<td>179</td>
<td>107</td>
<td>286</td>
<td>100%</td>
</tr>
</tbody>
</table>

CONCLUSION

The number of suicidal deaths cases is increasing day by day. A well designed and comprehensive programme is needed to identify the causative factors and prevention of suicidal behaviours.

Suicide being viewed as giving swift painless death and with easily available methods in secluded place without arousing much suspicion, this mode is increasingly adopted to commit suicide.

Males are predominant gender than females which are succumbing to suicidal deaths. The study reveals that males aged between 21- 40 years are more vulnerable.

The present study throws some light on the emerging trends that poisoning is increasingly used for committing suicide.

A careful complete & detailed post-mortem examination is very important while giving an opinion in suicide. Any gross inconsistencies in this regard may create doubt of foul play or suspicious death.

The farmers need to be insured or provided support, so they don’t go into debt and conside suicide.
Appropriate education, reducing unemployment, improving the quality of self esteem and involvement of young generation in encouraging activities may reduce rate of suicidal deaths in future.

**Conflict of Interest:** The findings in this research work found to be similar to most of the research work conducted in India.

**Source of Funding:** Self Funding.

**Ethical Clearance:** Not Applicable.

**REFERENCES**


An Analytical Research Study on Neonatal Deaths in Chennai Medical College Hospital, Irungalur Area of Trichy City, Tamilnadu State, India from January 2011 to December 2015

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ABSTRACT

India’s child mortality rate has dropped by more than half since 1990 but it still recorded the world’s highest number of deaths among children below age five in 2013. India registered 1.34 million under-five deaths in 2013, the highest in the world. Infant and under five mortality rates are excellent indicators of health status of the children. India’s infant mortality rate fell from 88 deaths per 1,000 live births in 1990 to 41 in 2013, while the neonatal mortality rate fell from 51 deaths per 1,000 live births to 29. About half of the all under-five deaths occur in only five countries - India, Nigeria, Pakistan, Democratic Republic of the Congo and China. Two-thirds of neonatal deaths occur in just 10 countries, with India accounting for more than a quarter of such deaths.

Keywords: Neonatal mortality, birth injuries, birth asphyxia, prematurity, infections, low birth weight.

INTRODUCTION

Nearly 5 million neonates die each year in the world of which 96% are in developing countries. The infant mortality rate has been decreasing however the decline in neonatal mortality has been very slow. About two thirds of infant mortality rate is contributed by deaths in neonatal period. Neonatal period denotes first 28 days birth of which early neonatal period denotes first 7 days after birth and late neonatal period denotes period between 8th to 28th day after birth.¹

WHO estimates that 40% to 60% of neonatal deaths are potentially preventable and it may be possible to save over 2 million new born infants through basic low cost interventions. More epidemiological research is needed to make available more accurate data on risk factors and causes of neonatal morbidity and mortality. ²

Most new born deaths are largely due to infections (36%), birth asphyxia and injuries (23%) and consequences of prematurity and congenital anomalies (34%). Infections may account for approximately half of new born deaths at the community level. Low birth weight is an overriding factor in the majority of deaths.³

Any maternal disease can adversely affect foetal and neonatal health. Medications or substance abuse which can affect the new born includes maternal anticonvulsants, alcohol abuse, and tobacco. Pregnancy induced hypertension is associated with need for preterm delivery and IUGR. Systemic lupus erythematosis is associated with increased risk of spontaneous abortion, IUGR, preterm delivery, neonatal lupus syndrome. ⁴

Neonatal infections can be acquired transplacentally (congenital) or by ascent from vagina or during birth (intrapartum infections) or from environment, staff, parents or other babies. Risk factors include 1. Prolonged rupture of membranes > 24 hours especially if preterm 2. Signs of maternal infections Eg. Maternal fever, UTI, Chorioamnionitis 3. Fetal distress and prematurity, 4. Invasive procedure live central I.V line 5. Recurrent antibiotics 6. Congenital malformations like spina bifida 6. Severe illness, malnutrition & immunodeficiency disease. ⁵

Sudden infant death syndrome (SIDS) is death occurring in infants between 2 weeks to 2 years. Following are proposed theories of causation of SIDS – 1.Allergy to cow’s milk 2.Allergy to house

Postmortem findings in cases of SIDS are negative. Other findings may include trachea containing milky vomit sometimes blood stained. Multiple petechial hemorrhages on heart, lungs and thymus (agonal in nature) may be seen. Pulmonary edema is common. Milk or blood stained froth on child’s mouth or bedding. Hands are often clenched around fibers from bedclothes. 7

Accidental causes of death of new born can occur due to injury to mother on her abdomen in which death of baby may occur soon after birth. Prolapse of cord, prolonged labour and twisting of cord around the neck may cause death of foetus during or immediately after birth. In addition non-availability of nursing care and precipitate labour leading to head injury, suffocation or drowning may cause death of the new born. 8

MATERIALS AND METHOD

Pediatrics department case sheets, Statistics records, Academic autopsy reports

FINDINGS

Table 1: Details of neonatal deaths with cause of death from year 2011 to 2015

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Case No</th>
<th>Name of Patient</th>
<th>Age</th>
<th>Sex</th>
<th>Diagnosis/ Cause of death</th>
<th>Date &amp; time of death</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>54515</td>
<td>B/o Uma Maheshwari</td>
<td>New born</td>
<td>Male</td>
<td>Achodroplexy</td>
<td>20/03/11 1.30 am</td>
</tr>
<tr>
<td>2.</td>
<td>55857</td>
<td>B/o Kavitha</td>
<td>New born</td>
<td>Female</td>
<td>Complex congenital cyanotic heart disease</td>
<td>07/04/11 9.20 pm</td>
</tr>
<tr>
<td>3.</td>
<td>57009</td>
<td>B/o Dhanabackiyam</td>
<td>4 days</td>
<td>Female</td>
<td>Severe birth asphyxia</td>
<td>28/4/11 5.50 am</td>
</tr>
<tr>
<td>4.</td>
<td>75032</td>
<td>B/o Kanaga</td>
<td>New born</td>
<td>Female</td>
<td>Respiratory distress syndrome, extremely low birth weight</td>
<td>23/12/11 2.20 am</td>
</tr>
<tr>
<td>5.</td>
<td>75289</td>
<td>B/o Malarkodi</td>
<td>20 days</td>
<td>Male</td>
<td>Interventricular Hemorrhage</td>
<td>31/12/11 11.30 pm</td>
</tr>
<tr>
<td>6.</td>
<td>86692</td>
<td>B/o Rekha</td>
<td>16 days</td>
<td>Female</td>
<td>Perinatal asphyxia Multi Organ Dysfunction Syndrome</td>
<td>24.05.2012 11.30 am</td>
</tr>
<tr>
<td>7.</td>
<td>101433</td>
<td>B/o Sangeetha</td>
<td>New born</td>
<td>Female</td>
<td>Congenital Complete AV Block</td>
<td>02.11.12 11.05 pm</td>
</tr>
<tr>
<td>8.</td>
<td>113486</td>
<td>B/o Gunamathy</td>
<td>New born</td>
<td>Female</td>
<td>Birth Asphyxia LBW baby</td>
<td>26/3/2013 12.20 am</td>
</tr>
<tr>
<td>9.</td>
<td>121825</td>
<td>B/o Poongodi</td>
<td>3 days</td>
<td>Female</td>
<td>Aspiration Pneumonia</td>
<td>04/07/13 6.10 pm</td>
</tr>
<tr>
<td>10.</td>
<td>122894</td>
<td>B/o Shalini</td>
<td>New born</td>
<td>Male</td>
<td>Complex Congenital Heart Disease</td>
<td>16/07/13 12 am</td>
</tr>
<tr>
<td>11.</td>
<td>128489</td>
<td>B/o Kalavathy</td>
<td>New born</td>
<td>Male</td>
<td>Foetal Distress Syndrome Prematurity</td>
<td>17/09/13 10 am</td>
</tr>
</tbody>
</table>
Almost two-thirds of pregnant women still deliver at home and only few of these women receive care from skilled birth attendants. In India still prematurity, low birth weight and birth asphyxia contribute to majority of neonatal deaths. Silent respiratory and cardiovascular diseases go undiagnosed and also contribute to neonatal deaths.

Basic strategies such as adequate balanced diet for pregnant woman, regular antenatal check up from well trained doctors from peripheral health centres itself, equipping parents with better knowledge about the value of antenatal care, hospital delivery, immunization and post natal care are keys to reduce childhood mortality. Pediatricians and centres capable of providing care for the preterm infant should be made available at peripheral health centres itself.

**Acknowledgement:** Nil

**Ethical Clearance:** Department of Pediatrics, Chennai Medical College Hospital & Research Institute, Irungalur, Trichy, Tamilnadu.

**Source of Funding:** Self

**Conflict of Interest:** Nil

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Profile and Analysis of Pattern of Medico- Legal Cases in the Casualty of a Teaching Hospital, Khammam, Telangana

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ABSTRACT

This retrospective study was conducted to analyze the pattern and magnitude of all the medico legal cases registered in the emergency Dept of MGH, Khammam, between Jan 2016 to Dec 2016. Total 1312 cases were studied, 1225 were males and 187 were females. The most of the victims were of the age group 21-30 years. Majority of victims were Hindus, married, urban, secondary educated, belonged to low socioeconomic class, working as laborers. Maximum number of MLCs reported to casualty were in winter season. This study revealed that RTAs constitute majority of 529 [40.32%] of medico legal cases followed by poisoning 259 [19.74%], thermal buns 153 [11.66%), fall from height 102 [7.77%], assault 94 [7.16%] cases and asphyxial 72 [5.48%] in relation to the cause of admission. The manner of injuries were accidental in nature in majority of cases. Most of the patients reported in hospital within one hour of sustaining the injury / other causes. The peak time of attending to the casualty was during 12 pm to 6 p.m. Maximum numbers of MLCs were treated on the indoor basis. Most of MLCs were registered at the time of admission. Single department opinions were most common. Maximum opinions were shout from Surgery. Utmost numbers of cases were discharged after completion of treatment. Main object of the present study is to evaluate complete profile & pattern of medico-legal cases at a tertiary care hospital.

Keywords: MLCs, Pattern, Profile, RTA, Season, Assault, Poisoning, Casualty.

INTRODUCTION

Generally physician has two duties, medical and medico-legal. It is true in Indian context also. Medico-legal duties become more pertinent if physician is working in a teaching hospital. The casualty department is the very important area of any hospital. Almost all Medical and Surgical emergencies reported first to casualty department of medical college hospital and apart from these emergencies all MLCs are registered in casualty and all medico legal formalities are required to be fulfilled here.

Casualty medical officer is the first contact doctor. First and prime duty of CMO is to give first aid and save the life of the patient and another duty of CMO is to do all medico legal formalities concerned to patients.

A medico legal case is a case of injury or illness where attending doctor after eliciting, listing and examining patient; is of opinion that some investigation by law enforce agencies is essential to establish and fix responsibility for the cases in accordance with the law of the land. Medico legal case is a medical case with legal implications or a legal case requiring medical expertise.¹

In recent days, medico legal cases are on the rise. This may be due to increased vehicular traffic density, un-employment, high income disparities, substance abuse, and meager infrastructure facilities, insurance /compensations etc.²

Pattern of medico legal cases is of importance for those, who are directly or indirectly related with Law and Order, who treat them and also who are concerned with etiology, manner of causation, and their...
Profiling of medico legal cases are an integral aspect for the prevention of preventable casualties in future and to study the crime rate in area. If pattern of cases that present to an emergency or elective setup is known, one can get better acquainted with more types of medico legal cases and have better understanding of them. As a result of which, a medical practitioner shall be more comfortable in dealing with such cases.

This retrospective study was conducted to analyze the pattern and magnitude of all the medico legal cases registered in the emergency department of MGH.

AIMS AND OBJECTIVES

To know the profile and pattern of medico legal cases in a tertiary care hospital

To know seasonal variation and month wise, time period between injury and reporting to casualty, time of occurrence, type of injury, manner of injury, prognosis and mortality profile of MLCs.

To know the burden of MLC & suggestions for improving medicolegal work in casualty

MATERIAL AND METHOD

This is a record based retrospective study of medico legal cases registered in medico legal register in casualty of MGH, Medical College, Khammam; Telangana from Jan 2016 to Dec 2016.

Related general data like type of MLCs reported in casualty during this period, age, and sex of cases, time of arrival, months, and season concern in arrival of MLCs in casualty were collected from medico legal registered.

During this study period the total 1312 MLCs were registered in casualty of MGH, Khammam. The collected data was analyzed, presented with tables and compared with previous studies and concluded.

OBSERVATIONS AND DISCUSSION

Out of 1524 cases studied 1312 [86.88%] were MLC and 212 [13.91%] were non MLC deposition. Our analysis regarding disposition of patients various specialties are comparable with the other research study.

In this study, maximum number of medico legal cases were reported to casualty were from age group 21-30 years 722 [55.03%] followed by 31-40 years 310[23.62%] next 11-20 years 168[12.80%] and 41-50 years 66 [0.45%]. Minimum number of 18 medico legal cases reported were above 60 years whereas 2 cases reported from age group 0-10 years. The reason might be this age group individually lead more active life, are involved in outdoor activities, and take risk for work, which leads more injuries and accidents. These are consistent with other authors.

In our study, male 1125[85.74%] victims outnumbered female187 [14.25%]. Male to female ratio was 6:1. Similar observations were made by other authors. The male predominance may be explained by the fact that males were active in various activities, so they are more vulnerable to accident or injuries. Similar findings observed by authors.

In this study, maximum were number of medicolegal cases belong to Hindu religion 1225[93.36%], Muslims constituted 57[4.34%] and Christian 30[2.22%]. These findings were supported by Indian other studies.

Our study shows that the urban population 958 [73.01%] constituted more than rural population 354[26.98%]. This distribution of medico legal cases is because of modernization and industrialization. Which are supported by authors.

In present study, most of the medico legal cases were married 952 [72.56%] when compared with unmarried 360[27.43%]. A total of 952 married people out of which males 820[62.50%] and 132[8.53%] were females. Whereas unmarried males 305 [23.24%] were more than the unmarried females 55 [4.19%]. Same findings were noted by other studies.

In this study, highest number of medico legal cases belongs to low socioeconomic status 572[43.59%] followed by 402[30.64%] middle and 338 [25.76%] high. These are consistent with authors.

In our study, maximum number of medicolegal cases were studied up to secondary education 524 [39.93%] cases followed by 486 [37.04%] graduation, 236[17.98%] primary 102[7.77%] and remaining were 12[0.91%] post-graduation. Whereas Illiterate medico
legal cases 88 [6.70%] were reported in this study. Same observations were made by authors.\textsuperscript{8,9}

We reveal that maximum numbers of victims were laborer 362 [27.59%] followed by students 342 [26.06%] next un-employed 284 [21.64%] and house wives 132 [10.06%].70 [5.33%] medicolegal cases were farmers & employees in service 66 [5.03%], professional 14 [1.06%], and least 8 medico legal cases of others. Our findings were consistent with other studies.\textsuperscript{8}

In this study, maximum number of medico legal cases were reported during winter season 480 [36.58%] followed by Rainy 418 [31.85%] and Summer 414 [31.55%]. The high incidence of medico legal cases in winter season the reason might be dense fog which was responsible for RTA cases. These are consistent with other authors.\textsuperscript{6-9} as depicted in table no.1

Our study showed that maximum number of medico legal cases reported to casualty were in month of November 152 [11.58%] followed by July 136 [10.36%]. These are consistent with authors.\textsuperscript{6-9}

Our study showed that the maximum number of medico legal cases were reported to casualty was between 12 p.m. to 6 p.m. 542 [41.31%] followed by 6pm to 12a.m. 401 [30.56%] next 6 a.m. to 12 p.m. 221 [16.84%] and least 12 a.m. to 6 a.m. 148 [11.28%]. Similar results were made by authors.\textsuperscript{7-10}

We noticed that in most of the cases, manner of medico legal cases admission into the hospital was accidental 722 [55.03%] followed by suicidal 391 [29.80%] and 149 [11.35%] cases were homicidal in nature. Same results were obtained by other authors.\textsuperscript{10} In present study RTAs, fall from height and electrical constitutes maximum accidental manner of medico legal cases and there after poisoning cases contributes suicidal manner of medico legal cases.

The pattern of MLCs. a total of 1312 medico legal cases were brought to emergency department. Among medico legal cases, 529 [40.32%] were RTA, 259 [19.74%] were poisoning, 153 [11.66%] were thermal burns, 102 [7.77%] were fall from height, 94 [7.16%] were assault, 72 [3.96%] were asphyxial, 20 [0.15%] were Railway accidents, 10 [0.76%] were snake bite & scorpion sting 9 [0.68%], 4 [0.30%] cases were insect bite, 3 [0.22%] were dog bite, 8 [0.60%] were brought dead and remaining 49 [3.73%] were others. Our analysis regarding disposition of patients various specialties are comparable with the other research studies.\textsuperscript{10-17} as depicted in table no.2

Most of MLCs were registered at the time of admission 1300 [99.08%]. While some cases 12 [0.91%] were made medico-legal retrograde. Similar results obtained by other studies.\textsuperscript{6,18,19} It is sensible to real the fact that even if a case had not been booked as medico-legal at the time of examination or admission into the hospital, the case may become medico-legal at a later stage. This means conversion of an ordinary case into a medico-legal case, by a late entry made in Medico-legal register. So it is denoted as retrograde MLC.

In the study, 1102 [83.99%] of the medico legal cases reported within one hour of injury and 128 [9.75%] reported between one to two hours. Similar observations were made by studies.\textsuperscript{6,10-12,20} The reason might be availability of emergence transportation 108 services provided by government and easily reaching the hospital for further treatment after first aid. Chart no.1

In our study most of the cases were treated in indoor 1290 [98.93%] / OPD 14 [1.06%] and 8 [0.60%] were brought dead. Out of 429 cases of RTA, 12 cases and out of 94 cases of assaults 2 cases had minor injuries, so they did not required admission and were dealt with at the OPD level. These findings were similar to studies conducted by authors.\textsuperscript{4,6,18-20} chart no.2

Out of 1290 indoor cases, 843 [64.25%] cases were admitted in to the surgery department, because most of the cases of road traffic accidents, assaults, fall from height, some animal bite, and burns etc., were treated in the surgery department which is similar with the study by authors.\textsuperscript{4,6,16,19}

Opinion from experts was sought in most of the cases. Single department opinions 1079 [51.24%] were most common but more than one department opinions 233 [17.75%] were also not uncommon. Maximum opinions were shout from Surgery 878 [66.92%], followed by Orthopedics 201 [15.32%] and Medicine 191 [14.55%] departments which shows the workload in these respective departments.\textsuperscript{6,13,18-21} Surprisingly in only three cases expert opinion was obtained from Forensic Medicine Department. Chart no.3

In our study, out of all the 1312 patients,
1259[95.96%] were discharged after successful treatment from the same hospital whereas 39[2.97%] hospital deaths were reported in present study. This shows the effectiveness of the early initiation of the treatment in case of emergency. These findings were supported by other studies.6,11,12, 18,22

**SUGGESTIONS**

The doctors who are involved in treatment of such medico-legal cases need to be more trained in this field.

Also due to increase in accidents and violence cases, hospitals have the need for round the clock availability of such medico-legal experts in sufficient number to deal effectively with such cases to better serve laws of land.

### Table No.1 Season & Month Wise Distribution of Medico Legal Cases

<table>
<thead>
<tr>
<th>Season</th>
<th>Months</th>
<th>No of cases</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer</td>
<td>February</td>
<td>82</td>
<td>6.25</td>
</tr>
<tr>
<td>March</td>
<td>86</td>
<td>6.55</td>
<td></td>
</tr>
<tr>
<td>342[26.06%]</td>
<td>April</td>
<td>84</td>
<td>6.40</td>
</tr>
<tr>
<td>May</td>
<td>90</td>
<td>6.85</td>
<td></td>
</tr>
<tr>
<td>June</td>
<td>111</td>
<td>8.46</td>
<td></td>
</tr>
<tr>
<td>Rainy</td>
<td>July</td>
<td>136</td>
<td>10.36</td>
</tr>
<tr>
<td>August</td>
<td>102</td>
<td>7.77</td>
<td></td>
</tr>
<tr>
<td>452[34.45%]</td>
<td>September</td>
<td>103</td>
<td>7.85</td>
</tr>
<tr>
<td>October</td>
<td>119</td>
<td>9.07</td>
<td></td>
</tr>
<tr>
<td>Winter</td>
<td>November</td>
<td>152</td>
<td>11.58</td>
</tr>
<tr>
<td>518[39.48%]</td>
<td>December</td>
<td>131</td>
<td>9.98</td>
</tr>
<tr>
<td></td>
<td>January</td>
<td>116</td>
<td>8.84</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>1312</td>
<td></td>
</tr>
</tbody>
</table>

### Table no.2 Pattern of Medico Legal Cases with Sex Wise Distribution

<table>
<thead>
<tr>
<th>Type of cases</th>
<th>Male [%]</th>
<th>Female [%]</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assault</td>
<td>92[7.01]</td>
<td>2[0.15]</td>
<td>94</td>
<td>7.16</td>
</tr>
<tr>
<td>Road Traffic Accident</td>
<td>470[35.82]</td>
<td>59[4.49]</td>
<td>529</td>
<td>40.32</td>
</tr>
<tr>
<td>Fall from Height</td>
<td>100[7.62]</td>
<td>2[0.15]</td>
<td>102</td>
<td>7.77</td>
</tr>
<tr>
<td>Burns</td>
<td>6[0.45]</td>
<td>27[2.05]</td>
<td>33</td>
<td>2.51</td>
</tr>
<tr>
<td>Near Drowning</td>
<td>18[1.37]</td>
<td>4[0.30]</td>
<td>22</td>
<td>1.67</td>
</tr>
<tr>
<td>Near Hanging</td>
<td>24[1.82]</td>
<td>8[0.65]</td>
<td>32</td>
<td>2.43</td>
</tr>
<tr>
<td>Strangulation</td>
<td>8[0.60]</td>
<td>4[0.30]</td>
<td>12</td>
<td>0.91</td>
</tr>
<tr>
<td>Throttling</td>
<td>2[0.15]</td>
<td>4[0.30]</td>
<td>6</td>
<td>0.45</td>
</tr>
<tr>
<td>Industrial Accidents</td>
<td>7[0.53]</td>
<td>3[0.22]</td>
<td>10</td>
<td>0.76</td>
</tr>
<tr>
<td>Self-inflicted</td>
<td>10[0.76]</td>
<td>4[0.30]</td>
<td>14</td>
<td>1.06</td>
</tr>
<tr>
<td>Firearm</td>
<td>7[0.53]</td>
<td>-</td>
<td>7</td>
<td>0.53</td>
</tr>
<tr>
<td>Electrical injuries</td>
<td>74[5.64]</td>
<td>4[0.30]</td>
<td>78</td>
<td>5.94</td>
</tr>
<tr>
<td>Lightning</td>
<td>40[3.04]</td>
<td>2[0.15]</td>
<td>42</td>
<td>3.20</td>
</tr>
<tr>
<td>Blast injuries</td>
<td>4[0.30]</td>
<td>1[0.07]</td>
<td>5</td>
<td>0.38</td>
</tr>
<tr>
<td>Sexual Assault</td>
<td>-</td>
<td>2[0.15]</td>
<td>2</td>
<td>0.15</td>
</tr>
<tr>
<td>Animal injuries</td>
<td>4[0.30]</td>
<td>2[0.15]</td>
<td>6</td>
<td>0.45</td>
</tr>
<tr>
<td>Railway Accidents</td>
<td>17[1.29]</td>
<td>3[0.22]</td>
<td>20</td>
<td>0.15</td>
</tr>
<tr>
<td>Brought Dead</td>
<td>7[0.53]</td>
<td>1[0.07]</td>
<td>8</td>
<td>0.60</td>
</tr>
<tr>
<td>Snake Bite</td>
<td>8[0.60]</td>
<td>2[0.15]</td>
<td>10</td>
<td>0.76</td>
</tr>
<tr>
<td>Scorpion Sting</td>
<td>3[0.22]</td>
<td>6[0.45]</td>
<td>9</td>
<td>0.68</td>
</tr>
<tr>
<td>Insect Bite</td>
<td>1[0.07]</td>
<td>3[0.22]</td>
<td>4</td>
<td>0.30</td>
</tr>
<tr>
<td>Dog Bite</td>
<td>1[0.07]</td>
<td>2[0.15]</td>
<td>3</td>
<td>0.22</td>
</tr>
<tr>
<td>Alcohol intoxication</td>
<td>2[0.15]</td>
<td>-</td>
<td>2</td>
<td>0.15</td>
</tr>
<tr>
<td>Occupational injury</td>
<td>1[0.07]</td>
<td>2[0.15]</td>
<td>3</td>
<td>0.60</td>
</tr>
</tbody>
</table>
CONCLUSION

Maximum number of medico legal cases were reported to casualty were from age group 21-30 years, male, married, Hindu, urban, belong to low socioeconomic group, studied up to secondary education working as laborer.

Highest number of medico legal cases were reported during winter season and reported to casualty in between 12 p.m. to 6 p.m., within one hour of injury, manner of medico legal cases was accidental followed by suicidal and homicidal in nature, registered at the time of admission, treated in indoor admitted in to the surgery department.

Pattern of medico legal cases, 529 [40.32%] were RTA, 259[19.74%] were poisoning, 153 [11.66%] were thermal burns, 102[7.77%] were fall from height, 94[7.16%] were assault, 72[3.96%] were asphyxial, and 20[0.15%] were Railway accidents.

Single department opinions were most common

Umost cases discharged after successful treatment from the hospitalThis study shows the load of medico-legal cases at the tertiary care hospital and hospital not only caters to the needs of patients who reports for their illness but also carries out legal responsibilities to examine, document and certify medico-legal cases.

Source of Funding: Self

Conflict of Interest: Nil

Ethical Clearance: Not need

REFERENCES


Stature Estimation from Combined Forearm and Hand Length in Adults in Bareilly, Uttar Pradesh

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ABSTRACT

Stature is one of the basic parameters that aids in identification of an individual. Though not overtly specific in nature, it does help to narrow down search parameters in cases of grossly mutilated bodies or body fragments. In a variety of studies reported worldwide, a correlation was observed between stature and length of body segments. However, a discerning finding was that stature differs based on environmental, geographical and demographic factors, thus warranting the need for population specific formulae for assessment of stature from various body parts. This study conducted an analysis of stature estimation on individuals of Bareilly, Uttar Pradesh and reports that there is a formula specific for estimating stature from combined forearm length in males and females.

Keywords: Stature, Combined Forearm and Hand, Regression equation.

INTRODUCTION

In forensic anthropology, stature forms an important component in the estimation of a biological profile, where a forensic anthropologist performs an analysis of skeletal remains to establish ancestry, sex, age-at-death and stature. The establishment of an accurate biological profile is critical in human identification as it allows a discriminatory search on the missing persons database to narrow potential matches. To maintain the accuracy of biological profiles it is generally supported that contemporary population specific standards are required. Many techniques currently employed by forensic anthropologists are outdated due to secular trends and their lack of applicability to global population diversities.\(^{(1)}\)

The Trotter and Gleser stature equations are the most widely used method for estimating stature. Trotter and Gleser formulated these equations from American Caucasians and Negros from World War II and the Terry Skeletal Collection housed at the Smithsonian Institute (Washington, DC). As the study utilised individuals born before 1944, this no longer represents a contemporary population and as a result, has been shown to produce error between actual stature and predicted stature on contemporary American and Asian populations. As stature is a valuable contributor to the identification process, it is vital that accurate region specific stature estimation equations are made available through appropriate research on contemporary individuals.\(^{(2)}\)

It is well known that body segments exhibit consistent ratios among themselves and relative to the total body height. The ratios between body segments are age, sex, physical activity and race dependent.\(^{(3)}\) Prediction of stature from incomplete human limbs and skeletal remains is particularly important in personal identification. The estimation of stature using different parts of the body is crucial for formulating a biological profile during the process of personal identification, especially when mutilated and amputated limbs or body parts are found.\(^{(4)}\)

The hand length was found to be the most reliable alternative and the hand can be used as a basis for estimating age-related loss in height. The length of the body while alive is one of the key parameters established in the course of identification of unknown skeletal remains.\(^{(5)}\)

Stature provides insight into various features of a population including nutritional health and genetics.
Stature is considered as one of the parameters for personal identification. (6)

Despite its significance and potential practical utility, little is known concerning the relationship between upper limb dimensions and stature among north Indians. Hence, this study was designed to elucidate the norms for limb dimensions and to propose population and gender specific regression models for stature estimation using the linear dimensions of the forearm.

METHODOLOGY

The study was a cross-sectional, observational study conducted among students and employees of various institutions of Shri Ram Murti Smarak Trust. The study availed a sample size of 400 individuals with 199 males and 201 females. An attempt was made to collect same number of samples from both genders. The study was conducted between December 2014 to December 2015, in a period of one year. The combined length of forearm and hand was measured as a straight distance between apex of olecranon process and tip of the middle finger. Subjects were asked to keep the forearm and hand on a plain table, to which a white sheet of paper was fixed. Elbow was flexed at right angle and forearm was kept in supine position. The position of the apex of olecranon process and tip of middle finger was marked on the paper and distance between two points was measured.

All measurements were taken between 10 AM and 2 PM, to eliminate diurnal variations. All measurements were taken in centimeters, upto two decimal points. The data was compiled in tabular form in data sheet and later uploaded on a excel sheet in the computer. Obtained data was analysed statistically with the help of statistician and linear Regression equations were derived from it.

OBSERVATIONS

In the combined study of all subjects, it was noted that the total sample size of 400 the maximum stature as recorded was 195.50 cms while the other end of the spectrum was 151 cms. The right forearm and hand was marginally longer at a maximum recorded value of 52.100 as compared to the maximum value of left forearm at 52.00 cms. The minimum values as recorded were 37.70 and 37.80 for the right and left forearm and hands respectively. The values are depicted in table 01 as below. The standard deviation among the values for stature were 6.46016. The standard deviation for the measurements of right and left forearm and hand were calculated as 3.194614 and 3.18238 respectively. The age group under study varied between 20 years to 30 years.

Table 01. Stature and combined forearm and hand measurements of total sample.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Age</th>
<th>Stature</th>
<th>Right Forearm &amp; Hand</th>
<th>Left Forearm &amp; Hand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subjects</td>
<td>400</td>
<td>400</td>
<td>400</td>
<td>400</td>
</tr>
<tr>
<td>Mean</td>
<td>22.56</td>
<td>166.8183</td>
<td>43.83575</td>
<td>43.7700</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>2.784</td>
<td>6.46016</td>
<td>3.194614</td>
<td>3.18238</td>
</tr>
<tr>
<td>Minimum</td>
<td>20</td>
<td>195.50</td>
<td>52.100</td>
<td>52.00</td>
</tr>
<tr>
<td>Maximum</td>
<td>30</td>
<td>195.50</td>
<td>52.100</td>
<td>52.00</td>
</tr>
</tbody>
</table>

Statistical analysis of the stature and combined hand and forearm length of the sample population of male population sub groups showed a Pearson co relation to be significant at 99 % confidence interval. This means that there was a statistically significant co relation between stature and the measurements of the right forearm of male population as a whole without any segregation of age. Similarly, statistical analysis of the stature and combined hand and forearm length of the sample population of female population groups showed a Pearson co relation to be significant at 99 % confidence interval. This means that there was a statistically significant co relation between stature and the measurements of the right forearm and hand of female population as a whole without any segregation of age. Based on the above data analysis, it was also noted that a significant difference existed between the stature as well as combined hand and forearm length measurements of males and females in the study population. Based on the measurements two separate regression equations were formulated as follows.
DISCUSSION

Personal identification is a vital device used by forensic scientists for medico-legal cases and anthropologist as well as anatomists in identifying an individual when only segments and fragments of unknown body part is left. Studies have shown that hand dimensions vary in different races therefore formulae derived for one ethnic group may not be applicable to another ethnic group and this may be attributed to biological and environmental factors.\(^{(5,7,8)}\)

Studies have also reported of individual difference. Various anthropometric studies have revealed that no two individuals are exactly alike genetically, even identical twins differ in some aspects, and the variability is strongly influenced by genetic and environmental factors. The present study shows that stature and forearm dimensions were statistically significant between the males and females.

Our study is in concurrence with studies by Jasuja and Harun\(^{(7,9)}\) in which the authors took measurements of hand and upper extremity and stature and reported a statistically significant correlation between the two entities. Both these studies also mentioned categorical differences in gender and age though the age sample were substantially low in frequency.

Sunit et al in 2005 reported a statistically insignificant difference in measurements of right and left upper limbs. In the study conducted on 150 individuals, there was a difference in the measurements of right and left upper limb and the measurements showed a positive correlation with stature. However the minor differences in measurements were insignificant and could be overlooked albeit by applying a standard error coefficient.\(^{(10)}\)

This study is in concurrence with our study wherein we observed a difference in lengths of right and left forearm and hand but it was insignificant and gave a close approximation of stature without any error coefficient.

B G Chikalkar and others also reported similar observations in terms of forearm length and stature correlations in their study published in 2009. They concluded that the study had provided regression equations for six different parameters, one of which was forearm length, that can be used for stature estimation in the population of Mumbai. These equations should not be used for other Indian population groups was a note mentioned in the publication. The author also mentioned that there are lot of variations in estimating stature from limb measurements among people of different region & race. Hence there is a need to conduct more studies among people of different regions & ethnicity so that stature estimation becomes more reliable & identity of an individual is easily established. Our study also reported a similar findings. It is assumed from reviewing literature that population specific regression formulae must be designed and incorporated in the particular population sub set only.\(^{(11)}\)

A notable study of particular interest was also published in the year 2014 by Shahnaz Choudhary from Jammu. The study was conducted in a relatively isolated region with a constricted ethnic group. The study was an endeavor to generate formula for estimation of stature from combined length of forearm and hand in Jammu region of India. Results of the study revealed highly significant gender differences between the selected parameters necessitating the need for separate data for two sexes. The authors concluded that the regression equations for determination of stature from the combined length of forearm and hand in Jammu region of India had been formulated in two sexes. The results showed that highly significant differences exist between these measurements in two sexes (P < 0.0001), hence the need for alternate formulae for the genders. This is in concurrence with our study that found that significant differences exist between males and females hence different regression equations are needed for the same.\(^{(12)}\)

CONCLUSION

1. Statistically Insignificant differences were observed in the length of right and left hand and forearms in both genders.

2. Statistically significant correlation by means of pearson coefficient was observed between stature and combined forearm and hand length in both genders.
3. The male and female subsets displayed statistically significant differences in combined forearm and hand length and stature.

4. The present study is limited by the inability to utilize a larger sample size and must be continued for defining a regression equation for the region.

5. The limiting factor in the study was the non-availability of a standard error quotient.

6. Study conclusively proved that combined forearm and hand length is a better indicator for stature estimation and can be utilized in living, and mutilated bodies for medicolegal or anthropometric studies.

Conflict of Interest: Nil

Source of Funding: Self funded.

Ethical Permission: Institutional ethical committee has approved study prior to commencement of data collection.

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10. Sunil, P.C.Dikshit, A Aggrawal, M Rani; Estimation of stature from hand length, JIAFM, 2005 : 27 (4) Pg 219-221.


Retrospective Study on Pattern of Road Traffic Accident Deaths Reported in VS General Hospital, Ahmedabad

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ABSTRACT

Road Traffic Accident is the most common cause of Death. Inspite of advance technology, traffic rules, safety measures and advances in medical sciences the rate of death and deformities is higher. This study was conducted at V.S. General Hospital, Ellisbridge, Ahemdabad, Gujarat. The study includes Cases reported and recorded from 1ST January 2014 to 31ST June 2014. Data was collected from the Forensic Medicine and Toxicology Department of Smt. NHL Municipal Medical College from the record of Autopsy, after due permission from the responsible authorities. During that period we found, death due to RTA is 153 in number, which were subjected to Autopsy. Young adults of age group 21 to 30 years accounted for maximum Cases, 38 (27.3%). Among them two wheeler riders accounted maximum cases, 61 (43.8%). Maximum Number of Deaths are due to Head Injury 49 (35.2%). According to counterpart by which victims hit due to bike sleeping 40(28.7%)

Keywords : Road Traffic Accident, Cause of death, death according to vehicle type, Counterpart of Victim.

INTRODUCTION

Accident is an event, occurring suddenly, unexpectedly and inadvertently under unforeseen Circumstances. In developed countries, RTA is the most common cause of death below the age of 50 Years. The pattern of injury, fatal and otherwise, varies considerably depending upon whether the Victim is a vehicle occupant, a motorcyclist a pedal cyclist or a pedestrian¹.

In spite of recent advancement of technology and medical sciences death and deformities. Following road-traffic accident is yet to be controlled successfully rather incidences of RTA has been increasing at an alarming rate throughout the world².

Worldwide the number of people killed in road traffic accidents (RTA) each year is estimated at almost 1.2 million, while the number of injured could be as high as 50 million. Nearly 50 lakh people lost their lives due to injury as per WHO estimates during the year 2002. Road traffic injuries are a major but neglected global public Health problem, requiring concerted efforts for effective and sustainable prevention. Of all the System that people have to deal with on a daily basis road transport is the most complex and the most dangerous³.

The mechanical forces like shearing, strains and biophysical motion that occur during accidents to the head are responsible for patterns of injuries. Road traffic accident is the third major preventable cause of death³.

In 2007, 1.14 Lakh people in India lost their lives in road mishaps that’s significantly higher than the 2006 road death figures in China⁴.

OBJECTIVE

1. To Find Age and Sex wise Distribution in RTA.
2. To Find Distribution of Death according to Mode of Transport
3. To study the distribution of injured persons in road traffic accident by counterpart to which they hit
4. To identify most common cause of Death in RTA and time for accident to death.

MATERIAL AND METHOD

This study was conducted at V.S. General Hospital,
Ellisbridge, Ahmedabad, Gujarat. The study includes cases reported and recorded from 1\textsuperscript{st} January 2014 to 31\textsuperscript{st} June 2014. Data was collected from the Forensic Medicine and Toxicology Department of Smt. NHL Municipal Medical College from the record of Autopsy, after due permission from the responsible authorities. The study encompasses the road traffic accident deaths reported during the 6-month period. Prior to study, approval was taken and confidentiality is maintained in obtaining information related to accident events.

**Study Design** - Retrospective record based study

**Sampling Method:** Case papers of Road traffic accidents from the records section were read and the necessary details were sought in terms of age, sex, mode of transport, victim role, counterpart and outcome of accidents. The cases with inappropriate details were not taken into consideration. The analysis is done by appropriate software and the results were interpreted in terms of mean and standard deviation.

**Sample Size:** A total of 153 RTA cases were studied from the case records of the Forensic Medicine Department records section in the said period from 1\textsuperscript{st} January 2014 to 31\textsuperscript{st} June 2014. All the road traffic accident cases coming in the particular specified time period were taken all the 153 cases were studied and analyzed for the different variables.

**Observation**

Out of total 139 cases, 117 (84.17\%) victims were male and the rest 22 (15.83\%) were female. Highest number of victim in the age group 21-30 years 38 (27.3\%) followed by 31-40 years 27 (19.4\%) in both the sex groups.

**Table 1: Age – Sex wise distribution**

<table>
<thead>
<tr>
<th>Age Group (years)</th>
<th>Sex</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-10</td>
<td></td>
<td>2 (1.7%)</td>
<td>0 (Nil)</td>
<td>2 (1.4%)</td>
</tr>
<tr>
<td>11-20</td>
<td></td>
<td>13 (11.1%)</td>
<td>3 (13.6%)</td>
<td>16 (11.5%)</td>
</tr>
<tr>
<td>21-30</td>
<td></td>
<td>33 (28.2%)</td>
<td>5 (22.7%)</td>
<td>38 (27.3%)</td>
</tr>
<tr>
<td>31-40</td>
<td></td>
<td>22 (18.8%)</td>
<td>5 (22.7%)</td>
<td>27 (19.4%)</td>
</tr>
<tr>
<td>41-50</td>
<td></td>
<td>19 (16.3%)</td>
<td>3 (13.6%)</td>
<td>22 (15.8%)</td>
</tr>
<tr>
<td>51-60</td>
<td></td>
<td>15 (12.8%)</td>
<td>5 (22.7%)</td>
<td>20 (14.4%)</td>
</tr>
<tr>
<td>61-70</td>
<td></td>
<td>13 (11.1%)</td>
<td>1 (4.5%)</td>
<td>14 (10.1%)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>117 (84.17%)</td>
<td>22 (15.8%)</td>
<td>139 (100%)</td>
</tr>
</tbody>
</table>

Almost 50\% cases of RTA occurring in 21-40 years age groups with mean age is 38.6 years, median 36 year, mode 30 years and standard deviation 16.3.

**Table 2: Distribution of Deaths notify by police station**

<table>
<thead>
<tr>
<th>Police Station</th>
<th>Number</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VSPT</td>
<td>34</td>
<td>24.5</td>
</tr>
<tr>
<td>Vejalpur</td>
<td>14</td>
<td>10.1</td>
</tr>
<tr>
<td>Ellisbridge</td>
<td>08</td>
<td>5.8</td>
</tr>
<tr>
<td>Danilimnda</td>
<td>6</td>
<td>4.3</td>
</tr>
<tr>
<td>Kheda Town</td>
<td>5</td>
<td>3.6</td>
</tr>
</tbody>
</table>

Deaths reported from number of police station in Ahmedabad district but highest reported death from VSPT (VS Police Table) 34 (24.5\%) which outside from the Ahmedabad city. In Ahmedabad, highest number of death reported from Vejalpur 14 (10.1\%) followed by Ellisbridge 8 (5.8\%).

**Table 3: Death Distribution According to Vehicle type**

<table>
<thead>
<tr>
<th>Deceased On</th>
<th>Number</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedestrian</td>
<td>36</td>
<td>25.9</td>
</tr>
<tr>
<td>Two Wheeler</td>
<td>61</td>
<td>43.8</td>
</tr>
<tr>
<td>Three Wheeler</td>
<td>09</td>
<td>6.5</td>
</tr>
<tr>
<td>Light Motor Vehicle (Car, Zeep, Aicer etc.)</td>
<td>08</td>
<td>5.8</td>
</tr>
<tr>
<td>Heavy Loaded Vehicle (Bus, Truck etc.)</td>
<td>06</td>
<td>4.3</td>
</tr>
<tr>
<td>No History</td>
<td>19</td>
<td>13.6</td>
</tr>
<tr>
<td>Total</td>
<td>139</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 3 reveals that victims at the time of accident they ride on and deaths occur highest due to Two Wheeler 61 (43.8\%), Pedestrian 36 (25.9\%) and 19 (13.6\%) cases No History available.

**Table 4: Death Distribution According to
According to above table shows that Maximum number of Deaths due to vehicle slips 40 (28.7%) followed by 26(18.7%) deaths in which there is no history available and 21 (15.1%) due to Light Motor Vehicle.

Table 5: Time Distribution from Incidence to Death

<table>
<thead>
<tr>
<th>Time</th>
<th>Number</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatal – 3 days</td>
<td>80</td>
<td>57.6</td>
</tr>
<tr>
<td>4 – 7 days</td>
<td>27</td>
<td>19.4</td>
</tr>
<tr>
<td>&gt; 7 days</td>
<td>32</td>
<td>23.0</td>
</tr>
</tbody>
</table>

Above data shows that Maximum Number of Deaths are occurring within 3 days 80 (57.6%).

Chart 1 : Cause of Death

Maximum Number of Deaths are due to Head Injury 49 (35.2%) followed by Multiple injuries 40 (28.7%) and Head Injury + Complications 24 (17.2%).

DISCUSSION

Maximum Deaths occurring in Male 117 (84.17%) and Female 22 (15.83%). Male to Female Death ratio is 5.31: 1 with mean age 38.63 years. Highest number of deaths is occurring between 21-50 years age group 87 (62.6%) which is most economically active age group in which 38 (43.6%) deaths in 21-30 years age group. Moshiro C et. Al (2005) in their study found that males had significantly increased risk of transport injuries as compared to females.

They also found transport related injuries, To be much common among adults, 15 years and above. Jha et.al (2004) in their study found 83% victims to be male and 17% female victims. The average age of the victims was 31.5 years. The highest number of victims (31.3%) was between 20-29 years of age. Similar results are also seen in the present study.

Ganveer and Tiwari (2005) in their study in Nagpur found that number of male victims(85.8%) was more as compared to female victims (14.2%).The results are similar to our study.

Among all Police Station of VS General Hospital in which deaths are reported; In VSPT (VS Police Table) 34 (24.5%) followed by Vejalpur 14 (10.1%) and Ellisbridge 8(5.8%).

Maximum number of victims rides on two wheelers 61(43.8%) followed by pedestrian 36(25.9), similar result found in Patil et.al (2008) also found that out Of total 129 drivers, 79(61.2%) were motorized Two-wheeler drivers.

According to counterpart by which victims hit due to bike sleeping 40(28.7%) followed by four wheelers (Light Motor Vehicle and High Motor Vehicle) 39 (28.0%) and Maximum number of deaths are occurring within 3 days 80 (57.6%). According to death distribution highest number of deaths due to Head Injury and Head Injury + Complications 73(52.5%) followed by multiple injuries 40(28.7%).

Ethical Clearance : As it was non invasive study. Ethical clearance was not required.

Source of Funding : Self

Conflict of Interest : Nil
REFERENCES

The Role of Care After Leaving in the Prevention of Recidivism

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ABSTRACT

One of the most important organizations of crime prevention, is care centers after leaving. These centers by support and control functions help to prevent the incidence of crime. Continuous efforts after leaving care centers, creates a condition for training, employment, marriage, education, housing, bank loans and so on for the clients. Controlling of clients behavior in the first stage after freedom and improvement of knowledge level, culture and religious believes is achieved by presenting different camps. In these centers to provide a healthy social life and improve the economic, cultural statues and … some special programs have been planned.

Crime prevention has caused lower costs for criminal justice. The prevention of recidivism and return to prison requires the cooperation of various organizations. Therefore, prevention of crimes and return to prison is not only duty of penal organizations but multiple natures of variables of the crime, the participation of communities such as family, employment, education; housing, social services, health and social security are effective issues.

Keywords: After leaving care centers, Prevention of crime, Recidivism, Correcting and training.

INTRODUCTION

Law arises from society and applies on it. The main theme of law is to maintain the foundations of social life so that it prevents violation of privacy and it does systematic support for the oppressed people. Our life in these frames continues. The main use of rights is to prevent crimes in society and between them there is a meaningful relationship. Each part influence on other part.

However, the relationship between these two (society and law) does not fallow a clear method. The society needs law and law needs society. In this relation if the society fallow wrong way so the law correct it. The society response to law and this feedback can refer to correctional supervision and sometimes is called care.

Care and supervision of corrected person has many advantages such as announcing him for more punishment while he repeats the wrong action. Legal scholars learned from this situation to prevent crime and they believe that if suitable control (care) is made, then repeating the crime is trending downward. The opinions of experts in development of legal doctrine in crime prevention are important so evaluating them is necessary.

1-Theoretical bases

1-1 discussing the issue of after leaving care in the view of correction and treatment theory

Nowadays, criminology includes a new penology that emphasizes on the use of society capacities in reforming offenders. This penology defines the offender as a patient and crime is the sign of his illness. So instead of applying punishment to offenders they should help them to create conditions to avoid recidivism¹.

Monthly consecutive contacts between officers of correction and care with offenders by using series of requirements such as professional training, community service, are important parts of care programs. The care
programs are tried to reform and correct offenders. The performance of care plans in face of drug offenders is full of doubts. Many studies have been shown that most of drug offenders continued their criminal activities after releasing of prison. Also many researches showed that there is a direct relationship between using drugs and occurrence of criminal activities.

The system of after leaving cares for prisoners have some advantages like falling cases;” Cost savings, facilitate and accelerate the necessary interventions, prevention of crime and correction in society that in these circumstances, the released persons experience complying with society.

Nowadays, the corrective approached changed to a corrective- therapeutic approach and skilled experts are used for released prisoner in treatment after leaving cares. The difference between the two approaches refers to moral measures of new approach. In corrective-therapeutic method the most focus is on psychological treatments about offenders. Due to sociological findings, re-socialization of offenders is main purpose of care period so that this tool is a useful tool for re-socialization process among released prisoners.

1-2 Remedy theory (recovering)

This concept of justice that means compensation is a new concept in the theory of criminology. The followers of penal justice method insist on the use of punishment and that the penal measures against crime. They believe the only way to fight against crime is to punish felons. The followers of remedying theory believe that real justice does not achieve just by punishment but this issue is achieved by correcting and treatment of vulnerable conditions that lead to crime.

The proponents of recovering justice believe that retributive pattern of criminal justice in the fight against crime has been failed to deal with crimes and preventing them in the future so using of a new model is necessary. They believe that the crime rate is increased and recidivism has become a norm and not an expectation. Most of whom that are sentenced, after the period of imprisonment will repeat their criminal actions. Now we need new thoughts in the field of criminal law that these ideas today entitled as “restorative justice”. In this model offenders can recover damages usefully. Especially, he can rearrange the damages to social discipline. So, in this model, the importance is given to the people. This doctrine focuses on the community more than individuals.

In the process of restorative and recovering justice, facilities and talents in the society are used to recover and correct errors and to identify and define the effects of crime, and by using human resources the errors corrected, with the return of offenders to social life social so created ruptures in social relations are restored. In care period since the offender is not isolated from the society so more opportunities are made for offender in compare to prison to repair the damages to the community.

2-After leaving care centers statute in the prevention of crime

One way to recognize the statute of each organization is to determine the scope and functions of that organization intervention, explaining the relationship between the released prisoner care centers in situations where the structure under the impact of globalization care, under a variety of ideas is different, is an important issue.

2-1 The scope and functions of the centers in the view of Prevention

The mean of scope is area of function and refer to field of actions and mean of scopes in after leaving care centers is scope of operation in these centers. Examining the scope of intervention of the centers of care is necessary. Integrated or randomly care occurs at certain locations and times. Better understanding of the scope and specific opportunities for released prisoners is an essential tool in assessing the interests of the released person by the fusion of traditional and modern models for the prevention of crime.

Here the function is also referring to serve, work and set tasks that are the responsibility of care centers. Functionality can be negative or positive, visible or invisible. In the positive function, the care centers perform measures properly, and in the negative function the negative aspect of activities is shown. In after leaving care centers those functions and intuitive operations that are done implicitly are latent function.

2-2 after leaving care functions in the light of prevention

Regardless of the functions that listed for after
leaving care centers, the transformation of the traditional functions of care to new developments, have been ups and downs.

The first function of care centers as disciplined justification that if there is no after leaving care the performance of preventive measures will be very difficult. Note that while the society exists, the deviation of disciplinary functions in society exists.

According to official aspect of care centers, they can supply the needs of released prisoners in the society as other citizens. Also they can response to a released prisoner parallel to the public and control them by etiology measures.

Disciplinary work in after leaving care centers, values and fundamental rules in the field of crime prevention, gives great effects and guarantee the success of the measures taken in the face of crime and deviation. Due to view of these centers presence of disciplinary operations making regulated, justified and reasonable situations.

The function of disciplinary in care centers is as a public power. Here, the public power is try to discipline operations according to the interest of the society that prevents recidivism.

According to scattering of crimes among society, proper context in the view of prisoner’s deviation is prevented by after leaving care centers. These centers can provide suitable background to supply right of released prisoners in the social life.

Protecting the dignity and sanctity of released prisoner is responsibility of care centers and for them the path of honesty and willingness is paved. The systematic discipline in after leaving care centers without impacting of political forces lead to prevent released prisoners from any kind of deviation in society.

Implementation of laws related to the rights of released prisoners in the country and applying policies and plans after is another disciplinary function of after releasing care centers. Since care issue is relatively a new issue so the institutionalization of this issue in addition cultural and public education needs implementation of the rules and basic tasks. Care centers also with understand the sensitivity of this issue and the scientific-criminological approach is trying to implement relevant laws. The prevention of crime is the responsibility of the institution by applying this approach. Approach of after leaving care centers, is administrative and general approach. Condemning the perpetrators and political look at the issue of crime prevention is leded to disciplinary attention to authorized organizations for released prisoners. Needless to say, a released prisoner is not still an offender so he is not an eternal enemy against society but he is prone to do crime. Only a disciplinary function can prevent shut down or at least slow the process of executive care.

The second function of care centers is to balance between components. Base on these criteria, care centers play moderate role to reform released prisoner. In this case, the care centers guarantee preventive measures and strengthening regulations and that without them successful prevention is not achieved.

Balance in this operation refer to support damaged person and ensure the protection of his rights and compliance them with the main causes of crime prevention. The basic element of care is the prevention and elimination or minimization of hazardous situations. The care centers with balancing living conditions, psychological and cultural situation for released prisoner prevents the occurrence or repetition of offense. The released prisoners that returned to society considered as normal citizen. Care centers by supporting of prisoners retain his contributions to public funds as shareholder.

Due to the functions of balance and harmony, care centers express peaceful coexistence with practicable measures to improve care and management in prevention of crime. Fighting against crime will cause increased level of security and public peace.

Balance of care measures separate path of crime with deviation among released prisoners. By focusing on supporting factors and making suitable decision with stable bases, the theoretic aspects of crime prevention will develop.

The third function of care centers refer to smoothness and refinement. In this scale, the operation and behavior of the released prisoners out of the prison is reformed by using suitable filters.

2-3 Range and scope of centers activities

Since the establishment of such care centers for after releasing from prison in the judicial system in addition to current duties to examine released prisoners records,
other institutions engaged in continuous cooperation with these centers.

Thus, the range and scope of care facilities in these institutions has more effects. Police, Welfare Organization, the Organization of prisons and Corrective Measures Organization with periodic and ad hoc solutions have an important role in care centers.

“In the first step, the scope of activities in care centers cover a holistic and comprehensive operation to imagine that in all areas of security, cultural, social and legal assistance for prisoners after releasing period are provided11.

An integrated approach is created base on a comprehensive relationship between prisoner and care centers. In this case, “the role of traditional political and social institute participation is more in proportion to the division of labor for prisoners but in term of a plurality of centers they are not solved, thus the institutions generally percent their activities for the development of the care measures12.

CONCLUSION

Due to the studies and investigations that have been conducted in this study, it was observed that after leaving care is created as a result of the evolution in criminal legal techniques. It is believed that the society has high importance and in it public health should be considered. In after leaving cares, social welfare and their impact on statute of social health are considered. In after leaving care provisions for prisoners some issues like the law of social welfare, housing rights, the rights of his health, nutrition, food security and individual rights should be considered. It is concluded that functions of care centers in prevention of crime as disciplinary, balancing and refinement function have a comprehensive coverage on released prisoners. However, the care centers should avoid of interference in private life of prisoners. Also their interference should not damage human values since cold behaviors have a negative effect on preventive methods and they are not wise. Also they disorder process of preventive plans.

Conflict of Interest: nil

Source of Funding: both self-funding and university funding

Ethical Clearance: this article is ethically verified by Islamic Azad University of Kerman, Law Department.

REFERENCES

A Case of Sexual Deviation: Ethical Questions Relating to Management

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ABSTRACT
Despite societal and legal proscriptions, sexual deviations have persisted over the centuries. While some experts consider these deviations as mental disorders, some do not. Nonetheless, many of the persons with sexual deviations may seek clinical attention for treatment of their problems. The treatment of such conditions poses ethical challenges to physicians. These include maintenance of confidentiality, responsibility to protect those in danger, coerced treatment, options of irreversible treatment and aversive treatment. The present write up discussed the potential ethical issues faced while dealing a case of sexual deviation.

Keywords: Sexual deviation, Pedophilia, Ethical, Legal, India

INTRODUCTION
Sexual deviations including pedophilia have persisted in the human society since ages.[1] Though there are relatively strict laws to curb certain offensive practices, they have not been absolute deterrent in preventing these behaviors.[2,3] Psychiatrists have debated whether these behaviors should be considered as a mental disorder or not.[4] The present psychiatric nosological systems do give them a diagnostic label,[5,6] perhaps more from a forensic point of view rather than a therapeutic standpoint. This case discussion explores the ethical aspects encountered while dealing with cases of legally unacceptable sexual deviations.

CASE DESCRIPTION
A 22 years old college dropout and currently unemployed man sought treatment at our outpatient for problems relating to sexual urges. The patient had sought help primarily in relation to his urges towards young boys. The patient described that on a few occasions, he had lured boys as young as 6 or 7 year old to his home with sexual desire by offering them small amounts of money. He would fondle and kiss them, and at times attempted unprotected sexual intercourse. He would feel guilty after completing the act. But after a few days time, he would again have an urge to indulge with a young boy and would try to find opportunities for the same. He had attempted intercourse with about 20 children of age 6 to 17 years. Occasionally, some of the children would scream or run away to tell their parents. On discovery of his deed, he has been beaten up by parents and neighbors of the aggrieved children. However, no police case had yet ensued as the parents had not pressed charges.

On exploration of the sexual history, the patient said that he had started masturbation with male fantasies since 13 years of age. He had gained knowledge of sexual matters from friends. He had had homosexual encounters since the age of about 16 years. The patient was staying in a hostel for the period of time and had receptive and penetrative intercourse with his male roommate which was at times unprotected. He had oral and anal intercourse with this person over a period of three years. He would have desire mainly for males and even when he would see a couple, he would be drawn towards the physique and features of the male. His college colleagues came to know about his activities 3 years back and started teasing him as a ‘hijra’ (eunuch). Feeling embarrassed patient dropped out of college but continued to live away from home. He had not openly discussed about his preferences to his parents. The patient during this time also started to have urges towards young boys and attempted intercourse as described above. He has never had sexual urges towards female and feels uncomfortable that the parents are planning for his marriage. He could not sleep properly and would have distress when he thought about his sexual life. Due to social ridicule and apprehension...
that he may not be able to satisfy his wife, he sought treatment to change his preference for young boys and men. He did not have any history of fetishism, fetishistic transvestism, exhibitionism or voyeurism.

The patient would also drink alcohol occasionally when more distressed, though not in an abuse or dependent pattern. There was no sustained elevation of mood along with increased energy levels or any other manic symptoms. There would be occasional sadness of mood and sleep disturbance when he would be thinking about his problems. No evidence of other substance use, sustained and pervasive low mood, generalized anxiety or panic attacks were found. No evidence of antisocial personality disorder could be ascertained from the history. A diagnosis of pedophilia (F65.4) and ego-dystonic sexual orientation (homosexuality) (F66.11) was made as per ICD 10. The patient was started on fluoxetine and clonazepam to aid in controlling his urges. Option of psychotherapy and aversion therapy was discussed with the patient.

DISCUSSION

The gamut of sexual deviations have spanned from relatively innocuous behaviors like fetishism to potentially dangerous ones like sadomasochism and finally those with serious legal concerns like pedophilia. Many of them go unnoticed as the persons concerned do not report it or seek help to change their ways. Some degree of gratification often accompanies the act. What is considered as sexual deviation may be dependent upon values of the society in a particular region and the point of time. Homosexuality was once considered a sexual deviation by societies which consider it now as a normal variant of human sexuality.[7] The present discussion does not focus upon sexual deviations per se, but on ethical issues in treatment of the same.

Penal code

Before the Protection of Children from Sexual Offences Act, 2012, the Indian Penal Code had certain provisions for dealing with issues relating to child sexual abuse. The provisions for trials of such cases relied with article 354 (outraging the modesty of a woman), 375 (rape) and 377 (unnatural offences). However, the new Protection of Children from Sexual Offences Act, 2012[8] has specific provisions for dealing with such cases. It has provision for minimum sentence of 7 years to even life imprisonment. It also has specific set of guidelines for dealing with child pornographic cases, and cases dealing with abetment of such crimes etc. The Act also provides for “Any personnel of the media or hotel or lodge or hospital or club or studio or photographic facilities, ... on coming across any material or object which is sexually exploitative of the child (including pornographic, sexually-related or making obscene representation of a child or children) through the use of any medium, shall provide such information to the Special Juvenile Police Unit, or to the local police, as the case may be.”. This means that a medical facility should report a case where an obscene representation of a child has been made. But presently it does not require a person with perversion seeking treatment voluntarily to be reported immediately by medical professionals.

Confidentiality and duty to the aggrieved party

One of the major ethical issues in such a case dwells around the issue of confidentiality. As clinicians, it is our duty to maintain confidentiality towards our patients. This is true especially for embarrassing symptoms as described for the above case. The patient has urges and even acts upon them occasionally, and has guilt thereafter. The duty of the therapist is to attempt to reduce the behavior as well the distress resulting from the behavior enlisting patient’s or other’s help. But entering into a therapeutic contract entails respecting confidentiality so that patient-therapist trust remains. This trust might need to be broken in situations when the court summons a therapist to give evidence against the patient.

However, one of the exceptions to the rule of confidentiality is when a person’s condition is a threat to others. In this case, the threat to the young children remains. Whether the psychiatrist should inform ‘potential’ victims, their parents, the community services, or the legal services for a patient who voluntarily seeks treatment for these problems? From one point of view, it may not be clear when or who the next victim will be as predicting when the urge is insurmountable is difficult. So in case a person is diagnosed with such sexual deviation, the person may be needed to be incarcerated for a long period of time to curtail the risk even if the person is not psychopathic. The patient may not be willing to disclose the names of past or potential victims, an aspect which may not be of much consequence to the therapeutic process. Should the therapist play an additional role of an interrogator.
in such circumstances to elicit names? Answers to these questions may not be straightforward. Statutory requirements may help potential victims in some cases, but facture therapeutic relationship and keep at bay potentially beneficial treatment for some.

Treatment options including aversive treatment and irreversible treatment

The treatment options available for patients with sexual deviations include pharmacological, psychotherapeutic and surgical (Table 1). The surgical procedure of castration is an irreversible procedure though has shown impressive results in reducing sexually deviant behavior,\(^9\). Whether such a procedure is ethically correct can be debated. Voluntary request of castration for such persons can still be considered justified in some situations and is legally acceptable in some countries.\(^{10}\) However, it may on the other hand contravene with the medical oath of primum nocere, as the person undergoing the surgery would quite possibly be bereft of sexual ability subsequently. Similar arguments can be put forth for chemical castration with agents like leuprorelin and medroxyprogesterone acetate. As compared to surgical castration, the effects of chemical methods are reversible on discontinuation. The issues of coercion with respect to these methods are discussed subsequently.

<table>
<thead>
<tr>
<th>Table 1: Therapeutic options for patients with sexual deviations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pharmacological</td>
</tr>
<tr>
<td>- Antidepressants like Selective Serotonin Reuptake Inhibitor (SSRIs)</td>
</tr>
<tr>
<td>- Antipsychotics</td>
</tr>
<tr>
<td>- Naltrexone</td>
</tr>
<tr>
<td>- Medroxyprogesterone acetate</td>
</tr>
<tr>
<td>- Cyproterone acetate</td>
</tr>
<tr>
<td>- GnRH analogues – Goserelin, leuprorelin</td>
</tr>
<tr>
<td>- Oestrogens</td>
</tr>
<tr>
<td>Psychotherapy based treatment</td>
</tr>
<tr>
<td>- Cognitive behavior therapy</td>
</tr>
<tr>
<td>- Psychodynamic therapy</td>
</tr>
<tr>
<td>- Group therapy</td>
</tr>
<tr>
<td>- Therapeutic community</td>
</tr>
<tr>
<td>- Aversion therapy</td>
</tr>
<tr>
<td>Surgical:</td>
</tr>
<tr>
<td>- Castration</td>
</tr>
</tbody>
</table>

Another ethical issue revolves around use of aversion behavioral techniques in the treatment of sexual deviation. Aversion techniques involve the coupling of painful stimulus with sexual urges and thoughts and works by punishment model. Due to inflicting pain, the procedure has fallen out of favor. The ethical question remains whether use of pain is justified for treatment purposes. There are no controlled studies that have evaluated this modality, but the present standard of care in the form of cognitive behavior therapy has been found to been little effective either.\(^{11}\)

Coercion

One particular issue in this situation pertains to coercion. The patients with problems related to sexual impulses may be under coercion of the justice system to undergo treatment of their condition. Therein, it falls under the purview of the therapist to deliver some therapy (pharmacological, surgical or psychotherapeutic). The patient may not have quite an interest in getting a particular treatment (e.g. chemical or surgical castration),\(^{12}\) but might have to agree to undergo such procedure to ward off a higher punishment or incarceration. Alternatively the patient might be forced to undergo treatment on the instance of the family or community. The ethical debate is whether the physician or psychiatrist should be a party to such a coerced treatment. Utilitarian principles suggest that there is no deterrent to deliver or partake in a procedure provided it is good for the society, whether initiated by the person or the government-legal system. Deontologists may argue that physicians should act in accordance to their own professional mores and not be influenced by the state. Similar arguments may apply whether physicians and psychiatrists should be party to torture to extract information from ‘terrorists’ which might be beneficial to the society as a whole.\(^{13}\)

The authors are of the opinion that physicians and psychiatrists should be aware of such a possibility and should act in the best interests of their patients.

**CONCLUSION**

In conclusion, certain ethical principles need to be borne in mind and some debated when treating persons with sexual deviations, especially those of serious or offensive nature. These concerns relate mainly with issues like confidentiality, duty to present and potential victims, irreversible treatment and coercion for
therapeutic options. Some of the questions like whether coercion should be abhorred have no definite answer. But, being aware of these of issues and acting in an ethical manner will help treatment providers maintain dignity of the medical profession.

Informed consent from participant and Institute Ethical committee approval obtained, as per ICMR Guidelines interviewing patient fall in minimal risk category.

**Source of Funding:** Self

**Conflict of Interest:** Nil

**REFERENCES**


An Analytical Research Study on Medicolegal Cases Attended in Casualty of Chennai Medical College Hospital, Trichy, Tamilnadu from January to September 2016 Year

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ABSTRACT

In India about one lakh thirty thousand deaths occur annually due to road traffic accidents and many women suffer from injuries due to domestic injuries. It is important that doctors working in different hospitals and the police work hand in hand to help the injured. Our legal system has to correct loop holes in the legal procedures to avoid people losing their lives waiting for treatment in medicolegal cases.

A medico legal case is when a person gets injured or harmed in any way and needs medical attention. It also means Injury cases which suggest some criminal offense. Following are classified as medicolegal cases like burn injuries, vehicular accidents including railways and other modes of transport, suspected homicide/murder, poisoning, sexual assault and criminal abortion. Unconscious patient due to unknown reasons, brought dead or die shortly after admission in the hospital without proper medical documents to indicate cause of death also come under medicolegal cases. Patient dying suddenly following administration of medication or when death occurs in the ICU or during surgery can also be classified under medicolegal cases. A medical autopsy is a must to be ordered under all the above circumstances.

It is the legal duty of the treating doctor to report it to the nearest police station immediately after completing primary lifesaving medical care in all medicolegal cases. This is in accordance with Section 39 of Criminal Procedure Code of India. The basic idea is to initiate legal proceeding at the earliest so that maximum evidence can be collected by the police officer. Immediate action by the police also helps to avoid the destruction of evidence by the treating doctor.

Keywords : Medico legal case, injuries, homicide, suicide, accident, evidence, poisoning, assault, death, road traffic accident etc

INTRODUCTION

Inquest is an enquiry into the cause of death. It is conducted where there is suspicion regarding cause of death or cause of death is to be ascertained. On receipt of information about the crime, the investigating officer reaches the scene of crime and takes the stock of the situation. If the person is injured or needs medical assistance, he is rushed to hospital. If the victim is dead, the investigating officer seals the scene of crime and sends requisition for a photographer and if needed finger print expert, ballistics etc to collect evidence. He prepared detailed inquest report and then forwards the body for postmortem examination. Medicolegal reports are document prepared by the doctor on the request of police in criminal cases like assault, rape, murder, poisoning, etc. When the doctor describes the injuries on the body and tells how the injuries may have been produced he acts like an expert witness.¹

Medical evidences may primarily be oral or documentary. For oral evidence a doctor has to attend the court when summoned. Documentary medical evidences include 1. Medical certificates comprising of ill health, fitness, birth and death certificates 2. Medicolegal reports comprising of injury,
postmortem, sexual offences, age estimation report etc 3. Dying declaration.²

Injury is defined as any harm whatever illegally caused to any person in body mind reputation or property (Sec 44 IPC). Wound means any injury where there is breach of natural continuity of skin or mucous membrane. In medicolegal practice, the terms wound and injury are synonymous but strictly wound will include any lesion external or internal caused by violence with or without breach of continuity of skin.³

Examination of injuries by doctor in medicolegal cases will provide information regarding - 1.Site of impact and direction of force used to inflict injury can be known 2.Type of object/weapon used can be known 3.Time of assault can be determined from the age of some types of wounds 4.Ascertain whether simple or grievous injury 5.Can give idea about some type of offences committed like road traffic accident, sexual offence, self inflicted injuries etc 6.Presence of foreign material along with injury such as sand particles, mud, dirt, grease etc may connect the injuries with scene of crime.⁴

Since the nature of infliction of mechanical injuries is accidental, suicidal or homicidal, they are always associated with legal implications. Many such cases find their way to the criminal court. A wound certificate is a medicolegal requirement to be recorded by the attending medical officer in full detail in all cases irrespective of accident, suicide or homicide. It is to be prepared in duplicate with the original furnished to the police as a confidential report and the duplicate to be retained in the institution under confidential safe custody.⁵

Road traffic accidents account for the great majority of accidental deaths worldwide. The purpose of doctor’s examination in traffic accident is to determine the nature and manner of causation of injuries on a pedestrian or the occupants or driver of a vehicle. At times it may be necessary to reconstruct the details of an accident on the basis of the pattern of injuries especially if there are no eyewitnesses. In traffic accidents, apart from examination of injuries sustained, a doctor has to observe whether the driver or pedestrian was suffering from any disease or disability or if there is evidence of intoxication and if so whether the accident could have been a result of that. Identification of the vehicle involved in a hit and run case may be assisted by looking for trace evidence that is likely to have been exchanged between the victim and vehicle at the time of impact.⁶

In case of poisoning, the first duty is the care and treatment of the patient. Secondly comes the legal duty of assisting the police to determine the manner of death. In case of suspected homicidal poisoning the doctor must confirm his suspicion before expressing his opinion. For this he must collect vomit and urine and submit for analysis. A government medical officer has to police all cases of suspected poisoning irrespective of whether it is accidental, suicidal or homicidal poisoning. If condition of patient is serious, he must arrange to record dying declaration and if patient dies, doctor should not issue death certificate.⁷

A mass disaster is considered to have occurred when the number of casualties occurring in a single event exceeds twelve. Biological natural disaster includes earth quake, cyclone, flood, drought, heat wave, volcanic eruption, landslide, disease epidemic and mass poisoning. Man made disasters include transportation accidents, building collapse, mining accidents, fires, food poisoning, explosions, leakage toxic gases or substances, riots, nuclear, biological and chemical war fare, terrorism etc. The duty of doctor in these cases is 1.To establish identity 2.To conduct autopsy and establish cause of death 3.To seek evidence of the cause of the disaster from autopsy examination.⁸

MATERIALS AND METHOD

Casualty Case Sheets, Medicolegal/Accident Register, Statistics Record

FINDINGS

Table 1: Pattern of cases attended in casualty of Chennai Medical College Hospital, Trichy, Tamilnadu (out of 1103 cases)

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Pattern of Cases</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Road Traffic Accidents</td>
<td>33</td>
</tr>
<tr>
<td>2.</td>
<td>Domestic injuries</td>
<td>22</td>
</tr>
<tr>
<td>3.</td>
<td>Assault Cases</td>
<td>04</td>
</tr>
<tr>
<td>4.</td>
<td>Poisoning Cases</td>
<td>16</td>
</tr>
<tr>
<td>5.</td>
<td>Self Inflicted Injuries</td>
<td>04</td>
</tr>
<tr>
<td>6.</td>
<td>Accidents at work place</td>
<td>08</td>
</tr>
<tr>
<td>7.</td>
<td>Miscellaneous</td>
<td>13</td>
</tr>
</tbody>
</table>
Table 2: Sex ratio among victims of road traffic accident cases attended in casualty of Chennai Medical College Hospital

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Sex</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Males</td>
<td>74</td>
</tr>
<tr>
<td>2.</td>
<td>Females</td>
<td>26</td>
</tr>
</tbody>
</table>

Table 3: Sex ratio among victims of domestic injury cases attended in casualty of Chennai Medical College Hospital

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Sex</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Males</td>
<td>18</td>
</tr>
<tr>
<td>2.</td>
<td>Females</td>
<td>82</td>
</tr>
</tbody>
</table>

Table 4: Sex ratio among victims of poisoning cases attended in casualty of Chennai Medical College Hospital

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Sex</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Males</td>
<td>41</td>
</tr>
<tr>
<td>2.</td>
<td>Females</td>
<td>59</td>
</tr>
</tbody>
</table>

Table 5: Age pattern among victims of poisoning cases attended in casualty of Chennai Medical College Hospital

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Age Group</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>15 – 25 years</td>
<td>52</td>
</tr>
<tr>
<td>2.</td>
<td>26 – 40 years</td>
<td>35</td>
</tr>
<tr>
<td>3.</td>
<td>Above 40 years</td>
<td>13</td>
</tr>
</tbody>
</table>

DISCUSSION

It is clear from the above statistical data that road traffic accident cases constitutes the major number of cases brought to casualty of Chennai Medical College Hospital followed by domestic injuries, poisoning cases, accidental injuries at work place, assault cases, self inflicted injuries and other miscellaneous cases. Males are most affected with injuries due to road traffic accident compared to females. The drivers of two wheeler vehicles in the age group of 15 to 20 years and age group of above 40 years are most commonly involved in road traffic accidents due to their inexperience in driving and various disease conditions affecting driving respectively. The pedestrians of age group 21 to 40 years are more involved in road traffic accidents sustaining injuries because of active roaming outside for their daily activities. Coming to domestic injuries, females are more commonly injured compared to males. There is not much difference among males and females with regards to injuries sustained due to assault. In about little more than 50% of poisoning cases, known poison has been consumed and females consume poison to commit suicide more than males and age group of 15 to 25 years consume poison followed by age group of 26 to 40 years. Males commit more self inflicted injuries than females. Likewise males suffer accidental injuries at work place more than females. Based on the above statistical study the casualty department of different levels of hospitals especially peripheral health centres should be well equipped with all the necessary facilities for treating road traffic accidents, domestic injury cases and poisoning cases which constitute major portion of cases brought to casualty.

CONCLUSION

Any case of injury where some crime is involved is called as medicolegal case. It is a legal case for which medical expertise is needed for knowing the causation of injury. Forensic medicine is branch of medicine which deals with application of medical knowledge to aid in the administration of justice. Medicolegal case examination and reporting is minimum and compulsory courtesy duty of the doctor towards the state. Irrespective of whether doctor is working in government or private hospital, he will come across medicolegal case in his day to day practice and hence cannot and should not refuse to examine a medicolegal case. Supreme Court has dispelled the fact that only government hospital doctors have to examine and report in medicolegal cases. A good knowledge in law and learning correct examination procedures and drafting in medicolegal cases will help the doctors to deal with medicolegal cases effectively both in his professional life and in legal issues especially when doctor has to appear in the court of law as expert witness. The duties of the doctor in any medicolegal case will be first to resuscitate the patient and stabilize him suspending the legal formalities. After stabilizing the patient successfully, the doctor should examine the case thoroughly and decide whether it falls under medicolegal case or not. If the doctor feels that particular case is a medicolegal case, then he should inform to the police of nearest police station.
An acknowledgement of intimation given to nearest police station to be maintained for future reference. All hospitals should maintain medicolegal register in their casualty department and full details of these medicolegal cases should be entered and maintained confidential for future reference. No need of registering as new medicolegal case if it has been already registered as medicolegal case in some other hospital. A case may be made as medicolegal case even if it is brought to doctor several days after the incident. The following cases should be considered as medicolegal cases – Burns, road traffic accidents, electrocution, poisoning, sexual offences, suspected criminal abortion, cases of hanging, strangulation, drowning, cases brought by police or sent by court for medical examination, unconscious patient where the cause is not known or not clear, any other case having legal implications. In poisoning cases, vomit and or urine sample should be collected and send for analysis to forensic science laboratory. If the patient is serious, dying declaration should be recorded and if death occurs in a medicolegal case after admission or while treating in outpatient department, death certificate should not be issued. The death in such cases should be informed to the nearest police station immediately.

Acknowledgement: Nil

Ethical Clearance: Casualty department, Chennai Medical College Hospital & Research Institute, Irungalur, Trichy, Tamilnadu.

Source of Funding: Self

Conflict of Interest: Nil

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Study of Rigor Mortis and Factors Affecting its Development for Determination of Postmortem Interval

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ABSTRACT

Rigor mortis, a physico-chemical change that occurs within muscles after death, is one of the significant component in determination of post-mortem interval in warm countries like India, though its development is affected by various factors. This prospective study was carried out to evaluate and interpret variations in development of rigor mortis with respect to cause of death and media from which the body was brought and to determine time and sequence of its development in various muscle groups and joints. It was observed that commencement and full development of rigor mortis is earlier in deaths due to infectious conditions, regional injuries, head injury and deaths due to poisoning as compared to that of deaths due to hanging. Rigor commenced late and developed fully late in water media as compared to air media. It appeared first in the eyelid, then in the face, followed by neck, upper limbs, trunk, lower limbs and lastly the fingers and toes. It disappeared in the same order as it appeared.

Keywords- Rigor mortis, post-mortem interval, media.

INTRODUCTION

Determining the post-mortem interval has always been a topic of keen interest amongst the forensic pathologists from its inception till date. The interval between death and the time of examination of body is known as post-mortem interval. In criminal cases, it can set the time of murder, eliminate or suggest suspects, confirm or disprove an alibi. In civil cases, the time of death might determine who inherits property or whether an insurance policy was in force. Unfortunately, all methods now in use to determine the time of death are to a degree unreliable and inaccurate. Rigor mortis is the stiffening of the muscles, sometimes with slight shortening of fibres, which follows the period of primary flaccidity. Rigor mortis along with other conventional methods like post-mortem cooling of body and post-mortem lividity can give approximate range of time of death. However, onset and duration of rigor mortis is altered by conditions like age, muscular state of deceased, temperature, cause of death and media from which the body is brought. Hence, this research work has been carried out to study effects of cause of death and media from which the body is brought on development of rigor mortis and to establish time and sequence of appearance, development and disappearance of rigor mortis.

MATERIAL AND METHOD

This prospective research work was carried out in the Department of Forensic Medicine and Toxicology, Indira Gandhi Government Medical College, Nagpur over a period of one year. Total 141 cases brought for medicolegal post-mortem examination over a period of one year were observed, studied for maximum duration and analyzed.
Inclusion criteria-
1) Dead bodies which were kept under room temperature.
2) Dead bodies in which exact time of death was known.

Exclusion criteria-
1) Dead bodies which were kept in cold storage.
2) Dead bodies in which rigor mortis was broken by untrained attendants due to rough handling.

Rigor mortis was noted as soon as body was received in mortuary. Clothes, age, sex, weight, media from which the body was brought and environmental temperature were noted and the date and time of death were recorded. Time taken for appearance and disappearance of rigor mortis was noted at every half hour till 36 hours. Rigor mortis was appreciated by lifting the eyelids, pressing downwards the jaw and gently flexing the neck and various joints of the body. The sequence and time taken by different muscle groups to become rigid was recorded. Medicolegal autopsy was performed and cause of death was determined.

**OBSERVATIONS AND RESULTS**

Variations in development of rigor mortis according to causes of death

In present study all 141 cases were divided as per the causes of deaths as shown in table no.1. Maximum number of cases were of deaths due to infectious diseases i.e. 35 (24.82%) and minimum number of cases were of deaths due to electrocution i.e. 5 cases (3.54%). This bulk in the infectious causes of deaths was due to merging of cases developing septicaemia secondary to burns or injuries.

It was observed in the study that mean time for the appearance of rigor mortis in cases of deaths due to infectious conditions was 1.06 hrs with a range of 30 minutes to 2:00 hrs and the mean time required to develop full rigidity was 7.28 hrs with a range 5:30 to 9:00 hrs. Similarly, mean times for commencement of rigor mortis in deaths due to regional injuries and head injuries were 1.24 hrs and 1.37 hrs and the ranges were 30 minutes to 2:30 hrs and 30 minutes to 3:00 hrs, respectively. The mean time taken for the onset of rigor mortis in deaths due to poisoning was found to be 1.29 hrs having range of 30 minutes to 2:30 hrs and for its full development was 8:30 hrs with range of 5:30 - 12:00 hrs. Mean time for appearance of rigor mortis in deaths due to hanging was 2.11 hrs and the range was 1.00 to 3.00 hrs. Also, mean time for full development was found to be 9.20 hrs having the range of 7.30 hrs to 11.00 hrs. From above findings, it is evident that rigor mortis appears and fully develops early in deaths due to infectious conditions, regional injuries, head injury and deaths due to poisoning as compared to that of deaths due to hanging. In present study, we studied 5 cases which died due to electrocution. Rigor mortis was found to be well marked in all the 5 cases in duration of 3:00-5:30 hrs.

Variations in development of rigor mortis according to media from which the body was brought

In present study out of 128 cases evaluated, 119 cases were from air media and 9 cases were from water media. Out of 9 cases from water media, 7 cases were of deaths due to drowning. Mean time for the appearance of the rigor mortis in air media was found to be 1.26 hour with the range of 0 to 3:00 hrs and the time required for full development in the same media was found to be 7.57 hrs with the range of 5:00 hrs to 12:00 hours. On the contrary, mean time for appearance of rigor mortis in water media was found to be 3.03 hrs with the range of 2:00 - 4:00 hrs and the time required for its full development was found to be 8.48 hrs with the range 7:30 - 10:00 hrs. Thus, it was seen that rigor commences late and develops fully late in water media as compared to air media.

Appearance and disappearance of rigor mortis in various groups of muscles and joints and time since death

To summarize the time required and sequence of appearance of rigor mortis in various joints and different group of muscles, 121 cases were studied as a one group irrespective of intrinsic and extrinsic factors. Out of 121 cases, the examination of rigor mortis in eyelids was possible in 106 cases .The mean time for appearance of rigor mortis in eyelids was found to be 1.39 hrs with a range 0 to 3:00 hours. Subsequently, 108 cases out of 121 were observed for rigor mortis in face and the mean time for its appearance in face was 2.08 hrs with a range 30 minutes to 4:00 hrs. Mean time for the appearance in neck was found to be 2.40 hrs with the range of 1:
00 to 4:30 hrs. In upper limbs excluding fingers, mean time for the appearance of rigor mortis was found to be 3.10 hrs with the range of 1:00 - 4:30 hrs. Its appearance in the trunk was found to be in the mean time of 3:45 hrs with the range of 1:30 - 6:00 hrs and in the lower limbs excluding toes it was found to be 4.34 hours with the range of 2:00 - 7:00 hrs. Rigor mortis in fingers appeared in the mean time of 6.40 hrs with the range of 3:00 to 9:00 hrs, while in the toes it was 7.10 hrs with the range of 3:30 - 10:00 hrs. Hence, it can be concluded that appearance of rigor mortis was found in the following classical sequence i.e. appeared first in the eyelid, then in the face, followed by neck, upper limbs, trunk, lower limbs and lastly the fingers and toes. Complete disappearance of rigor mortis was found in 39 cases in the range of 20.30-36.00 hrs. It disappeared in the same order as it appeared.

**DISCUSSION**

**Variations in development of rigor mortis according to causes of death**

Polson CJ and Gee DJ observed that violent exertion shortly before death, deaths caused by convulsing poisons, violent death by cut throat, firearms or electrocution, hastens the onset and passing of rigor mortis. It is early to appear and passes early in death from septicemia or wasting diseases. Rigor mortis is delayed in asphyxial deaths notably by hanging or carbon monoxide poisoning. Spitz WU found that appearance and disappearance of rigor mortis is accelerated by prior exercise, convulsions, electrocution, and hyperpyrexia or hot environmental temperature. Knight B stated that factor modifying the speed of onset of rigor was physical activity shortly before death. Parikh CK quoted that rigor might appear early and pass off quickly due to depletion of glycogen stores in long continued febrile and chronic diseases and some convulsive disorders. Reddy KSN stated that in deaths from diseases causing great exhaustion and wasting e.g. Cholera, typhoid, tuberculosis, and cancer and in violent deaths as by cut-throats, firearms or by electrocution, the onset of rigor is early and duration is short. In deaths from asphyxia and nervous diseases causing paralysis of muscles, the onset is delayed.

We found that commencement and full development of rigor mortis is earlier in deaths due to infectious conditions, regional injuries, head injury and deaths due to poisoning as compared to that of deaths due to hanging. Thus, our observations regarding causes of death and appearance and development of rigor mortis are consistent with the findings of Polson CJ and Gee DJ, Spitz WU, Parikh CK, Reddy KSN and Knight B.

The reason for early commencement and full development of rigor may be due to hyperpyrexia at time of death in infectious conditions, which accelerates the breakdown of ATP. In regional injuries, it may be due to severe loss of blood. In deaths due to hanging, the mean average duration for appearance of rigor was delayed. The reason may be paralysis of muscles at the time of death in hanging.

Rigor mortis in cases of electrocution showed a relatively quick appearance and full development. The route cause for this rapid onset and short duration of rigor mortis may be severe muscle contractions that occur during convulsions as the electric current passes through the body, which ultimately causes the depletion of ATP.

**Variations in development of rigor mortis according to media from which the body was brought**

Mant AK observed that the bodies sunk in the cold water would retain the rigidity for a long time. Cold water also tends to retard putrefaction. Kannan stated that rigor mortis comes on rapidly and disappears late in bodies immersed in cold water.

We observed that rigor commences late and develops fully late in water media as compared to air media and our findings are consistent with the findings of Mant AK. The reason might be due to the cold environmental temperature of the water media, which slows the chemical reaction and therefore delays the process of rigor mortis.

**Appearance and disappearance of rigor mortis in various groups of muscles and joints and time since death**

Nandy A observed that in summer, rigor mortis appears first in the muscles of eyelids by the end of 1st hour and then it spreads gradually in the muscles of the face, neck, jaw, thorax, upper limbs, abdomen and lower limbs and lastly the muscles of fingers and toes. Singh D and Dewan observed that rigor mortis commences first in the eyelids followed by lower jaw,
neck, upper limbs and lower limbs with fingers and toes in the last. It disappeared in the same order as it appeared. Mant AK\(^8\) observed that rigor mortis first starts in the muscles of eye, face, neck, trunk, and then spreads to the muscles of upper extremities and lastly in legs. Parikh CK\(^7\) stated that rigor mortis first appears in the muscles of the eyelids, then in the muscles of face, neck, trunk, followed by muscles of upper extremities and then the legs and lastly in small muscles of fingers and toes. It passes off in the same order in which it appeared. In India, rigor mortis commences in 1-2 hours after death, takes about 12 hours to develop from head to foot, persist for another 12 hours and takes 12 hours to pass off. According to Reddy KSN,\(^3\) in India, rigor mortis begins in 1-2 hours after death and takes further 1-2 hours to develop. It lasts 24-48 hours in winter and 18-36 hours in summer. As per Camps FE,\(^2\) rigor mortis first appears in the face, and then spreads to the neck and upper limbs, trunk and lower limbs. Those muscles first to develop rigor are first to become flaccid again and rigor usually stays longest in the lower limbs.

In our study from above observations, it is evident that the appearance of rigor mortis followed the classical sequence i.e. appeared first in the eyelid, then in the face, followed by neck, upper limbs, trunk, lower limbs and lastly the fingers and toes. It disappeared in the same order as it has appeared. The sequence of appearance and disappearance of rigor mortis in this study is more or less consistent with the sequence as described by Nandy A,\(^10\) Singh D and Dewan I,\(^11\) Mant AK\(^8\) and Camps FE,\(^2\). In our study, the mean average time duration of commencement of rigor mortis was in agreement with the observations of Parikh CK\(^7\) and Reddy KSN.\(^3\)

The reason for the sequence may be, as rigor mortis is a physico-chemical process, it involves completely, small masses of the muscles much more rapidly than large masses. Thus, variations in the sizes of different joints and in the muscles which control them, determine the fixation of joint and produce an apparent proximo-distal progression of rigor, which is consistent with the present study. The reason for early appearance in eyes as stated earlier is due to the smaller muscle mass in the eyes as rigor mortis depends totally on the muscle bulk. The reason for late appearance in fingers and toes may be due to the reason that fingers and toes are attached to the limbs by means of tendons and ligaments extending from forearm and legs respectively. Thus the fingers and toes rigidity is fully appreciated when the formers became rigid. This sequence is maintained during disappearance of rigor mortis when putrefaction sets in.

Table showing distribution of cases in which rigor mortis was studied in relation to various causes of death

<table>
<thead>
<tr>
<th>Causes of death</th>
<th>Total No. of cases</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head injury</td>
<td>22</td>
<td>20</td>
<td>02</td>
</tr>
<tr>
<td>Regional injuries</td>
<td>15</td>
<td>14</td>
<td>01</td>
</tr>
<tr>
<td>Infectious diseases</td>
<td>35</td>
<td>22</td>
<td>13</td>
</tr>
<tr>
<td>Hanging</td>
<td>11</td>
<td>05</td>
<td>06</td>
</tr>
<tr>
<td>Poisoning</td>
<td>29</td>
<td>19</td>
<td>10</td>
</tr>
<tr>
<td>Natural</td>
<td>09</td>
<td>07</td>
<td>02</td>
</tr>
<tr>
<td>Drowning</td>
<td>07</td>
<td>06</td>
<td>01</td>
</tr>
<tr>
<td>Electrocution</td>
<td>05</td>
<td>04</td>
<td>01</td>
</tr>
<tr>
<td>Shock due to burns</td>
<td>08</td>
<td>0</td>
<td>08</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>141</strong></td>
<td><strong>97</strong></td>
<td><strong>44</strong></td>
</tr>
</tbody>
</table>

CONCLUSION

1) Rigor mortis develops early in deaths due to infectious conditions, regional injuries, head injury and deaths due to poisoning as compared to that of deaths due to hanging.

2) Rigor mortis develops early and is of short duration in cases of electrocution.

3) Rigor commences late and developed fully late in water media as compared to air media.

4) Rigor mortis appeared first in the eyelid, then in the face, followed by neck, upper limbs, trunk, lower limbs and lastly the fingers and toes. It disappeared in the same order as it appeared.

**Ethical Clearance** - Necessary ethical clearance has been taken from ethics committee of institute.

**Source of Funding** - Self
References

Study of Estimation of Stature from Hand Length at Tumkur Region of Karnataka

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ABSTRACT

Background: Estimation of stature from hand length differs in various researchers in different ethnic groups. Same is done here to derive the regression equations for correct estimation of stature from hand lengths in tumkur region. **Material and Method:** The present study was conducted on 120 medical students (60 males and 60 females) of Shridevi institute of medical sciences and research hospital, tumkur. The right and left hand length and height was measured by the same observer with same instrument and between 2.00pm-4.00pm. **Results:** Observations were analysed and tabulated. Regression equations for estimation of stature are derived for both right and left hand in both sex and coefficient correlation of height with respect to right and left hand was also calculated. P value was found to be significant in all cases. **Conclusion:** The present study would be useful for prediction or estimation of stature from hand length in forensic investigations and anthropology.

**Keywords:** Stature; Height; Hand length; Regression equation; Coefficient correlation.

INTRODUCTION

The stature of an individual is an inherent characteristic which varies with race and is determined by genetic constitution of a person, geographical location, environment and climatic conditions. With increasing frequency of mass disasters, it is essential to find out correlations between stature, age and sex of an individual with variable information collected from different systems, organs or its parts which is of immense value in forensic medicine. Estimation of stature from incomplete skeletal and decomposing human remains is particularly important in personal identification. The relationship between specific body dimensions / proportions can be used to help solve crimes in the absence of complete evidence. For example, it has been proved that stature can be estimated from imprints of the hand, foot or footprints or from a shoe left at the scene of a crime. Similarly, the stature of a victim can be estimated when a part of body, such as a long bone, or hand, is all that remains.

**MATERIALS AND METHOD**

The present study was conducted on 120 medical students, who are randomly selected (60 males and 60 females) of Shridevi institute of medical sciences and research hospital, tumkur after obtaining informed consent from the students. The age of the students ranged from 20-23 years who belonged to South Indian region. The hand length was measured as the direct distance between distal wrist crease and the distal end of the most anterior projecting point of the middle finger, was measured using a sliding calipers. Measurements of length of right hand and left hand were taken separately for calculation. Height was measured by measuring crown to heel distance in standing erect posture with head in Frankfurt plane. All the measurements were taken between 2:00pm to 4:00pm to eliminate discrepancies due to diurnal variation and further recorded by the same person to minimise the errors in methodology. Statistical analysis was done using SPSS software.
RESULTS

The observations were analysed separately for both right and left hand for males and females and results are tabulated in table 1, 2 and 3.

| Table 1: Shows Range, Mean and Standard deviation for right hand length, left hand length and height for males and females |
|---|---|---|---|---|---|
| Parameter | Males | | | Females | |
| | Range | Mean | SD | Range | Mean | SD |
| Right hand length | 17-21 | 18.91 | 0.872 | 14.5-19.6 | 17.46 | 1.009 |
| Left hand length | 17-20.7 | 18.88 | 0.825 | 14.5-19.6 | 17.41 | 1.017 |
| Height | 159-185 | 171.89 | 5.302 | 145-176 | 158.77 | 5.864 |

Correlation coefficient (r) between height and length of the right hand is 0.58 and between height and length of left hand is 0.63 which shows significant positive correlation in males. Similarly for females correlation coefficient of height with right hand length and left hand length are 0.63 and 0.65 respectively, P value in all cases is <0.001 which was statistically significant.

| Table 2: Shows Correlation coefficient of height with right hand length and left hand length and P values for males and females |
|---|---|---|---|---|---|
| Correlation with height | Males | | | Females | |
| | Coefficient | P value | Coefficient | P value |
| Right hand length | 0.58 | < 0.001 | 0.63 | < 0.001 |
| Left hand length | 0.63 | < 0.001 | 0.65 | < 0.001 |

The relationship between the changes of a dependent variable (say, y) and an independent variable (say, x) was ascertained by simple linear regression, with regression equation was y = a + bx (where a = y intercept, when x =0). The standard error of estimates in males for right and left hand is 4.34 and 4.11 and for females are 4.58 and 4.49 respectively. At 95% confidence interval, the final equation was y = (a +bx) ± (1.96 x Standard error of estimate).

| Table 3: Linear Regression equation and standard error of estimate for right hand length and left hand length in males and females |
|---|---|---|
| Regression equation | R square | SE of estimate |
| Males | | |
| Height= 104.9+3.53(right hand length) | 0.399 | 4.34 |
| Height= 94.4+4.1(left hand length) | 0.423 | 4.11 |
| Females | | |
| Height= 94.7+3.67(right hand length) | 0.339 | 4.58 |
| Height= 93.5+3.74(left hand length) | 0.408 | 4.49 |

DISCUSSION

Stature is one of the primary characters for the identification of a person 6. From the present study, the results obtained are in par with the studies conducted by Patel JP et al 7 (where in correlation coefficient (r) of height with right hand length and left hand length for males are 0.510 and 0.504 and in females 0.540 and 0.542 respectively) Illayperuma I et al 3’(where in
correlation coefficient (r) of height with hand length for
males is 0.58 and for females is 0.59).

Studies conducted by Pal A and Geeta GN reported
different equations for males and females for estimation of stature from hand length. Similarly in our
study also we have derived different linear regression
equation for stature prediction from right and left hand
length separately for both sex.

CONCLUSION

In our study we found that there is strong correlation
between stature and hand length and would be useful
for estimation of stature from hand length in forensic
investigations and anthropometry. So in this study we
have derived a separate linear regression equation to
estimate stature from hand length of medical students
who represents the South Indian population.

Conflict of Interest: Nil.

Source of Funding: Self.

Ethical Clearance: Obtained from the Institutional
Ethical Committee.

REFERENCES


Study of Pattern of Internal Injuries of Neck in Fatal Ligature Compression

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ABSTRACT

Deaths by ligature have always been common in the society. The manner of death being suicidal, accidental or homicidal has always been a controversy faced by an autopsy surgeon. Due to the variability of the appearance of the external lesions in different mannerism of mechanical asphyxia’s the autopsy surgeon is highly dependent upon the history and the circumstances of the death. This study was undertaken in an attempt to identify specific internal lesions in cases of ligature compression of neck. We studied 46 cases of suicidal hanging and 12 cases of ligature strangulation. All the internal lesions were categorized and their correlation was sought in various manner and mode of asphyxia. Strap muscle haemorrhages, laryngeal fractures and tongue bleed were found to be more prevalent in strangulation than hanging. Absence of external injuries points more towards the case being suicidal hanging.

Keywords: Hanging, Ligature Strangulation, Tongue bleed, Neck Compression, Hyoid Fractures, Thyroid Fractures.

INTRODUCTION

Asphyxial deaths due to fatal compression of neck by ligature are commonly encountered by Forensic Pathologists¹. There is a thin line of distinction to decide the manner in fatal compression of neck by ligature particularly when there are allegations of foul play with equivocal circumstances. Some of these cases challenge even an experienced forensic expert in differentiating the manner of death. The external and internal neck findings help a lot on arriving at a proper cause of death²-⁵. But in some cases the external findings are so indistinguishable that they are little help to arrive at logical conclusion about the manner of death to be hanging or homicidal ligature strangulation, which is an important aspect of medico legal autopsy. Thus internal examination of neck injuries can definitely give a clue towards proper diagnosis. The hemorrhagic lesions in the tongue can also be a guide towards the mode of compression of neck⁶. We aimed to study the internal injuries over the laryngeal complex, strap muscles, bleeding in the tongue, hemorrhage in the vocal cord, epiglottis and tonsilar beds in cases of ligature compression of neck and note down there frequency with each type of the ligature death.

MATERIALS AND METHOD

The study was conducted at University College of Medical Sciences and Guru Teg Bahadur Hospital, New Delhi. All the cases with alleged history of fatal neck compression were included in the study, except where the dead body was severely decomposed, which would have affected the observation of findings. A thorough dissection of the larynx was done according to the Pollanen technique⁷. The larynx was inspected for the evidence of injury i.e. laryngeal cartilages and haemorrhages into the soft tissues. In the present study the tonsils and the tonsilar bed were also inspected. After removal of the tongue, as a whole organ the dissection was done as per Maxeiner method. In cases of doubtful neck & tongue hemorrhages, the specimens from these areas were taken for histopathology. Similarly laryngeal framework was observed for vocal fold haemorrhages, epiglottic haemorrhages, and tonsilar bleeds, which along with associated external injuries were grouped...
together as Minor criteria.

RESULTS AND OBSERVATIONS

The study comprised of a total of 68 cases of fatal ligature compression out of which 46 cases were of hanging and 12 cases of ligature strangulation. The hanging cases showed a high frequency of cases in younger age groups whereas no substantial trend regarding age distribution was noted in strangulation cases. The overall male to female ratio was found to be 0.92 in hanging and 1.4 in strangulation cases (Table-1). All the hanging cases were suicidal in nature. Out of strangulation cases 3 were accidental and rest 9 were homicidal.

TABLE-1: AGE AND SEX DISTRIBUTION OF CASES

<table>
<thead>
<tr>
<th>Age group</th>
<th>HANGING</th>
<th>STRANGULATION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>1-10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>11-20</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>21-30</td>
<td>14</td>
<td>12</td>
</tr>
<tr>
<td>31-40</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>41-50</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>&gt;50</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>22</td>
<td>24</td>
</tr>
</tbody>
</table>

In hanging soft tissue hemorrhage were found in 20 (90.9%, out of 22 cases) in males and all 24 cases in females. In strangulation it was found in 100% of cases in both males and females.

In hanging, strap muscle haemorrhage were found in 4 (18.18%, out of 22 cases) in males and 7 (29.16%, out of 24 cases) in females. In strangulation it was seen in 5 (71.4%, out of 7 cases) in males and 2 (40%, out of 5 cases) in females.

Hyoid bone fractures were found in 3 (6.5%) cases, out of which two cases were of age group of 41-50 years. In strangulation hyoid fractures were seen in 3 cases (25%). Thyroid cartilage fractures were found in 2 cases of hanging (4.3%) and 4 cases of (33.33%) ligature strangulation.

TABLE-2: AGE- WISE DISTRIBUTION OF HYOID AND THYROID FRACTURES

<table>
<thead>
<tr>
<th>Age group</th>
<th>Hyoid Fracture</th>
<th>Thyroid Fracture</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hanging</td>
<td>Strangulation</td>
</tr>
<tr>
<td>1-10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>11-20</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>21-30</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>31-40</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>41-50</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>&gt;50</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>3 (6.5%)</td>
<td>3 (25 %)</td>
</tr>
</tbody>
</table>

Tongue bleeds were found in a total of 6 cases (13.04%) in hanging and 7 cases (58.33%) in strangulation. In strangulation all the tongue bleeds were found in the base of the tongue. In hanging 5 cases had bleeds in the base of the tongue, and 1 case had bleed in the body of the tongue on the right side.
TABLE-3: TONGUE BLEED POSITION IN HANGING AND STRANGULATION

<table>
<thead>
<tr>
<th>Tongue bleed position</th>
<th>HNG/STR</th>
<th>STR</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hanging</td>
<td>Strangulation</td>
<td>Total</td>
</tr>
<tr>
<td>Base</td>
<td>5</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>Other place</td>
<td>1</td>
<td>NIL</td>
<td>1</td>
</tr>
<tr>
<td>Not present</td>
<td>40</td>
<td>05</td>
<td>45</td>
</tr>
<tr>
<td>Total</td>
<td>46</td>
<td>12</td>
<td>58</td>
</tr>
</tbody>
</table>

Four other minor criteria were also recorded in the 58 cases of hanging and strangulations:- 1) Associated external injuries, 2) Vocal fold hemorrhage, 3) Epiglottic hemorrhage and 4) Tonsilar bleed. The associated external injuries were found in 2 cases of strangulation. Vocal fold hemorrhages were found in only 2 cases of hanging (1 male, 1 female) and a single case of strangulation that was a male. Epiglottic hemorrhage was present in only a single case of hanging and that being a female. Tonsilar bleed were seen in 8 cases of hanging out of which 5 were males and 3 females.

TABLE-4: MINOR CRITERIA

<table>
<thead>
<tr>
<th>Minor criteria</th>
<th>Hanging</th>
<th>Strangulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Associated Injuries</td>
<td>NIL</td>
<td>2</td>
</tr>
<tr>
<td>Vocal fold hemorrhage</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Epiglottic hemorrhage</td>
<td>1</td>
<td>NIL</td>
</tr>
<tr>
<td>Tonsilar bleed</td>
<td>8</td>
<td>NIL</td>
</tr>
</tbody>
</table>

DISCUSSION

Ligature compression of neck is seen both in hanging and strangulation cases. Various researchers all over the world have been studied the internal and external findings in the neck in these cases to establish a diagnostic criterion. The internal findings are influenced by many factors like age and sex of an individual, type of ligature material, knot positions etc.

The age distribution in hanging cases showed a peak in the age group of 21-30 years, followed by 11-20 years and 31-40 years respectively which is consistent with the previous studies. The overall male to female sex ratio was 0.92 in hanging cases which was in contradiction of the previous studies. Soft tissue haemorrhages did not seem to be a reliable criteria to differentiate between hanging and strangulation cases. The strap muscles haemorrhage was found to be more associated with strangulation (58.3%) than hanging (23.9%). James found soft tissue hemorrhage in 29% of hanging cases. Nikolic found injury to sternocleidomastoid to be most frequent injury in hanging cases.

The studies done in the past have reported varied incidence of Hyoid and Thyroid fractures in neck in hanging cases. The studies which compared the incidence of laryngeal fractures in hanging and strangulation cases found them to be more frequently associated with ligature strangulations. Knight and Morlid recommended and stressed on the importance of radiography before dissection in diagnosing the laryngeal fractures and its usefulness in diagnosing fine laryngeal fractures. Charoonnate reported that in cases, where no fractures were revealed by visual and palpatory methods only, use of subsequent stereomicroscopy and stereomicroscopy with toluidine blue stain revealed fractures to be present in 15% of the cases.

Tongue bleed varies in hanging from 0 to 14% and in strangulation from 5 to 37%. Bockhold reported haemorrhages in tongue to be present in 25% of strangulation cases and 2% in hanging cases that to due to presence of abnormal position of loop. In the current study also tongue bleed was more prevalent in strangulation than in hanging cases.

Hanging cases are mostly suicidal in nature with no signs of struggle or associated injury. In the current study also, no associated external injury was observed in hanging cases. Tonsilar bleed were seen in 8 cases of hanging which is 17.3% cases. The vocal fold and epiglottic hemorrhage were though found more in hanging cases but their percentage cannot be considered as a reliable differentiating criterion.

CONCLUSION

We can conclude considering the findings of the present study that strap muscle hemorrhage, tongue bleed, associated external injuries and thyrohyoid fractures are more likely to be found in cases of ligature strangulation than hanging. Soft tissue, Vocal fold and epiglottic hemorrhages cannot be considered as reliable differentiating criteria between hanging and ligature strangulations. Internal examination of neck and its findings can definitely give a clue towards proper diagnosis of equivocal asphyxia deaths. A more detailed approach can lead to finding of data supportive of the findings noted in the above study and generation of easily diagnosable criteria’s for differentiating the manner in suspected cases.

Conflict of Interests: None
Source of Funding: Nil required.

Ethical Clearance: UCMS Thesis Protocol Committee

REFERENCES


A Study of Homicidal Deaths in Kalaburagi

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ABSTRACT

One of the oldest crimes in human civilization is killing of one person by another. With passage of time the manner of homicide is being changing. The present study is carried out from January 2015 to December 2015 at Department of Forensic Medicine, Gulbarga Institute of Medical Sciences (GIMS), Kalaburagi, Karnataka, to know the incidence of homicidal deaths in Kalaburagi. As GIMS is a Government Institution almost all the autopsies of homicidal deaths in Kalaburagi are carried out here. During the present study period we have conducted 659 autopsies out of which 37 were alleged homicidal deaths. It formed 5.61% of all the autopsies performed. Homicidal deaths due to blunt trauma are most common followed by burns and sharp weapon injuries. We also observed that most of the victims belonged to the age group 21 to 40 and males outnumbered the females. There was not a single case of infanticide or homicide by firearm during the study period.

Keyword: homicide, blunt trauma, burns, age group etc

INTRODUCTION

Homicide is defined as killing of one human being by another. Homicide is most heinous crime known to mankind right from civilization to present day but motives have been changed. However not all the homicides are murders as some killings are lawful and some are justifiable.

Day by there is increase in the rate of homicidal deaths. This may be due to increase in population, stress, negative impact of media, change in life style, poverty, rapid urbanisation, increase in drug addiction, gambling, illiteracy, drug addiction and easily availability of weapons etc.

Homicidal investigations can never be complete without a detailed post mortem examination. The detailed and scientific interpretation of post mortem findings is very much important to reconstruct the crime¹.

To commit murder two elements should work together viz Mens – Rea means preplanning and Actus reus means actual execution².

Various methods by which homicide is carried out are stabbing, by blunt force, cut throat, strangulation, burns, poisoning, smothering etc.

In view of magnitude and frequency of such deaths and its impact on the society present study is carried out to establish the incidence of homicidal deaths in Kalaburagi and to know different methods used to kill others, vulnerable age group, sex.

MATERIAL AND METHOD

Present study is carried out in the Department of Forensic Medicine, GIMS, Kalaburagi from the period January 2015 to December 2015, a period of one year.

All the medico legal cases brought for post mortem examination to the mortuary of GIMS teaching hospital with alleged history of homicidal deaths are included in the study. Detailed information regarding the victim, circumstances of crime was collected by interaction with police, victims relatives and friends.

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OBSERVATION AND RESULTS

Out of 659 medico legal autopsy cases conducted in GIMS, teaching Hospital Kalaburagi from January 2015 to December 2015, 37 cases (5.61%) were alleged homicidal deaths.

In the present study we observed that most of the victims of alleged homicide were males (23 cases 62.16%). Female victims numbered 14 (37.84%) (Table No 1). Most of the victims were in the age group of 21 to 30 (total 15 cases 40.5%), followed by 31 to 40 years (10 cases 27%) (Chart No 1). There was not a single case of infanticide in our study.

Out of 37 homicidal deaths, most of the cases were due to blunt trauma (13 cases 35%) followed by burns (11 cases 30%) (Table No 2). In males most common way of assault was blunt trauma 12 cases followed by sharp injuries (6 cases). In females burning was the most common method as per the allegations (10 cases). We also encountered with one homicidal poisoning case in both the sexes. In post mortem examination there were injuries on the body. However there was not a single case of homicidal death by fire arm.

DISCUSSION

The incidence of homicidal deaths varies from country to country and from region to region in same country. During the period of the above study, we have conducted 659 medico legal post mortem examinations out of which 37 were homicidal. It accounts to 5.61%. Sinha et al\(^3\), Shivkumar B C et al\(^4\), Bassappa et al\(^5\), Prajapati et al\(^6\) observed total incidence of 5.9%, 4.76%, 4.32% and 4.12% respectively. However Rekhi et al\(^7\) and Murty et al\(^8\) observed 53.6% and 5.1% respectively. Ghambir et al\(^9\) have noted an incidence of 2.89% in their study.

In our study peak incidence of homicidal deaths is noted in the age group of 21 to 30 (15 cases). It accounts for 40.54% of total homicidal deaths followed by 31 to 40 years 27.02%. If we take into consideration of age group 21 to 40 years, incidence was highest 67.56%. These findings indicate that homicidal deaths are most common in most active and productive period of life. Importantly most of them are married and earning members of the family. Similar findings were observed in the study by Shivkumar et al\(^4\), Gupta et al\(^10\), Prajapati et al\(^1\), Vij et al\(^12\) and Murty el al\(^13\). However observations of Rekhi et al\(^7\), Wahlsten et al\(^10\), Henderson et al\(^11\) and Saint Martin et al\(^12\) contradicted our findings.

In our study it is observed that most of the victims were killed by their close relative/friends. Similar findings were observed by Shivkumar et al\(^4\), Waslsten et al\(^10\) and Ambade et al\(^13\). However Gupta et al\(^8\) observed that most of the homicidal deaths were by unknown people.

Our study reflects that most common weapon used for homicide is blunt weapon accounting for 37.13% followed by burns 29.72% and sharp weapons 16.21. It is because of the fact that most of the cases we encountered were injured by stone which is easily available and helps to disfigure the face. Though burns were the second most common method of alleged homicide, more than 90% of cases were observed in the females. Chances of false allegations in few cases may not be ruled out. These findings contradict the findings of Shivkumar et al\(^4\) and Vij et al\(^12\) who observed 5% and 2.2% cases of homicidal deaths due to burns.

Even though homicide by drowning is rare, in our study we observed two cases of homicidal deaths by drowning. Both the victims were siblings and were killed by their mother before her attempt to commit suicide by drowning. Age of both children was less than 2 years. Homicide by drowning accounted for 5.4% of all the homicidal deaths. Humayun et al\(^14\) observed 3.8% of homicidal deaths by drowning.

During our study period we did not encounter with a single case of homicidal death by fire arm injury. The finding is in contrast with the observations made by Sinha et al\(^7\) who observed fire arm as the most common weapon used for homicide.

CONCLUSION

1. Homicidal deaths constituted 5.61% of all autopsies conducted.
2. Homicidal deaths are most common in young age group who are most active and productive. (age group of 21 to 40)
3. Males outnumbered the female.
4. Common weapons used for homicide are blunt.
5. Infanticide is not common in this area.
6. Homicide by fire arms is very uncommon in this area.
Table No 1: Age and sex wise distribution of cases

<table>
<thead>
<tr>
<th>AGE GROUP</th>
<th>MALE</th>
<th>FEMALE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No of cases</td>
<td>%</td>
<td>No of cases</td>
</tr>
<tr>
<td>0 TO 1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1 TO 10</td>
<td>1</td>
<td>4.34</td>
<td>1</td>
</tr>
<tr>
<td>11 TO 20</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>21 TO 30</td>
<td>10</td>
<td>43.47</td>
<td>5</td>
</tr>
<tr>
<td>31 TO 40</td>
<td>6</td>
<td>26.08</td>
<td>4</td>
</tr>
<tr>
<td>41 TO 50</td>
<td>2</td>
<td>8.69</td>
<td>0</td>
</tr>
<tr>
<td>&gt; 50</td>
<td>4</td>
<td>17.39</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>23</td>
<td>100</td>
<td>14</td>
</tr>
</tbody>
</table>

Table No 2: Distribution of cases according to manner of homicide

<table>
<thead>
<tr>
<th>Weapon</th>
<th>MALE</th>
<th>FEMALE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No of cases</td>
<td>%</td>
<td>No of cases</td>
</tr>
<tr>
<td>Sharp weapon</td>
<td>6</td>
<td>26.1</td>
<td>0</td>
</tr>
<tr>
<td>Blunt weapon</td>
<td>12</td>
<td>52.2</td>
<td>1</td>
</tr>
<tr>
<td>Strangulation</td>
<td>2</td>
<td>8.7</td>
<td>1</td>
</tr>
<tr>
<td>Burns</td>
<td>1</td>
<td>4.35</td>
<td>10</td>
</tr>
<tr>
<td>Poisoning</td>
<td>1</td>
<td>4.35</td>
<td>1</td>
</tr>
<tr>
<td>Drowning</td>
<td>1</td>
<td>4.35</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>23</td>
<td>100</td>
<td>14</td>
</tr>
</tbody>
</table>

Conflict of Interest – Nil

Ethical Clearance – Taken

Source of Funding - Self

REFERENCES


Suicide is a great menace to the society and shows increasing trends throughout the world. One hundred and fifty cases of known dead bodies of both genders brought for medico-legal autopsy with history of Suicide by hanging were studied at the department of Forensic Medicine, Government Medical College, Madurai, Tamil Nadu, India.

There was a male preponderance in the study group (73.3%) whereas in females it was (26.6%). The major cause of suicide was family dispute (30.6%), followed by ailment (26%) and economic crisis (21.3%). The majority of cases were married (66.6%). Socioeconomic status was low in majority of the cases (96.6%).

Keywords: Suicide, Hanging, Family dispute.

INTRODUCTION

Suicide is the act of intentionally causing one's own death. Suicide rate shows increasing trends worldwide. Tamil Nadu has the highest suicide rates per one lakh people (12.5% of all suicides). In India according to the report of National Crime Records Bureau, common methods of committing suicide are hanging (37%), poisoning (33%), self-immolation (8%), and drowning (7%). In Tamil Nadu 52% of suicide in the year 2011 and 54% of suicides in 2012 were due to hanging. Firearms are the most used method of suicide. The second most common method of suicide for men is hanging, which is more common among the young adults and the adolescents.

The World Health Organization (WHO) estimates that of the nearly 900,000 people who die from suicide globally every year, 170,000 are from India. However, India’s National Crime Records Bureau (NCRB) – which report official suicide rates based on police reports – estimated only 135,000 suicides in 2011. One possible reason for under-reporting of suicide by the NCRB is that suicide remains a crime in India. A review of 56 countries found that hanging was the most common method in most of the countries, accounting for 53% of the male suicides and 39% of the female suicides.

There is a fine relation between suicide and the social context where it occurs. In Western it is very common to perceive suicide as a coward act. Genetics appears to account for between 38% and 55% of suicidal behaviors. Half of all people who die by suicide may have major depressive disorder. Suicide rate increases with age and males predominates the females at all ages. Marriage is considered as a protective factor. Risk factors for suicide are family dispute, psychiatric disorders, economic crisis and physical disorders.

Hanging is a form of violent asphyxial death produced by suspending the body with the ligature around the neck and the constricting force being the weight or part of body weight. All cases of hanging are considered to be suicidal until proved otherwise. Any substance available in hand is used as ligature for hanging. Asphyxial deaths may be caused by different methods, such as hanging, strangulations (manual and ligature), suffocations (environmental, smothering, choking, mechanical, and suffocating gases), chemical asphyxia (carbon monoxide, hydrogen cyanide, and hydrogen sulfide), and drowning. It is a common incident in forensic practice. In such deaths, a detailed and meticulous autopsy plays a major role to solve the case while the scene investigation and collection of samples have their own significance.

Present study was an attempt to analyse the socio demographic pattern, precipitating events and other factors pertaining to suicide by hanging.
MATERIAL AND METHOD

This cross sectional study was conducted on 150 cases of known dead bodies of both genders brought for medico-legal autopsy with definite history of suicide by hanging, at the Department of Forensic Medicine, Madurai Medical College, Tamil Nadu during the period from January 2015 to August 2015. The police records, inquest reports were scrutinized in detail.

Near relatives having good personal information of the deceased were interviewed in detail in every case to collect history of the incident and precipitating factors if any, and other information like age, number of family members, education level, marital status, history of depression, were entered in a checklist. The data / findings of the examinations were recorded in the proforma coded into a chart and analysed.

RESULTS AND DISCUSSION

Hanging is the most reported suicide method which is accounts more than 72%. On analysing 150 cases of suicide by hanging the following observations were made in Madurai Medical College and Hospital, Madurai during the period from January 2015 to August 2015. There are many evidences for the rate of suicide by gender. Studies reports that higher proportions of suicide were males (73.3%) whereas female victims were (26.6%). Majority of suicide cases were from low socioeconomic status (96.6%). A case study reported that more than 50% of suicides occur in households with monthly income of Rs. 3000 and less. It is the independent risk factor for suicide (11). There is a consistent evidence for education and suicide. In one study, individuals who were illiterate or less educated are significantly higher risk of suicide. In thus study the percentage of victims without educational qualification was 86% while those with school and college education contributed to 14%.

Few studies say suicide decedents were married at the time of death but there are majority of cases in which there is higher proportion of suicide decedents status are un married. In one prospective study males suicides decedents are more likely to be married those under the age of 50. Majority of victims were married (66.6%). Out of 150 cases no single case had a family history of suicide (12, 13). The major causes of suicide by hanging were family dispute (30.6%), followed by physical disorders (26%), economic crisis (21.3%), psychiatric disorders (11.3%), and education related (4.6%), illegal affairs (4.6%) and obscure history in (1.3%) (14, 15). Majority of persons who committed suicide were living with their family (83.3%), while persons separated from family contributed to (16.6%).

Hanging is the most common method of suicide. About one hundred and fifty cases of suicide by hanging brought for Autopsy during a period of January 2015 to August 2015 were studied. Particularly young men are at high risk of suicide, because of low socioeconomic status, interpersonal stresses and the presence of mental illness, which is the most important risk factors of suicide. There are few evidences that draw conclusions about the potential risk factors of suicide, which are: education, marital status. Registrar General of India implemented a survey nationally between 2001 and 2003, and obtained the results stating that the estimated rate of suicide in persons 15 years of age or older in 2010 was 22 per 100,000 population (16). Therefore, a male preponderance was noted in this study group also similar to the study by Davidson (17). As cited previously, males committee suicide between 21 – 60 years. Likely, similar other studies were conducted in India and worldwide (18). The youngest among the victims were a 9 year old boy who committed suicide at home, problems at school cited as reason. This substantiates Modi’s (19, 20) statement, that "Age is no bar to suicide by hanging". Polson and Gee also reported suicide of a 10 year old child by hanging (21). Unemployed persons constituted 30% of the victims, probably due to lack of financial support. Increased stress which was faced by people of lower socio-economic strata is one more major cause of Hanging.

Marriage does not seem to be a protective factor particularly for males in Tamil Nadu unlike western data. In cases of hanging more among males is due to ligature material, either soft material (saree, shawl, lungie, bed sheet); nor hard material (coir or plastic rope). As observed by Modi (20), all were "easily available materials". Naik S K has also observed the use of soft materials as ligatures in majority of his cases (22). In the study conducted by Arthur (23), a person hung himself in his cell room, while he was in police custody. At present a young boy and a girl hanged themselves at two ends of the same ligature material that is hooked at one point. This kind of hanging pacts was reported by Di Maio (24) in his study. Nuts (25), reported about the different types of knots during hanging.
In the present study 66.6% of victims were married. Suicides rated were also higher in the rural area. Family dispute was the main cause of suicide by hanging 30.6% which is in concordance with study by BL Meel (26). Various factors leading to family dispute was alcoholism, economic crisis, and illegal affairs. Tamil Nadu is infamously known for high alcohol consumption rate when compared to other major states in the country. Therefore, this finding forms a vicious cycle of factors leading to suicide. Since family dispute leads to physiological upset, this observation is similar to that of Davidson (27), who had noticed physiological upset as the major cause of suicide in 62.8% of cases.

Socioeconomic status was low in majority of cases 96.6%. This observation is similar to studies conducted by E Farrell (28). Family history of suicide was not found in any of the case. This observation is not similar to studies conducted by A Roy (29). Sharma et al. (30) studied 97 cases of asphyxial deaths in Chandigarh, in which hanging was the commonest mode observed in 66(69%) cases.

### TABLE 1: MARITAL STATUS

<table>
<thead>
<tr>
<th>MARITAL STATUS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>MARRIED</td>
<td>100</td>
</tr>
<tr>
<td>UNMARRIED</td>
<td>50</td>
</tr>
</tbody>
</table>

### TABLE 2: CAUSES OF SUICIDAL HANGING

<table>
<thead>
<tr>
<th>CAUSES</th>
<th>NO OF SUICIDAL HISTORY</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICAL DISORDER</td>
<td>26%</td>
</tr>
<tr>
<td>ECONOMIC CRISIS</td>
<td>21.30%</td>
</tr>
<tr>
<td>PSYCHIATRIC DISORDER</td>
<td>11.30%</td>
</tr>
<tr>
<td>EDUCATION REALTED AFFAIRS</td>
<td>4.60%</td>
</tr>
<tr>
<td>ILLEGAL AFFAIRS</td>
<td>4.60%</td>
</tr>
<tr>
<td>OTHERS</td>
<td>1.3%</td>
</tr>
</tbody>
</table>

### CONCLUSION

A better understanding of the profile of suicide attempts and consummations is critical to establishing strategies and policies compatible to deal with the problem. Hanging is the second most common method of suicide in Tamil Nadu. The factors deciding method of suicide like accessibility, feasibility, credibility and rapidity, as death by hanging can be easily achieved using cheap and easily available materials (33). Marked differences were noted in different geographical areas regarding age group, gender, causes and method of suicide. Rate of suicide in Tamil Nadu differs from
national average but it is similar to western standards.

Medico legal autopsies provide an important statistical data related to legal incidents in the regions. There is increasing tendency for suicides by hanging, emerging among youth and families. The reason for this increased rate of suicides may be due to transition phase from protective to liberal economy in Tamil Nadu and lack of social support. Most of asphyxial deaths were in young males and suicidal in manner which can be prevented by education, adopting safety measures in case of accidental drowning, addressing the problems of the youths and needy persons and improving the quality of life of people in the locality. The government has to accept this reality and take steps to tackle this growing menace at the grass root level.

Ethical Clearance: Taken from institutional review board/independent ethics committee, Govt. Rajaji Hospital, Madurai.

Source of Funding: Self

Conflict of Interest: Nil

REFERENCES


Myocardial Infarction in Sudden Natural Deaths: Autopsy Based Study from Pune Region

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ABSTRACT

WHO defines sudden death as, “Death is said to be sudden or unexpected when a person not known to have been suffering from any dangerous disease, injury or poisoning is found dead or dies within 24 hours after the onset of signs and symptom”. The present autopsy based study conducted at department of forensic medicine of B.J. Medical college and Sassoon General hospital, Pune, Maharashtra, from October 2013 to May 2015; during this period total 9497 cases of were brought for medico-legal autopsies out of that 807 cases of sudden deaths constituted the study population. In the study population 354 cases had cardiovascular system involvment; in that 64 cases shown myocardial infarction and were further analyzed in detail. As stressed by WHO scientific group the early recognition of Ischemic Heart Disease is very important aspect of its prevention, as it would lead us to the development of methods for prevention and control. The present autopsy based study is an attempt to do the same by analyzing the cardiac causes of sudden deaths with special reference to myocardial infarction deaths.

Keywords: Sudden death, autopsy study, cardiac deaths, myocardial infarction, risk factors, clinical profile, Pune region.

INTRODUCTION

As noted American cardiologist Paul Dudley White said in 1951 in his classic book “Heart Disease”, “The ideal goal towards which mankind should strive is to control cardiovascular threats so that, one lives a healthy, happy and useful youth and middle age till an advanced age- a point at which even sudden death from cardiovascular disease itself wouldn’t have to be regretted.”

WHO defines sudden death as, “Death is said to be sudden or unexpected when a person not known to have been suffering from any dangerous disease, injury or poisoning is found dead or dies within 24 hours after

the onset of signs and symptoms.”

In sudden death, the immediate cause is almost always to be found in the cardiovascular system, even though topographically the lesion is not in the heart or great vessels. As stressed by WHO scientific group the early recognition of Ischemic Heart Disease is very important aspect of prevention, as it would lead us to the development of methods for prevention and control.

The present autopsy based study is an attempt to do the same by analyzing the sudden natural deaths due to myocardial infarction.
MATERIAL AND METHOD

The present autopsy based study was conducted at department of forensic medicine of B.J. Medical college and Sassoon General hospital, Pune, Maharashtra, from October 2013 to May 2015; Cases of sudden deaths brought for medico-legal autopsies died within 24 hours of onset of symptoms, who is not known to have been suffering from any dangerous disease, injury or poisoning were selected as study population. Aims and objectives of the study were to study modifiable and non-modifiable risk factors, clinical profile, gross and microscopic findings in sudden natural deaths due to myocardial infarction.

RESULTS AND DISCUSSION

During the study period total 9497 cases were brought for medico-legal autopsies out of that 807 cases of sudden natural deaths constituted the study population; further out of those sudden natural deaths, 354 cases had cardiovascular system involment; in that 64 cases shown myocardial infarction and were further analyzed in detail.

Risk factor analysis of myocardial infarction cases

Age

Table 01: Age Distribution of Myocardial Infarction Cases

<table>
<thead>
<tr>
<th>Age Group In Years</th>
<th>Number Of Cases</th>
<th>Percentage (n=64)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 20</td>
<td>01</td>
<td>02%</td>
</tr>
<tr>
<td>21-40</td>
<td>18</td>
<td>28%</td>
</tr>
<tr>
<td>41-70</td>
<td>40</td>
<td>62%</td>
</tr>
<tr>
<td>Above 71</td>
<td>05</td>
<td>08%</td>
</tr>
<tr>
<td>Total</td>
<td>64</td>
<td>100%</td>
</tr>
</tbody>
</table>

In the present study, maximum numbers of the cases i.e. 62% in total were present in the age range of 41-70 years (Table 01).These findings matches with studies conducted by Pells and D” Alonza et al (1963)⁶, Reichenbach D et al(1977)⁷. Datta et al (1985)⁸ and Andrew Farb et al (1995)⁹; while that conducted by Toshinobu H et al (1978)¹⁰ and Bardoli G. and Falzi et al (1979)¹¹ has higher age range (Table 04).The difference might be due to different selection criteria.

Sex

Table 02: Sex Distribution of Myocardial Infarction Cases

<table>
<thead>
<tr>
<th>Sex Of Deceased</th>
<th>Number Of Cases</th>
<th>Percentage (n=64)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>51</td>
<td>80%</td>
</tr>
<tr>
<td>Female</td>
<td>13</td>
<td>20%</td>
</tr>
<tr>
<td>Total</td>
<td>64</td>
<td>100%</td>
</tr>
</tbody>
</table>

In the present study, among the 64 cases of myocardial infarction, Male to Female ratio was 4 indicating, males (80%) are more commonly affected than females (20%) (Table 02).These findings matches with study conducted by Andrew Farb et al¹⁰ (1995): while it is different from that of Robert and Buja¹² (1972), Bardoli G. and Falzi et al¹¹ (1979) and Datta et.al¹² (1985); as these were older studies with respect to time, emphasizes the changing pattern of ischemic heart disease among female population with changing time.

Table 03: Prevalence of Other Risk Factors of Myocardial Infarction Cases

<table>
<thead>
<tr>
<th>Risk Factors</th>
<th>Number Of Cases</th>
<th>Percentage (n=64)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking</td>
<td>40</td>
<td>63%</td>
</tr>
<tr>
<td>Sedentary life style</td>
<td>39</td>
<td>61%</td>
</tr>
<tr>
<td>Hypertension</td>
<td>33</td>
<td>52%</td>
</tr>
<tr>
<td>Alcohol consumption</td>
<td>36</td>
<td>56%</td>
</tr>
<tr>
<td>Diabetes</td>
<td>17</td>
<td>27%</td>
</tr>
<tr>
<td>Family history</td>
<td>21</td>
<td>33%</td>
</tr>
</tbody>
</table>

Smoking

Among the 64 cases of myocardial infarction with analysis of the risk factors, smoking was largely associated with 63% of cases (table 03). These findings are similar with those of Myeong Ki Hong et al¹³ (1994), Weinberger I et al¹⁴(1987) and Dwivedi S et al¹⁵ (2000) but not so with Yen Chen Lin et al¹⁶ (1979) might be due to selection of only young patients in later study.

Sedentary life style

In present study 61% of cases had sedentary life style (table 03), this matches with study conducted by Dwivedi S et al¹⁵ and proves the fact that no exercise and sedentary life style is the root of current epidemic of CAD.
Hypertension

Among the 64 cases, 52% had hypertension (Table 03); these findings are similar with studies by Yen Chen Lin et al 16 (1979) and Woon VC and Lim KH 17 (2003), but not with Lars Werko 18 (1976) high prevalence in later study was due to specific selection criteria.

Alcohol consumption

In this study 56% of cases had history of alcohol consumption (table 03); Benito M and Covadonga A 19 (2011) found in their study that 36.4% had alcohol consumption in cases of acute myocardial infarction in total 216 of sudden cardiac deaths. Changing life style patterns of the population as well as larger sample size of sudden cardiac deaths (354 cases) in this study might be reason for the difference.

Family history

In this study 33% of the deceased population had family history of IHD (table 03). In the present study history taking was prompt and reliable and establishes family history as significant risk factor, though study conducted by Dwivedi S et al 15 (2000) had 18.8% cases with family history.

Diabetes

In the present study among the 64 cases of myocardial infarction, history of diabetes was present in 27% of cases, (Table 03). This finding is similar to study conducted by Yen Chen Lin et al 16; but Davies M 20 and Benito M and Covadonga A 19 recorded lower association; it might be due to iceberg phenomenon of diabetes detection and its inclusion in history during study.

Clinical Profile in Myocardial Infarction Cases

Table 04: Clinical Symptoms in Myocardial Infarction Cases

<table>
<thead>
<tr>
<th>Clinical Symptom</th>
<th>Number Of Cases</th>
<th>Percentage (n=64)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chest pain</td>
<td>44</td>
<td>69%</td>
</tr>
<tr>
<td>Breathlessness</td>
<td>14</td>
<td>22%</td>
</tr>
<tr>
<td>Sweating</td>
<td>06</td>
<td>09%</td>
</tr>
<tr>
<td>Giddiness</td>
<td>15</td>
<td>23%</td>
</tr>
<tr>
<td>Epigatric pain</td>
<td>04</td>
<td>06%</td>
</tr>
</tbody>
</table>

In the present study, as per history given by family, friends or accompanying person, chest pain was the most common complaint with 69%. Present study findings are more or less similar to study conducted by Mumtaz Ahmad et al 21. This emphasizes the need for high degree of suspicion of IHD, especially when history is that of chest pain with exertional dyspnea as likewise Goyal and Billimoria 22 stressed that it is imperative for the physician to probe deeply into patient’s history for early recognition of ischemic heart disease.

Gross morphological features in Myocardial Infarction Cases

Cardiac Hypertrophy

Table 05: Cardiac Hypertrophy by Heart Weight and Ventricular Wall Thickness

<table>
<thead>
<tr>
<th>Cardiac Hypertrophy</th>
<th>Number Of Cases</th>
<th>Percentage (n=64)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac Hypertrophy by Heart Weight</td>
<td>20</td>
<td>31.25%</td>
</tr>
<tr>
<td>right ventricular hypertrophy (more than 5 mm)</td>
<td>21</td>
<td>33%</td>
</tr>
<tr>
<td>left ventricular hypertrophy (more than 15 mm)</td>
<td>38</td>
<td>60%</td>
</tr>
</tbody>
</table>

In present study, cardiac hypertrophy by heart weight as measure was present in total 31% of cases. Left ventricular hypertrophy was present in 60% of cases, while right ventricular hypertrophy in 33% of cases. These findings of Gross morphological features are more or less similar to study conducted by Bardoli G. and Falzi et al 11

Microscopic Finding in Myocardial Infarction Cases

Findings on H and E Stain

On microscopic examination after routine haematoxylin and eosin staining, polymorphonuclear infiltrate was the most common finding with 64% of cases; Thrombosis in 39%, Coagulative necrosis in 28%, Congestion in 25%, Old infarcts in 19%, Waviness of fibres in 16%, Oedema in 13% and Hyper eosinophilia in 09%; these findings are consistent with as mentioned by Knight B 4, Schoen Frederick J 23 and studies conducted by Ian Lodge and Patch 24, R Foster Scott et al 25, Rissannen M Romo et al 26 and Lt Col RB Kotabagi et al 27.
Vessel Involvement

Table 06: Vessel involvement in Myocardial Infarction Cases

<table>
<thead>
<tr>
<th>Number Of Vessels Involved (n = 64)</th>
<th>Significant Coronary (i.e. more Than 75%) Narrowing (n = 64)</th>
</tr>
</thead>
<tbody>
<tr>
<td>One vessel disease</td>
<td>Right coronary artery</td>
</tr>
<tr>
<td>Two vessel disease</td>
<td>Left circumflex coronary artery</td>
</tr>
<tr>
<td>Three vessel disease</td>
<td>Left anterior descending coronary artery</td>
</tr>
<tr>
<td>No significant narrowing</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>16</td>
</tr>
<tr>
<td>53%</td>
<td>25%</td>
</tr>
<tr>
<td>16</td>
<td>27</td>
</tr>
<tr>
<td>12</td>
<td>46</td>
</tr>
<tr>
<td>05%</td>
<td></td>
</tr>
<tr>
<td>03</td>
<td></td>
</tr>
<tr>
<td>19%</td>
<td></td>
</tr>
<tr>
<td>53%</td>
<td></td>
</tr>
<tr>
<td>25%</td>
<td></td>
</tr>
<tr>
<td>42%</td>
<td></td>
</tr>
<tr>
<td>72%</td>
<td></td>
</tr>
</tbody>
</table>

In present study, among the three major coronary arteries, only one vessel involvement was seen in 53% of cases. Two vessel disease was seen in 25% of cases while 19% of cases showed all three coronary artery narrowed significantly. In 05% of cases of myocardial infarction there was no significant coronary narrowing in any of the three major coronary arteries (Table 06). These findings are almost consistent with studies conducted by Enos et al, McNamera et al and Andrew Farb et al. In present study, left anterior descending coronary artery was most common coronary artery involved with 72% of cases (Table 06). These findings are consistent with studies conducted by Satish Chandra & Tiagi, McNamera et al and Andrew Farb et al with respect to involvement of Left anterior descending coronary artery but slightly lower with respect to other two coronary involvement, this might be due to different methods to calculate coronary narrowing.

SUMMARY AND CONCLUSION

The present study can be summarised and concluded as, ischemic heart diseases are the most common causes of sudden cardiac death. Myocardial infarction is most commonly seen in cases of more than 40 years of age and males are commonly affected that females. Smoking, sedentary life style, alcohol consumption and hypertension are major risk factors in pathology of myocardial infarction. Chest pain is the most consistent clinical symptom followed by giddiness and breathlessness. Cardiac hypertrophy (more commonly left ventricular) increases the risk of myocardial infarction. Significant coronary atherosclerotic narrowing is most commonly seen in left anterior descending artery. Polymorphonuclear infiltrate is most common histopathological findings, followed by thrombosis, coagulative necrosis and congestion. This analysis of myocardial infarction deaths in present study will help in early recognition of Ischemic Heart Diseases and development of methods for its prevention and control.

Source of Funding: None

Ethical Clearance: Acquired From Institutional Ethical Committee, BJGMC, Pune.

Conflict of Interest: Nil

REFERENCES


Correlation between Road Conditions and Non – Fatal Road Traffic Accidents – A Prospective Study

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ABSTRACT

Introduction: Road Traffic Accidents (RTA) are one of the leading causes of death and disability worldwide. In this study, the authors have attempted to study the correlation between conditions of roads and incidence of non – fatal RTA admitted in Mahatma Gandhi Medical College & Research Institute, Pondicherry.

Materials and Method: The prospective study was conducted by the Department of Forensic Medicine & Toxicology and the Emergency Medicine Department, Mahatma Gandhi Medical College & Research Institute, Pondicherry. It was conducted from November 2012 to May 2014 and a total of 186 cases were taken. Only RTA cases admitted in the hospital were included and cases other than RTA, RTA cases admitted elsewhere or brought – dead cases were excluded from the study. Data was obtained by interviewing the victims or relatives of the victims. Informed written consent was taken. Medicolegal records, case sheets and lab or radiological reports were used for collecting additional data.

Results: Majority of accidents (46.2%) took place on straight roads followed by narrow roads (23.7%), curved roads (17.2%) and junctions (12.9%). According to the type of roads, most cases (43.5%) occurred on tarred highways, followed by rural dirt roads (31.2%), tarred rural roads (21.5%), tarred city roads (3.2%) and cemented roads (0.5%).

Discussion: Incidences of RTA are increasing by leaps and bounds in India. India has to take concrete steps to bring down incidence of such cases. With this view, the government has formulated the National Road Safety Policy. It is left to us citizens to see that such policies are strictly adhered to so that the coming years see a decline in the incidences of such cases.

Keywords: Road, accidents, India.

INTRODUCTION

On a present date, Road Traffic Accidents (RTA) are one of the leading causes of death and disability. As per the data projected by WHO, 20 to 50 million people suffer from non – fatal injuries every year due to RTA.¹ By 2020, non – fatal RTA will be the third leading cause of disability – adjusted life years (DALYs) lost worldwide.² Every year, number of reported cases have gone up by leaps and bounds, especially in developing countries and is generally attributed to rapid economic growth and resultant motorization.³,⁴

This situation is a major concern in fast growing economies like India. Due to rapid unplanned urbanization and industrialization, more and more vehicles are being sold in India every year (around 6 million).³ Consequently India has one of the highest accident rates of 35 per 1000 vehicles worldwide.⁶

Of the many factors that cause RTA, conditions of roads and highways play an important role. The authors attempt to study the correlation between condition of roads and incidence of non – fatal RTA admitted in Mahatma Gandhi
Medical College & Research Institute, Pondicherry. The authors hope that this study will be of some benefit to the medical fraternity, the lawmakers and town planners for proper understanding of factors that cause these accidents so that their incidences can be contained in the time to come. Data retrieved from this study can be used by the policy makers to formulate necessary laws to improve road safety and maintain road discipline.

MATERIALS AND METHOD

The prospective study was conducted by the Department of Forensic Medicine & Toxicology in collaboration with the Emergency Medicine Department, Mahatma Gandhi Medical College & Research Institute, Pondicherry. Mahatma Gandhi Medical College & Research Institute is a tertiary level healthcare and medical teaching institute that serves the rural and urban population of Eastern Tamilnadu.

The study was conducted over a period of one and half years from November 2012 to May 2014. A total of 186 cases were taken.

Inclusion Criteria:

• only cases of RTA admitted in the hospital

Exclusion Criteria:

• any trauma not due to RTA
• medical or surgically intervened cases done elsewhere
• brought – dead cases.

METHOD

The study was proposed to be done on minimum of 100 cases of road traffic accident. Data was obtained by interviewing the victims of the accident. Informed written consent was obtained from the victims or the persons accompanying the victims. A pretested proforma was used for this purpose. Medicolegal records, case sheets and lab or radiological reports were used for collecting additional information.

All the findings noted were recorded in the proforma and the parameters were charted in diagrams.

RESULTS

As per the study, majority of accidents (46.2%) took place on straight roads. Least number of accidents (12.9%) took place at the junctions, probably due to slow speed of the vehicles at those points.

Table 1: Distribution of cases according to the nature of road.

<table>
<thead>
<tr>
<th>Nature of road</th>
<th>Number of cases</th>
<th>Percentage of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Junction</td>
<td>24</td>
<td>12.9</td>
</tr>
<tr>
<td>Curve</td>
<td>32</td>
<td>17.2</td>
</tr>
<tr>
<td>Narrow</td>
<td>44</td>
<td>23.7</td>
</tr>
<tr>
<td>Straight road</td>
<td>86</td>
<td>46.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>186</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

A vast majority of accidents (43.5%) seemed to have occurred on the tarred highways, which is again an unfortunate consequence of high – speeding on those roads. Number of accidents on rural dirt roads came in second (31.2%). Cemented roads accounted for the least number of accidents (0.5%), primarily because of less number of such roads and consequently fewer footfalls and less vehicular traffic on them.

Table 2: Distribution of cases according to the type of road

<table>
<thead>
<tr>
<th>Type of road</th>
<th>Number of cases</th>
<th>Percentage of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tarred city road</td>
<td>6</td>
<td>3.2</td>
</tr>
<tr>
<td>Tarred rural road</td>
<td>40</td>
<td>21.5</td>
</tr>
<tr>
<td>Rural dirt road</td>
<td>58</td>
<td>31.2</td>
</tr>
<tr>
<td>Tarred highway road</td>
<td>81</td>
<td>43.5</td>
</tr>
<tr>
<td>Cemented road</td>
<td>01</td>
<td>0.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>186</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

DISCUSSION

Incidence as well as severity of RTA is on an increasing trend in developing countries due to rapid industrialization and concurrently less regard to legal, healthcare and safety reforms.7 Globally, it is the eight leading cause of death and the most important cause of death in the age group of 15 – 29 years.8

Among all countries, India has recorded the highest number of casualties due to RTA with a quantum 17.6% increase in deaths from 2008 to 2012.9 India spends 12.5 billion dollars on an average every year towards RTA in terms of prehospital care, emergency care, and rehabilitation. This estimate does not include the
economic burden on accident survivors with a permanent disability. The amount is equivalent to 3% of gross domestic product of India. Thus the socio economic and financial implications of RTA are astronomical for a developing country like India. If the number of cases keeps on increasing every year, as predicted by several studies, the financial burden on the country will simultaneously increase and is likely to affect the economic stability and hamper growth and development.

Risk factors are broadly classified into human and environmental factors. Condition of roads fall under the realm of environmental factors. Factors like defective and narrow roads, defective layout of crossroads, poor maintenance and poor lighting significantly influence the incidence of RTA.

Our institute lies in the vicinity of State Highway 49 that connects Pondicherry to the rest of the state of Tamilnadu. This long stretch of road cramming with slow moving vehicles (cycles, animal carts, tractors) and fast vehicles (two and four wheelers, interstate long distance buses), lack of sidewalks for pedestrians, lack of dividers, insufficient width at places, improper placement of road signs and lights, improper drainage, all contribute to an increased incidence of RTA. Defective maintenance issues like potholes and road erosion, broken guiderails, failure to remove roadway debris and failure to maintain road signs and signal lights are a matter of concern and contribute directly to an increased incidence of cases.

As per our study, a majority of accidents (46.2%) took place on the straight roads, followed by 23.7% of cases that took place on the narrow roads and the least number of cases occurring in the junction (12.9%). These findings have been corroborated by other studies on a similar topic which noticed a similar trend of more number of RTA occurring on straight roads and the least number of cases occurring on the crossroads.

In our study, a greater number of accidents (43.5%) had occurred on tarred highways and the least number of cases (0.5%) had occurred on cemented roads. Bharadwaj et al, in his study conducted in North India also noticed a similar trend.

Developing countries like India cannot afford to bear the increasing expenses of RTA every year. The need of the hour is to bring down the number of cases. Many developed countries have intensified their approach to road safety with special emphasis on traffic management, appropriate infrastructure, road designs, law enforcement and provision for prompt accident care. Considering the scenario here, certain steps may be taken. Potholes and road erosion can be mended on a war footing. Traffic signal lights have to be in a proper working condition. Protective devices like suitable sign – ages, markings etc should be installed. Certain measures like lawful limiting of speed, use of breath analyzers at check points and imposing fines for not wearing helmet for two wheelers, using cellphones during driving or not wearing seat belt can be taken to limit accidents due to drivers’ fault.

The government has initiated some programmes to improve road safety in India. It has formulated a National Road Safety Policy and is in the process of forming a National Road Safety Council. Tamilnadu has started a Road Accident Data Management System and this model is going to be replicated in different states throughout the country. Amendments have been brought to existing laws concerning road safety. However, implementation of these laws is still a matter of anguish. So, the people of this country should whole heartedly cooperate with the government for implementation of these laws and schemes concerning road safety so that incidence of RTA can be gradually reined in within an appropriate time period.

Conflict of Interests: The authors declare that they have no competing interests.

Source of Funding: Self

Ethical Clearance: Ethical clearance was obtained from the Institutional Ethical Committee of Mahatma Gandhi Medical College & Research Institute (Deemed University), Pondicherry.

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Successful Treatment of Zolpidem Dependency with Replacement Benzodiazepine Therapy: A Case Study

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ABSTRACT

Zolpidem is a non-benzodiazepine hypnotic drug used in short-term insomnia management. It is considered to be a safer drug than benzodiazepines. Zolpidem was initially considered to have lower incidences of dependence and tolerance than benzodiazepines. However, studies, have shown that zolpidem can lead to dependency. Although various cases of zolpidem dependence have been reported till date, but there is few published reports regards the medication to be used in the detoxification. We present a 21-year-old woman with history of zolpidem dependency. She had previously been using zolpidem for 3 years. She admitted and treated with replacement therapy with benzodiazepine. The equivalent diazepam was calculated (100 mg) and the replacement therapy consisted of 70 mg diazepam divided in doses of 20 mg in the morning, 20 mg midday, and 30 mg at night. A psychiatrist and a psychologist visited her in the morning and evening, respectively. Diazepam was tapered by 5 mg per day after 48 h; she was discharged when the dose was tapered to 60 mg per day with subsequent daily outpatient visits for continued dose tapering. Dose tapering was more gradual in comparison to the inpatient setting, namely by 5 mg every 5 days; overall, final tapering to a 20 mg daily dose took 60 days. She stopped diazepam usage after 65 days. She was followed-up for a 6-month period and urinary immunoassays ruled out benzodiazepine usage; all urinary tests were negative. This case of zolpidem dependency successfully treated by substitution with an equipotent, longer half-life benzodiazepine followed by tapering of benzodiazepine to discontinuation; this method can help in the prevention of seizures. Furthermore, it is advisable to manage replacement therapy in an inpatient setting. This method can help in the prevention of seizures. Meanwhile, it is advisable to manage replacement therapy in an inpatient setting.

Keywords: Zolpidem, dependency, benzodiazepine

INTRODUCTION

Zolpidem is a non-benzodiazepine hypnotic drug used in short-term insomnia management. This agent binds to the gamma-aminobutyric acid-A (GABAA) receptor and selectively acts on benzodiazepine receptor subtypes1. It is considered to be a safer drug than benzodiazepines2. Furthermore, zolpidem was initially considered to have lower incidences of dependence and tolerance than benzodiazepines1, 2. However, experimental studies, reviews, and case reports have shown that zolpidem can lead to dependency3, 4.

Systematic review studies on the safety of zolpidem showed that dose self-escalation can result in tolerance to its hypnotic and sedative effects5. Symptoms such as

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sweating, tachypnea, tachycardia, tremors, and extreme anxiety have been observed following zolpidem discontinuation. In addition, discontinuation syndrome symptoms include fatigue, flushing, panic attacks, abdominal discomfort, uncontrolled crying, nausea, emesis, and delirium. Withdrawal seizures may also happen after sudden discontinuation. Although various cases of zolpidem dependence have been reported till date, there is few published reports regarding the medication to be used in the detoxification.

We herein present a case of zolpidem dependency successfully treated by substitution with an equipotent, longer half-life benzodiazepine followed by tapering of benzodiazepine to discontinuation.

CASE REPORT

We present a 21-year-old woman with history of zolpidem dependency. She had no current or past history of substance abuse and did not smoke or drink alcohol. Her medical history was unremarkable. The patient did not report history of confirmed neurologic or psychiatric disorders, although she mentioned some degree of anxiety but she was not visited by a physician or psychiatrist. She had no personal or family history of chronic medical problems. She had previously been using zolpidem for 3 years. She had initiated its use based on some friends’ recommendation to control her anxiety with the primary dose of 50 mg every 12 hours. She had gradually increased the total dose of the medication to 200 mg/day. Although she used the medication with such a high dose, her sleep duration was 5.5 hours in 24 hours, far less than the standard daily duration. The main cause of her sleep disturbance needed neurologic and psychiatric evaluations. The patient did not report history of confirmed neurologic or psychiatric disorders, although she mentioned some degree of anxiety but she was not visited by a physician or psychiatrist. She had no personal or family history of chronic medical problems. She had previously been using zolpidem for 3 years. She had initiated its use based on some friends’ recommendation to control her anxiety with the primary dose of 50 mg every 12 hours. She had gradually increased the total dose of the medication to 200 mg/day. Although she used the medication with such a high dose, her sleep duration was 5.5 hours in 24 hours, far less than the standard daily duration.

She was initially managed in an inpatient setting to taper zolpidem dose. During the course of her treatment, she complained of insomnia and fatigue. Zolpidem tapering treatment commenced with 10 mg orally at morning time every 2 days and the bedtime dose was continued on an as-needed basis for insomnia. The patient complained of insomnia and fatigue in the first week and experienced headaches and nightmares in the second week. The dose reached 140 mg zolpidem daily after 12 days, after which she suddenly decided on discharge due to personal problems. Within a few days of treatment initiation, the patient’s family had complained about the prolonged period of hospitalization and requested her to be discharged and managed in an outpatient setting.

The patient was visited two months later and she had unfortunately returned to 200 mg zolpidem daily (same as the previous dose); she was re-admitted and treated with replacement therapy. The equivalent diazepam was calculated (100 mg) and the replacement therapy consisted of 70 mg diazepam divided in doses of 20 mg in the morning, 20 mg midday, and 30 mg at night. A psychiatrist and a psychologist visited her in the morning and evening, respectively. Diazepam was tapered by 5 mg per day after 48 h; she was discharged when the dose was tapered to 60 mg per day with subsequent daily outpatient visits for continued dose tapering. Dose tapering was more gradual in comparison to the inpatient setting, namely by 5 mg every 5 days; overall, final tapering to a 20 mg daily dose took 60 days. She stopped diazepam usage after 65 days. She was followed-up for a 6-month period and urinary immunoassays ruled out benzodiazepine usage; all urinary tests were negative.

She experienced less rebound insomnia (significant worsening of sleep difficulties) and recurrence of insomnia following repeated administration of diazepam in comparison to tapering methods; recurrence of insomnia appears more slowly and progressively in comparison to tapering methods within 2–3 weeks. Replacement therapy helped in the reduction of inpatient time without the risk of convulsion.

DISCUSSION

Dependence criteria are difficult to determine because various case reports use a different terminology for pharmacodependence, abuse, and addiction. The WHO pharmacodependence experts committee played an important role in the elaboration of the terminology related to pharmacodependence. DSM-IV and its definition criteria are compatible with WHO definitions. Therefore, we considered DSM-IV criteria...
for diagnosis.

Dependency must be managed by the clinician through different aspects of treatment from a physiological, psychological, psychiatric, and social perspective. Zolpidem detoxification by gradual dose reduction is a challenging treatment given that seizures can occur following rapid dose reduction. The withdrawal symptoms of zolpidem reported in less than 1% of the users emerge within 48 hours of discontinuation. There is very few published reports regards the medication to be used in the zolpidem detoxification. Case reports showed that Quetiapine and Flumazenil can be used in an inpatient setting to mitigate the taper dose approach. We think replacement therapy using the long-acting benzodiazepine (diazepam) instead of zolpidem is a more acceptable treatment; such treatments are used in opium and cigarette dependency.

It has been observed that zolpidem may bind less specifically to brain receptors at higher levels. If drug levels are high enough, then GABAA receptors containing α1 subunits can be saturated and the drug can also bind to lower-affinity receptors that contain the α2 and/or α3 subunits. In our case, these paradoxical effects did not occur. Some reports emphasize that zolpidem is used to achieve euphoria and stimulation and not for sedation. However, our patient used it only for sedation.

Molecular biology, via possible mutations of GABAA receptors, may provide some answers as to why some patients increase the dose gradually seeking something other than the drug’s hypnotic effect. Changes in the expression of genes encoding various α or γ subunits of the GABAA receptor complex can affect receptor affinity to such a degree that the benzodiazepine site can lose its activity resulting in differences in sensitivity, as occurs in cases of extreme intoxication, where there seems to be no certain correlation between clinical symptoms and ingested dose.

While the existence of previous dependence or psychiatric disease is often reported as a risk factor for substance abuse, our patient did not present evidence of abuse or psychiatric disorders. In many studies, a history of substance abuse is a risk factor for other dependencies; however, in the present case the patient had no experience with opium, opioid, stimulants, or hallucinogenic agents.

Despite of the widespread use of zolpidem, the number of reported cases of zolpidem abuse or dependence is very small. This low incidence may be due to a continued unawareness of patients of the potential for abuse of zolpidem, even if it concerns only a small proportion of patients. Furthermore, practitioners do not report abuse or dependence as often as they should. In fact, the drug is routinely used as a long-term treatment; and a definitive level of overdosing is accepted by medical professionals, which explains the low rate of reports.

CONCLUSION

Our case of zolpidem dependency successfully treated by substitution with an equipotent, longer half-life benzodiazepine followed by tapering of benzodiazepine to discontinuation; this method can help in the prevention of seizures. Furthermore, it is advisable to manage replacement therapy in an inpatient setting.

Conflict of Interest: None
Funding of Support: None
Ethical Clearance: Informed consent was given by the patient for publication of the case study.

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Determination of Sex from the Fragments of Femur

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ABSTRACT

One of the objectives of medico-legal investigation is sex determination, especially in skeletal remains, decomposed or mutilated bodies. Pelvis and skull are considered to be the bones which have highest accuracy for sex determination as they exhibit prominent sexual dimorphic features. However in cases where these bones are absent, long bones are useful to determine sex as they are better preserved and have sexually dimorphic features which are easily measurable. In such instances femur is the most suited of all long bones in sex determination as it is the largest of all long bones. As previous studies suggest, a single standardized formula cannot be used within all population groups for determining the sex of individuals as there is considerable intra- and inter-population variability in femoral dimensions. Genetics, environment and socio-cultural factors all influence the development of bone. This made us to think that it might be necessary to derive standards for the contemporary south Indian population. Femurs of 100 individuals (50 males and 50 females) were analyzed in this study and an attempt has been made to use various osteometric data from femur of south Indian origin to develop standards for determining sex from complete and fragmentary remains. In the present study epicondylar breadth and bicondylar width was found to have highest accuracy for sex determination and distal end of femur was a better sex discriminator compared to proximal epiphysis.

Keywords; femur fragments, sex, discriminant function equation.

INTRODUCTION

Determination of sex is an important step towards establishing identity from unknown human skeletal remains. The skeletal remains of humans differ between males and females¹-⁴ and the characteristic differences can be used to determine the sex of unknown human remains. The pelvis and skull exhibit prominent sexually dimorphic characters and hence can predict sex with fairly high accuracy.⁵. But in their absence the task of the medico-legal expert becomes quite difficult especially in cases where isolated or fragmentary bones are recovered. Therefore, in the recent times there is a greater thrust towards morphological and metrical analysis of other bones especially the long bones for the purpose of determining sex. Long bones have especially been studied extensively because of the ease of defining measurements, and better preservation.⁶ Since a long time, by virtue of its strategic position in human anatomy and also being largest bone in human skeleton, the femur has attracted the attention of researchers from all over the world. Among long bones probably it is one of the most extensively studied bone.⁷-⁸,¹⁴ In this study, the measurements of articular ends of femur are made which makes it possible to determine sex from fragments of femur as in cases where dismembered/mutilated bodies are investigated. Considering the population variations,⁶,¹,³,¹⁰-¹⁸ and temporal variations¹⁹,²⁰ within same population, deriving standards for contemporary population is necessary. Metric analysis has been deployed in this study as the discriminant function analysis because of its objectivity and reproducibility. It has become the most preferred technique for determining sex from human skeletal remains.¹⁰,¹¹,²¹ The need for different discriminant function equations for different population groups has been reported¹²,²² and some authors have emphasized the importance of using differential equations where fragmentation is often the case.⁷,⁴,¹¹ The aim of this study is therefore to derive south Indian population specific standards for
The determination of sex from fragments of femur.

MATERIALS AND METHOD

The skeletal remains for this work were selected from the mortuary of R L jalappa hospital, Kolar and department of anatomy, Sri Devraj urs medical college, Kolar. A total of 100 individuals of known sex (50 males and 50 females) were analyzed. They belong to south Indian population aged between 22 and 85 years, and with no pathological or traumatic lesions affecting the femur. Damaged specimens were excluded. The length of the femur was measured using an osteometric board, other parameters such as maximum head diameter, breadth of both the epiphysis, inter trochanteric distance, vertical diameter of neck of femur etc., was measured using sliding vernier calipers. These measurements were performed on dissection samples after removing soft tissues, muscles, tendons and ligaments.

Table 1 – Various femoral parameters measured

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Abbreviation</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Femoral length</td>
<td>FL</td>
<td>Distance between highest point of head and lowest point of medial condyle</td>
</tr>
<tr>
<td>Vertical diameter of head</td>
<td>VHD</td>
<td>Distance between the highest and lowest point of the head along equatorial plane</td>
</tr>
<tr>
<td>Vertical diameter of neck</td>
<td>VND</td>
<td>Distance between highest and lowest point of neck perpendicular to axis of the neck</td>
</tr>
<tr>
<td>Bicondylar breadth</td>
<td>BB</td>
<td>Distance between the lateral edge of lateral condyle and medial edge of medial condyle</td>
</tr>
<tr>
<td>Epicondylar breadth</td>
<td>ECB</td>
<td>Distance between medial and lateral epicondyles of femur</td>
</tr>
<tr>
<td>Diameter of shaft of femur at lesser trochanter</td>
<td>DLI</td>
<td>Maximum diameter of shaft of femur at the level of lesser trochanter.</td>
</tr>
<tr>
<td>Inter condylar distance</td>
<td>ICD</td>
<td>Distance between two condyles</td>
</tr>
<tr>
<td>Anterior neck length</td>
<td>ANL</td>
<td>Distance between anterior inter trochanteric ridge to mid point of articular line of head of femur</td>
</tr>
<tr>
<td>Posterior neck length</td>
<td>PNL</td>
<td>Distance between posterior inter trochanteric ridge to mid point of articular line of head of femur</td>
</tr>
<tr>
<td>Intertrochanteric distance</td>
<td>ITD</td>
<td>Maximum distance between the trochanters</td>
</tr>
</tbody>
</table>

RESULTS

Table 2: Means, standard deviations and F-ratios for the femur between Genders

<table>
<thead>
<tr>
<th>Femur parameters</th>
<th>Gender</th>
<th>F ratio</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>Femur Length</td>
<td>45.12</td>
<td>1.75</td>
<td>39.97</td>
</tr>
<tr>
<td>Vertical diameter of head of Femur</td>
<td>4.42</td>
<td>0.22</td>
<td>3.75</td>
</tr>
<tr>
<td>Vertical diameter of Neck</td>
<td>3.17</td>
<td>0.29</td>
<td>2.69</td>
</tr>
<tr>
<td>Bicondylar Breadth</td>
<td>6.81</td>
<td>0.37</td>
<td>5.66</td>
</tr>
<tr>
<td>Epicondylar Breadth</td>
<td>7.60</td>
<td>0.27</td>
<td>6.62</td>
</tr>
<tr>
<td>Diameter at lesser trochanter</td>
<td>3.54</td>
<td>0.31</td>
<td>3.25</td>
</tr>
<tr>
<td>Inter condylar distance</td>
<td>2.33</td>
<td>0.33</td>
<td>2.11</td>
</tr>
<tr>
<td>Anterior Neck length</td>
<td>3.54</td>
<td>0.49</td>
<td>3.02</td>
</tr>
<tr>
<td>Posterior Neck Length</td>
<td>3.79</td>
<td>0.47</td>
<td>3.21</td>
</tr>
<tr>
<td>Intertrochanteric distance</td>
<td>6.98</td>
<td>0.54</td>
<td>5.81</td>
</tr>
</tbody>
</table>
Comparative statistics with the means and standard deviations with F-ratio included for each dimension can be seen in Table 2. All the means in the male group were greater than the means in the female group and these differences are statistically significant (p-value <0.001) thereby confirming sexual dimorphism of these variables.

### Table 3: Percentage of original cases reported correctly

<table>
<thead>
<tr>
<th>Femur Parameter</th>
<th>% of original cases reported correctly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Femur Length</td>
<td>92%</td>
</tr>
<tr>
<td>Vertical diameter of head of Femur</td>
<td>90%</td>
</tr>
<tr>
<td>Vertical diameter of Neck</td>
<td>87%</td>
</tr>
<tr>
<td>Bicondylar Breadth</td>
<td>95%</td>
</tr>
<tr>
<td>Epicondylar Breadth</td>
<td>95%</td>
</tr>
<tr>
<td>Diameter of shaft at lesser trochanter</td>
<td>70%</td>
</tr>
<tr>
<td>Intercondylar distance</td>
<td>68%</td>
</tr>
<tr>
<td>Anterior Neck length</td>
<td>76%</td>
</tr>
<tr>
<td>Posterior Neck Length</td>
<td>71%</td>
</tr>
<tr>
<td>Intertrochanteric distance</td>
<td>92%</td>
</tr>
</tbody>
</table>

Table 3 shows the accuracy of the variables measured. Of the 10 variables studied bicondylar breadth and epicondylar breadth shows highest accuracy while diameter of shaft and neck length shows lowest accuracy which is consistent with earlier studies.21

### Table 4: Stepwise discriminant function analysis for femur parameters

<table>
<thead>
<tr>
<th>Femur parameters</th>
<th>Wilks’ Lambda</th>
<th>F</th>
<th>Degree of Freedom</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Femur Length</td>
<td>0.321</td>
<td>207.138</td>
<td>98</td>
<td>0.000</td>
</tr>
<tr>
<td>Vertical diameter of head of Femur</td>
<td>0.316</td>
<td>212.477</td>
<td>98</td>
<td>0.000</td>
</tr>
<tr>
<td>Vertical diameter of Neck</td>
<td>0.482</td>
<td>105.478</td>
<td>98</td>
<td>0.000</td>
</tr>
<tr>
<td>Bicondylar Breadth</td>
<td>0.313</td>
<td>214.985</td>
<td>98</td>
<td>0.000</td>
</tr>
<tr>
<td>Epicondylar Breadth</td>
<td>0.290</td>
<td>239.376</td>
<td>98</td>
<td>0.000</td>
</tr>
<tr>
<td>Diameter at lesser trochanter</td>
<td>0.797</td>
<td>24.967</td>
<td>98</td>
<td>0.000</td>
</tr>
<tr>
<td>Intercondylar distance</td>
<td>0.885</td>
<td>12.779</td>
<td>98</td>
<td>0.001</td>
</tr>
<tr>
<td>Anterior Neck length</td>
<td>0.742</td>
<td>34.117</td>
<td>98</td>
<td>0.000</td>
</tr>
<tr>
<td>Posterior Neck Length</td>
<td>0.688</td>
<td>44.383</td>
<td>98</td>
<td>0.000</td>
</tr>
<tr>
<td>Intertrochanteric distance</td>
<td>0.447</td>
<td>121.154</td>
<td>98</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Table 4 depicts the data under three headings – Wilk’s Lamda, equivalent F-Ratio and calculated degree of freedom. F-ratio determines how much variation exists within and between sexes and significance level of variance. Wilk’s Lamda calculates how useful a given variable is in discriminant function analysis.
Table 5: Canonical discriminant function coefficients and sectioning points Entire Femur

<table>
<thead>
<tr>
<th></th>
<th>Classification Function Coefficients</th>
<th>Canonical Discriminant Function Coefficients</th>
<th>Standardized Canonical Discriminant Function Coefficients</th>
<th>Sectioning or Cut off value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Femur Length</td>
<td>16.766</td>
<td>15.143</td>
<td>.347</td>
<td>0.620</td>
</tr>
<tr>
<td>Vertical diameter of head of Femur</td>
<td>-20.176</td>
<td>-20.007</td>
<td>-.036</td>
<td>-0.008</td>
</tr>
<tr>
<td>Vertical diameter of Neck</td>
<td>-40.662</td>
<td>-38.615</td>
<td>-.437</td>
<td>-0.103</td>
</tr>
<tr>
<td>Breadth of upper end of femur</td>
<td>-10.874</td>
<td>-11.135</td>
<td>.056</td>
<td>0.024</td>
</tr>
<tr>
<td>Bicondylar Breadth</td>
<td>4.096</td>
<td>1.241</td>
<td>.610</td>
<td>0.239</td>
</tr>
<tr>
<td>Epicondylar Breadth</td>
<td>26.789</td>
<td>26.463</td>
<td>.070</td>
<td>0.022</td>
</tr>
<tr>
<td>Medial condylar length</td>
<td>-45.678</td>
<td>-39.663</td>
<td>-1.285</td>
<td>-0.391</td>
</tr>
<tr>
<td>Lateral condylar length</td>
<td>93.932</td>
<td>81.268</td>
<td>2.705</td>
<td>0.743</td>
</tr>
<tr>
<td>Diameter at lesser trochanter</td>
<td>22.558</td>
<td>22.112</td>
<td>.095</td>
<td>0.028</td>
</tr>
<tr>
<td>Int condylar distance</td>
<td>38.478</td>
<td>34.156</td>
<td>.923</td>
<td>0.274</td>
</tr>
<tr>
<td>Anterior Neck length</td>
<td>8.524</td>
<td>6.623</td>
<td>.406</td>
<td>0.180</td>
</tr>
<tr>
<td>Posterior Neck Length</td>
<td>9.571</td>
<td>9.688</td>
<td>-.025</td>
<td>-0.011</td>
</tr>
<tr>
<td>Intertrochanteric distance</td>
<td>12.359</td>
<td>10.845</td>
<td>.323</td>
<td>0.172</td>
</tr>
<tr>
<td>Constant</td>
<td>-641.592</td>
<td>-494.130</td>
<td>-31.499</td>
<td></td>
</tr>
</tbody>
</table>

Male = 2.341  Female = -2.341

Table 5 represents the classification function coefficients, canonical discriminant coefficients, standard canonical discriminant coefficients and sectioning points of the variables.

Table-6: Discriminant function analysis equation for entire femur, upper end and lower end dimensions of femur;

Discriminant function analysis equation entire femur

\[ .235 \times LF + 0.560 \times VDH + 0.385 \times VDN + 0.923 \times BCB + 0.481 \times ECB + (-0.125) \times DLT + 0.843 \times ICD + 0.365 \times ANL + 0.094 \times PNL + 0.365 \times ICD - 27.878 \]

Discriminant function analysis equation for upper end dimensions of femur;

\[ 2.208 \times VDH + 1.009 \times VDN + 0.365 \times DLT + 0.607 \times ANL + 0.114 \times PNL + 0.817 \times ITD - 20.832 \]

Discriminant function analysis equation for lower end dimensions of femur;

\[ 1.406 \times BCB + 1.846 \times ECB + 0.296 \times ICD - 22.542 \]

The mean value of each measurement, its coefficient, constant and its controls are used to formulate the corresponding discriminant function equations for the entire femur, upper end and lower end of femur as shown in table 6.

**DISCUSSION**

Skull and pelvis are the bones which gives most accurate estimate of sex of an individual. In their absence long bones especially femur has been most accurate in sex determination. Metric analysis has been helpful whenever femur has been found fragmented, as the articular ends give definite measurements. Male robustness and muscle weight are the features that influence the sexual dimorphic features in femur. The cortical areas of long bones is proportional to the body mass, hence the tranverse or sagittal measurements of long bones are considered better discriminators than the longitudinal measurements and extremities have higher accuracy compared with shaft dimensions. However the metric value tends to show variations amongst different populations and also in different
periods amongst same population which is demonstrated in various studies and thus the present study is undertaken to derive standards for the contemporary south Indian population. The results of the present study shows that mean values of all the measurements are greater in men than in women and are statistically significant. In previous studies, among American population head of femur was the most important sex determinator. In Chinese population distal breadth of femur was more sexually dimorphic. According to study by Asala SA etal., on south African blacks, vertical diameter of head in upper end and medial condylar length in lower end of femur was most accurate in sex determination and combined variables were more accurate than individual variable. Study by Deog-Im Kim on Korean population concluded that medial and lateral condyles are reliable indicators of sex in fragmentary remains. Epicondylar breadth was reported to be the most successful variable in sex determination in various other studies, which is supported by present study. In the present study epicondylar breadth and bicondylar width has highest accuracy. Steyn and Iscan found distal end of femur to be a better discriminator compared to proximal epiphysis among south Africans, which is in conformity with the present study where as some authors have reported it otherwise.

**CONCLUSION**

This study demonstrates that femur of south Indian population is highly sexually dimorphic even if it is in fragmented form The study emphasizes the importance of population specificity of the femoral dimensions in determining sex. As revealed by previous studies considerable differences exist between populations. Moreover using metrics yields objective estimation of sex unlike the subjective visual observations. It also doesn’t require expertise to estimate sex. The present study is in conformity with previous studies that distal end is a better predictor of sex than the proximal end and bicondylar width and epicondylar breadth have highest accuracy whereas shaft diameter and neck length shows lowest accuracy. Almost all dimensions shows statistically significant differences demonstrating the importance of femur in determining sex in unknown skeletal remains.

**Conflict of Interest:** Nil

**Ethical Clearance:** Taken from institutional ethical committee, SDUAHER, Kolar.

**Source of Funding:** Self

**REFERENCES**

Analysis of Twenty Cases of Forensic Exhumation with Emphasis on Cause of Death

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ABSTRACT

Background: Exhumation is a Latin word ‘from the ground’ which means in its simplest form, the removal of human remains, including cremated remains from any place of burial. The main purpose of performing the exhumation is to determine the cause of death when foul play is suspected, but this is also done for identification purposes required in some civil and criminal cases. To determine the cause of death especially in homicidal cases but sometimes it is not determined and acknowledged as unascertained because examination of exhumed body is by no means infallible in revealing the cause of death.

Aim and Objective: To make a comprehensive analysis of the exhumation deaths conducted at Mortuary of Gandhi Medical College, Hyderabad.

Study Design: It’s a cross sectional Prospective study.

Material and Method: The present study was conducted over a period of Two years, during the said period total 20 exhumations were carried out in Hyderabad by the team of Gandhi Medical College, Hyderabad. Cases were studied thoroughly in Forensic Medicine Department of Gandhi Medical College, Hyderabad.

Observation and Discussion: There were 15 male cases and 5 female cases. Male sex is showing predominance than over female. They were divided into five groups on age basis. Majority of the cases from both genders came in group 2 with 45% of cases. Out of the 20 cases of exhumation in almost 70% of cases the cause of death could be ascertained whereas in only 30% of case it could not be established. 30% of cause of death had been due to poisoning, 20% cases Asphyxia was the cause for the death.

Conclusion: The present study underlines the importance of such kind of examinations even after considerable postmortem intervals however need caution because with each passing day the morphological evidences may be deteriorated.

Keywords: Forensic Pathology, Exhumation, Cause of Death, Autopsy.

INTRODUCTION

Exhumation means to dig up a dead body for medical investigation or other purposes. Exhumation is a Latin word ‘from the ground’ which means in its simplest form, the removal of human remains, including cremated remains from any place of burial. In most of the religion of the world, where human remains are buried, the general rule is that once the body or remains have been entered or cremated to the ground, whether in a coffin or in the case of cremated remains in a container or poured into to the ground from a container, should there be any cause to require an examination, removal or disturbance of the remains an exhumation license or order will be required¹. A person seeking to exhume a
body must usually petition to have the body exhumed. Because of the general disinclination to disturb remains, a valid reason is required before exhumation will be allowed.

Reasons may include newly discovered evidence requiring a medical examination as to cause of death or verification of identity in cases of possible mistaken identity. State laws regarding exhumation vary, so local law should be consulted to determine specific requirements in specific area. The main purpose of performing the exhumation is to determine the cause of death when foul play is suspected, but this is also done for identification purposes required in some civil and criminal cases. Though it is a key to determine the cause of death especially in homicidal cases but sometimes it is not determined and acknowledged as unascertained because examination of exhumed body is by no means infallible in revealing the cause of death, and herein no abnormality is detected on gross examination of body and histological, toxicological and microbiological procedures are insignificant.

In our country exhumation is carried out mostly for the purpose of establishing cause of death when any foul play is suspected and the relatives request for exhumation. They apply to DCO or Sessions Judge through local police. Then with the permission of authority a medical board is constituted who in the presence of a magistrate and police squad carries exhumation process. It is illegal and immoral to disturb human remains without lawful authority. This applies to both bodies and cremated remains buried beneath ground level. The next-of-kin of the deceased should normally make application to the relevantly legal authority for exhumation.

Success regarding finding cause of death depends upon condition of corpse at the time of exhumation. Cause of death lay in the vital organs or systems composed of soft tissues and rate of success depends upon the condition of the corpse, a thorough search is required. In Europe in some part of the world, exhumation services are carried out not only for forensic purposes as in our country but also for changing of graves, movements from overseas, from burial to cremation. In murder cases, after rape DNA of semen can be helpful in identification of assailant, if bodies are exhumed and culprit can be apprehended. A body can be exhumed after hundred years of burial for DNA testing to prove paternity. In UK, even the private parties are doing the task of exhumation; the government machinery provides license only.

Exhumation consists of following steps
- General precautions
- Identification of the grave, opening it, collection of sample of earth
- Identification of the coffin and collection of samples
- Identification of body by magistrate or coroner
- Autopsy

The aim and objective of this study was to make a comprehensive analysis of the exhumation deaths conducted at Mortuary of Gandhi Medical College, Hyderabad.

MATERIAL AND METHOD

The present study was conducted over a period of Two years, during the said period total 20 exhumations were carried out in Hyderabad by the team of Gandhi Medical College, Hyderabad. Cases were studied thoroughly in Forensic Medicine Department of Gandhi Medical College, Hyderabad. A standard prescribed protocol is followed, after receipt of Exhumation order from competent authority i.e., Executive Magistrate, in the presence of Executive Magistrate, Police Investigating Officer of the Jurisdiction and Medical Officer conducting medico legal autopsy, exhumations were conducted. After bringing out of the body from the grave, confirming its identity in known cases by near relatives. Then only the autopsy procedure was initiated to fulfill the current study objectives. Cases of deceased where cause of death was determined either by external and internal examination or by histological examination / chemical analysis of viscera were included in this study. Partially decomposed, advanced decomposed or skeletonised bodies, with no internal or external injuries sufficient to cause death and histological and toxicological reports failing to reveal any abnormal findings were also included in the study. Different variables of bodies e.g., sex, age, time of death & Exhumation, corpse condition, were analyzed using statistical package for social services (SPSS) version 16.

OBSERVATION AND DISCUSSION

The digging up of a buried body is called
Exhumation or disinterment, and is generally considered sacrilege or taboo by most cultures that bury their dead. Legally interred bodies are burials which have been approved by the authorities and which are buried in a cemetery. Unlawful burials on the other hand involve bodies not found buried in a cemetery and are the result of an individual or group trying to conceal or dispose of a body. The autopsies on exhumed bodies are performed for medico legal purposes in criminal cases such as homicide, suspected homicides, suspicious cases of poisoning, deaths resulted due to criminal abortions, malpractice or negligence. Apart from it civil cases like accidental death claims, double indemnity insurance, workmen’s compensation claims, liability for malpractice, negligence, torts, survival ship, inheriting claims to determine the cause of death. Even though the scope of exhumations stretches from crime to compensation, in reality its application is negligible and instances of misuse are more common.

In the present study a total number of 20 exhumations carried out by department of Forensic Medicine, Gandhi Medical College, Hyderabad. As per Fig. No 1 There were 15 male cases and 5 female cases. Male sex is showing predominance than over female. They were divided into five groups on age basis. Group-1 from 10–20 years, Group-2 from 21–30 years, Group 3 from 31–40 years, Group-4 from 41–50 years and Group 5 with more than 50 years age. Majority of the cases from both genders came in group 2 with 45% of cases.

Out of the 20 cases of exhumation in almost 70% of cases the cause of death could be ascertained whereas in only 30% of case it could not be established. 30 % of cause of death had been due to poisoning, 20% cases Asphyxia was the cause for the death.

The skin of the face, neck and the limbs, in that order was found to have decomposed and liquefied earlier than the skin on the back of the Trunk, and as early as 2 weeks. The skin on the back of the body resisted decomposition longest of all the body skin. External genitalia decomposed within a month. Serotum with testes decomposed within 2 weeks, while penis was recognizable up to 4 weeks. Internally, the spleen was completely autolysed within days. The organs of the Thorax and Abdomen decomposed and- merged into semi—solid confluent masses of tissue as early as 3 weeks. Costal cartilages softened and dropped into the thoracic cavity and disintegrated in 3 weeks. The intervertebral discs decomposed and completely disappeared as early as 3 weeks, in shallow and dry graves and where as could be identified in deep marshy graves for about 20 weeks. Laryngeal cartilages (Thyroid, Cricoid, Epiglottis, Tracheal rings, Nasal cartilages, (Septal, alar
and lateral). External ear cartilage, semi lunar cartilages of knee joints, articular cartilage of ends of long bones have decomposed and disintegrated in 3 weeks. Finger and toe nails disintegrated as early as 2 weeks. Teeth are separated from their sockets from decomposition and dissolution of soft tissue surrounding their roots within 3 weeks. It is noted that ligaments and cartilages were not destroyed between 3rd and 4th month after death in some cases buried in great depth. Capsules of the larger joints like Hip and shoulder are more resistant to decomposition than those of smaller joints. Ligaments of joints were intact as long as 20 weeks after death.

In most of the countries exhumation is carried out mostly for the purpose of establishing cause of death when any foul play is suspected and the relatives’ request for exhumation\(^\text{12}\) as in a retrospective study by Karger et al of 155 exhumations over more than 30 years, the most common indication for exhumation was primary suspicion of homicide followed by possible malpractice and accidents including traffic accidents\(^\text{13}\). There have been instances in the literature where exhumation for medico-legal purposes proved the cause of death beyond doubt when it had been ambiguous or unsatisfactory to the relatives.

Apart from exhumation for medico-legal causes, the reasons of removal of body after burial can be varied. Sometimes exhumation is carried out on cultural basis\(^\text{12}\). In Southern Chinese culture, graves are opened after a period of years. The bones are removed, cleaned, dried, and placed in Taiwan in a ceramic pot for reburial or in a smaller coffin to be taken home by the rest of the family as in Vietnam. In Hong Kong the purpose of exhumation is different, where real estate is at a premium in government run cemeteries corpse are disinterred after six years under exhumation order\(^\text{14}\). In some cultures exhumation is acceptable once the human remains reach a certain age. This may be followed by later reburial following traditional rites. There have been instances in history when notable individuals are exhumed to answer historical questions. Many Ancient Egyptian mummies have been removed for study and public display. Exhumation also enables archaeologists to search the remains to better understand human culture. Contrarily, in some cultures exhumation is forbidden as in Jewish law\(^\text{15}\).

**CONCLUSION**

In India, amongst others, the burial practice and postmortem interval are major determining factors for possible outcome at exhumation. With certain reservations, the present study underlines the importance of such kind of examinations even after considerable postmortem intervals however need caution because with each passing day the morphological evidences may be deteriorated.

**Source of Funding:** Nil

**Conflicts of Interest:** Nil

**Ethical Consideration:** Clearance from the Institutional Ethical committee was obtained in advance.

**REFERENCES**

7. Exhume bodies of Shopian rape victim, Kashmir High Court, India. The Times of India. Available


Road Traffic Fatalities: A Retrospective Study

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2Assistant Professor, Department of Forensic Medicine and Toxicology, Karuna Medical College, Palakkad

ABSTRACT

Introduction: Accidents, unfortunately, are not often due to inexperience, but are due to negligence, recklessness and rashness. Human automobile and environmental factors play roles not only during but also before and after a traumatic event. Road traffic mishaps, therefore, can be considered in terms of agent, host and environmental factors. The present study is a retrospective observational study.

Material and method: In the study period of two years from January 2014 to December 2015, a total of 181 road traffic accident cases which were subjected to Autopsy at Osmania General Hospital Mortuary were studied. All the cases were scrutinised for age, sex, type of vehicle and cause of death as a result of road traffic accidents.

Results: The major age group affected was 21-30 years (28.17%) and the least age group affected was between 71-80 years (1.1%). In majority of Cases Head and Face was affected. In present study motorcyclist accident constituted to the majority of the traffic collisions (38.67%), which was followed closely by pedestrians using road, the least affected were the bicycles who constituted to only 0.55% percent of the collisions. The males constituted to the majority of the collisions and the ratio of male: female was 5.4:1.

Study variables: Demographic characteristics of the victims and injury pattern.

Results: Percentages, Critical ratio

Conclusion: There is an immediate need to focus on prevention of road traffic accidents, spread awareness among general population about importance of following road traffic rules and fatalities associated with rash and negligent driving.

Keywords: Accidents, Head injury, trauma, injury

INTRODUCTION

Road safety is an issue of national concern, considering its magnitude and gravity and the consequent negative impacts on the economy, public health and the general welfare of the people. Today, Road Traffic Injuries are one of the leading causes of deaths, disabilities and hospitalizations, with severe socioeconomic costs, across the world. Every year road traffic accidents take the lives of 1.2 million men, women and children around the world, and seriously injure millions more1. The death toll is highest and still growing in low and middle-income countries, where pedestrians, motorcyclists, cyclists and passengers are especially vulnerable Over 70% - nearly 850,000 persons - killed in road traffic injuries in 1998 were under 45 years of age. India accounts for about 10 percent of road accident fatalities worldwide. At present 80,000 dies annually in India due to road traffic collisions. In India, for individuals of more than 4 years of age, more life’s are lost due to traffic crashes than due to cardiovascular diseases or neoplasm2, 3, 4. Currently motor vehicle accidents rank 9th in order of disease burden and are projected to be ranked third in the year 2020. Nearly three quarter of deaths resulting from motor vehicle crashes occur in developing country7. The

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Email: katkuriparvathi4444@gmail.com
A financial loss due to road traffic accidents is estimated to be around 12000 crores per year.

**Aim:** This study is conducted to analyse the pattern of injuries in relation to the mode of travel, cause of death with particular reference to age and sex of victim. This study is undertaken to help the policy makers and the researchers to prevent the further deaths and disabilities due to these collisions.

**MATERIALS AND METHOD**

The present study was conducted at Osmania General Hospital Mortuary attached to Osmania Medical College, Hyderabad, Telangana. The study was carried from January 2014 to December 2015. The material for the study comprised all dead bodies of fatal road traffic accidents brought to Osmania General Hospital mortuary. In the present study, a road traffic accident was defined as accident which took place on the road between one or more objects, one of which must be any kind of a moving vehicle. Others were excluded. All RTA victims who died on the spot or after treatment and subjected to autopsy at Osmania General Hospital Mortuary, autopsied by the Author were included. The history as regards the circumstances of the accidents and other relevant data about injuries to the victims, the site of impact etc. were collected. Data with reference to the vehicles involved in the accident, their types etc. were noted from the Inquest reports and FIR. All 181 dead bodies were examined at post-mortem for the presence of external injuries, internal injuries including bone and joints and finally characteristics of injuries were analysed regarding their nature, type, area of the body wounded and distribution of injuries. Furthermore, place of death of RTA victims, nature of treatment provided if any, and period of survival after accidents were also recorded. For the purpose of this study vehicles were divided into 2 wheelers, 3 wheelers, 4 wheelers and all heavy vehicles like RTC buses, Lorries, Oil tankers and Tippers were considered as 6 wheelers.

**Statistical analysis:-**

**Table 1: Age and Gender distribution of Road users involved in fatal RTA**

<table>
<thead>
<tr>
<th>Age group</th>
<th>Males</th>
<th>Females</th>
<th>Total victims</th>
</tr>
</thead>
<tbody>
<tr>
<td>01-10 yrs.</td>
<td>4(2.2%)</td>
<td>2(1.1%)</td>
<td>6(3.3%)</td>
</tr>
<tr>
<td>11-20 yrs.</td>
<td>17(9.39%)</td>
<td>4(2.2%)</td>
<td>21(11.6%)</td>
</tr>
<tr>
<td>21-30 yrs.</td>
<td>48(26.51%)</td>
<td>3(1.65%)</td>
<td>51(28.17%)</td>
</tr>
<tr>
<td>31-40 yrs.</td>
<td>23(12.7%)</td>
<td>8(4.41%)</td>
<td>31(17.12%)</td>
</tr>
<tr>
<td>41-50 yrs.</td>
<td>30(16.5%)</td>
<td>4(2.2%)</td>
<td>34(18.78%)</td>
</tr>
<tr>
<td>51-60 yrs.</td>
<td>22(12.15%)</td>
<td>6(3.3%)</td>
<td>28(15.46%)</td>
</tr>
<tr>
<td>61-70 yrs.</td>
<td>7(3.86%)</td>
<td>1(0.55%)</td>
<td>8(4.4%)</td>
</tr>
<tr>
<td>71-80 yrs.</td>
<td>2(1.1%)</td>
<td>0</td>
<td>2(1.1%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>153(84.53%)</td>
<td>28(15.46%)</td>
<td><strong>181</strong></td>
</tr>
</tbody>
</table>

**Table 2: Showing type of Vehicle the deceased was travelling in**

<table>
<thead>
<tr>
<th>Victim vehicle</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Wheeler</td>
<td>70</td>
</tr>
<tr>
<td>3 Wheeler</td>
<td>9</td>
</tr>
<tr>
<td>4 Wheeler</td>
<td>26</td>
</tr>
<tr>
<td>6 Wheeler</td>
<td>8</td>
</tr>
<tr>
<td>Bicycle</td>
<td>1</td>
</tr>
<tr>
<td>Pedestrian</td>
<td>65</td>
</tr>
<tr>
<td>Tractor</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>181</strong></td>
</tr>
</tbody>
</table>

**Table 3: Showing period of Survival**

<table>
<thead>
<tr>
<th>Period of survival</th>
<th>Number of Victims</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spot Death</td>
<td>84</td>
</tr>
<tr>
<td>00-06 hours</td>
<td>29</td>
</tr>
<tr>
<td>06-12 hours</td>
<td>10</td>
</tr>
<tr>
<td>12-24 hours</td>
<td>16</td>
</tr>
<tr>
<td>1-3 days</td>
<td>12</td>
</tr>
<tr>
<td>3-7 days</td>
<td>20</td>
</tr>
<tr>
<td>8-14 days</td>
<td>6</td>
</tr>
<tr>
<td>&gt;14 days</td>
<td>5</td>
</tr>
<tr>
<td>4 month</td>
<td>1</td>
</tr>
</tbody>
</table>
### DISCUSSIONS

Road traffic accidents (RTAs) are growing with quick speed and presently RTA’s are one of the prominent causes of death in developing nations. Vander sluis et.al.\(^7\) has reported that traffic is the most important cause of severe injuries and three quarters of severely injured cases who died during hospitalization are victims of traffic accidents. In the present study, a total of 181 cases of fatal road traffic accidents (RTA) have been studied with respect to distribution, nature and type of injuries. A majority cases have sustained multiple injuries and Fatal Head injuries. EKe N et. al.\(^8\) have also reported occurrence of multiple injuries in 93.5% of the victims. In the present study, a dominance of males over females M/F ratio 5.4:1 have been observed. This is in contrast to ratio of 9:1 as has been observed by Singh and Dhattarwal\(^9\). Highest incidence of fatalities have occurred in the age group of 21-30 years for males and 31-40 years for females followed by the age group 41-50 years. Cases involving children below 10 years of age were least involved as was the case with individuals beyond 61 years of age. Our findings are in general agreement with Singh & Dhattarwal\(^9\) who have reported that car and buses are commonly involved in the causalities followed by motorcycles, Lorries etc. Studies from developed countries have reported lesser involvement of pedestrians probably due to the fact that in developed countries use of motor vehicles is to such an extent that pedestrians are rare on the road. It has been noted by Gerberich et.al.\(^10\) that farm vehicle fatalities being a significant problem in U.S. During 1988-1993, in rural areas, 444 farm-vehicle occupants are killed, in addition, 238 occupants of other vehicles or pedestrians are killed in collisions with farm- vehicles. However, in the present study, minimal involvement and only two cases of death involving Tractors were noted. Present study has not involved the role of contributing factors like alcohol in fatal RTA, although role of alcohol in impairing driving ability is well documented. Additional works on road traffic suicides (pedestrian or drivers suicide) and natural deaths is rare. A great majority of fatal RTA victims have received multiple external injuries. Singh & Dhattarwal have also recorded involvement of multiple body parts in each case. In our series, head injury alone is the cause of death in 43% of cases our finding pertaining to head injury is at similar to those of Singh & Dhattarwal\(^9\) who have reported on incidence of 50.4% of head injury. Severe brain injury is the most important cause of death, is held by vander sluis\(^2\) as well. In present study, all 181 cases had sustained some kind of injuries, this is in contrast to the findings of EkE N et.al.\(^8\) who have observed that as many as 100 RTA victims had no evidence of violence on them on physical examination and on autopsy 37 victims had no physical injuries. The authors have opined that they may have died from natural causes; existing disease especially in elderly may be the cause of death in RTA. In the current study, we have observed that 84 cases died on spot. This is in contrast to Singh & Dhattarwal\(^9\) who

<table>
<thead>
<tr>
<th>Cause of Death</th>
<th>No. of victims</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blunt injury Abdomen</td>
<td>3</td>
</tr>
<tr>
<td>Blunt injury Abdomen and Chest</td>
<td>2</td>
</tr>
<tr>
<td>Blunt injury to Chest</td>
<td>5</td>
</tr>
<tr>
<td>fracture long bone</td>
<td>2</td>
</tr>
<tr>
<td>Head Injury</td>
<td>78</td>
</tr>
<tr>
<td>Head Injury with spinal injury</td>
<td>11</td>
</tr>
<tr>
<td>Multiple Injuries</td>
<td>77</td>
</tr>
<tr>
<td>pelvis Fracture</td>
<td>1</td>
</tr>
<tr>
<td>Septicaemia</td>
<td>2</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td><strong>181</strong></td>
</tr>
</tbody>
</table>

**Table 4: Showing the final opinion of the cause of death in RTA and number of Victims**

Moreover, majority of road users are pedestrians those are comparatively more exposed to the risk of accidents and lack traffic sense among 2 wheeler Occupants and Pedestrians. Our findings are in general agreement with those of other\(^8,9\). In the present study, 6 wheelers are more commonly involved in fatal RTA followed by 4 wheelers. This can be attributed to their higher speed, greater momentum, presence of single space roads, overtaking, volume of traffic etc. The finding are in conformity with Singh & Dhattarwal\(^9\). Our findings are in inconsistent with EkeN et.al.\(^8\) who have observed that car and buses are commonly involved in the causalities followed by motorcycles, Lorries etc. Studies from developed countries have reported lesser involvement of pedestrians probably due to the fact that in developed countries use of motor vehicles is to such an extent that pedestrians are rare on the road. It has been noted by Gerberich et.al.\(^10\) that farm vehicle fatalities being a significant problem in U.S. During 1988-1993, in rural areas, 444 farm-vehicle occupants are killed, in addition, 238 occupants of other vehicles or pedestrians are killed in collisions with farm- vehicles. However, in the present study, minimal involvement and only two cases of death involving Tractors were noted. Present study has not involved the role of contributing factors like alcohol in fatal RTA, although role of alcohol in impairing driving ability is well documented. Additional works on road traffic suicides (pedestrian or drivers suicide) and natural deaths is rare. A great majority of fatal RTA victims have received multiple external injuries. Singh & Dhattarwal have also recorded involvement of multiple body parts in each case. In our series, head injury alone is the cause of death in 43% of cases our finding pertaining to head injury is at similar to those of Singh & Dhattarwal\(^9\) who have reported on incidence of 50.4% of head injury. Severe brain injury is the most important cause of death, is held by vander sluis\(^2\) as well. In present study, all 181 cases had sustained some kind of injuries, this is in contrast to the findings of EkE N et.al.\(^8\) who have observed that as many as 100 RTA victims had no evidence of violence on them on physical examination and on autopsy 37 victims had no physical injuries. The authors have opined that they may have died from natural causes; existing disease especially in elderly may be the cause of death in RTA. In the current study, we have observed that 84 cases died on spot. This is in contrast to Singh & Dhattarwal\(^9\) who
have reported a lower incidence of 15.4% victims who died on the spot. It was observed that a total of 97 of 181 RTA victims were admitted in the hospital whereas 54 have died either on way to hospital or were declared as brought dead. This emphasizes the need for setting up specialized trauma centres in all big cities of the country and proper faster transportation of RTA victims to save the precious lives.

Regarding period of survival of fatal RTA victims, we have noted that a 139 victims have died within 24 hours hence first 24 hours are relatively critical for RTA victims. 42 cases survived beyond 24 hours and maximum being 1 victim surviving for 4 month. These observations are in general agreement with those of Singh & Dhattarwal. It may be concluded that there is a serious requirement to address the widespread bloodbath on the roads. In most cases fatal RTAs are triggered by human miscalculations and are therefore avoidable. A stricter licensing policy for all Vehicles, better awareness about traffic rules, cultivation of road traffic sense, and a properly planned road network in compliance with the volume of traffic will go a long way in reducing the prevalence and incidence of fatal RTAs. Furthermore, the recommendations from the world report on Road Traffic Injury Prevention should be considered and promptly implemented.

CONCLUSION

There is an urgent need to address the rampage of bloodshed on the roads. In most cases fatal RTAs are triggered by human errors and are therefore avoidable. A strict policy on driving licence especially for four wheelers and heavy vehicles, need to spread awareness about traffic rules, cultivation of road traffic sense, and a properly planned road network in compliance with the capacity of traffic will go a long way in reducing the incidence of life threatening RTAs. Moreover, the recommendations from the world report on Road Traffic Injury Prevention should be considered and promptly implemented.

**Ethical Clearance:** Osmania Medical College, Department of Forensic Medicine, Koti, Hyderabad, Telangana.

**Source of Funding:** Self

**Conflict of Interest:** Nil

**REFERENCES**

A Study of Cheiloscopic Patterns in Chhattisgarh Population

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ABSTRACT

Introduction: Cheiloscopy is the study of lip print patterns which are individualistic and unique like fingerprints. Cheiloscopy is quite significant in forensic investigation like personal identification and sex determination. But unfortunately, crime detective agencies are still unaware of the importance of lip prints and are not being used in identification of criminals. Aim: To study different types of lip patterns in different quadrants of lip, their incidence in the given age group in relation to specific gender and uniqueness in personal identification. Materials and method: The study comprised of 150 subjects, aged 25-50 years from Chhattisgarh population, India. Lipstick was applied over the lip and lip impressions were taken on white bond paper with the help of cellophane tape and then visualized by magnifying lens. Analysis of lip prints were done according to Suzuki and Tsuchihashi classification. Result and conclusion: It was found that type I was the most prevalent cheiloscopic pattern among both genders. The least common lip pattern was type IV among entire sample study. No gender wise distribution was observed among lip print patterns. Lip patterns are unique for every individual and no two prints are similar to each other. Emphasis to be given for further studies using standard methods to evaluate the lip prints.

Keywords: Cheiloscopy, lip prints, human identification, sex determination.

INTRODUCTION

Cheiloscopy is the study of lip print patterns that are in the form of grooves, furrows, wrinkles and lines which are individualistic and unique like fingerprints. The wrinkles and grooves on the labial mucosa, called as ‘sulci labiorum’ form the characteristic lip print pattern, which have been named as ‘sulci labiorum rubrorum’ by Tsuchihashi. Lip prints are unique and can be identified as early as 6th week of intrauterine life. No change in lip print patterns is seen during human life. Parents and siblings may have identical prints but lip prints are not similar even in identical and non-identical twins. Lip prints are found to be recovered after undergoing alterations due to minor trauma, inflammation and diseases like herpes. But the scarring of lips secondary to major trauma, pathology and surgical intervention may affect the size and shape of the lips, thereby changing the morphology and patterns of prints. Cheiloscopy is quite significant in forensic investigation in terms of age and sex determination, identity of unknown deceased person, bite mark analysis, charred bodies, mass casualty and giving evidence in child abuse. But unfortunately, crime investigators are still unaware of the importance of lip prints and are not being used in identification of criminals.

Fisher was the first to describe lip print patterns in 1902. In 1932, French criminologist Edmond Locard recommended the use of lip prints in personal identification and criminalization. In 1950, Synder
reported in his book ‘Homicide Investigation’ that lip print patterns are as individualistic and unique as the fingerprints\(^9,10\). A number of classifications have been proposed by various researchers to classify the lip prints among them being the Santos, Suzuki and Tsuchihashi and Renaud’s classification\(^3,2\). The present study aimed to find out different types of lip pattern in different quadrants of lip, their incidence in the given age group in relation to specific gender and uniqueness in personal identification.

**MATERIALS AND METHOD**

A sample of 150 individuals consisting of 75 males and 75 females aged between 25-50 years who visited and living in vicinity of CCM Medical College, Kachandur, Durg, C.G. over a period of six months i.e. from 1\(^{st}\) January to 30\(^{th}\) June 2016, were included in the study. Lips free from any pathology having absolutely normal transition zone between the mucosa and skin were selected in a sample. Individuals with known allergy to lipstick, inflammation of lips, trauma, malformation, deformity, surgical scars, facial palsy and active lesions were excluded. Consent was taken before study was carried out.

Materials used were: colored lipstick, bond paper, cellophane tape, white chart paper and magnifying lens. Lips of each individual were cleaned and lipstick was applied. Over the lipstick, a glued portion of cellophane tape was placed and a lip impression was made in a normal relaxed position by pressing it in the center and then evenly towards corners of the lips. The cellophane strip was then stuck on to the bond paper for permanent record and then visualized using magnifying lens. While studying, the lip prints were divided into 4 quadrants/compartments i.e. two compartments on each lip and were marked as digits 1-4 in a clockwise sequence starting from subject’s upper right. Lip patterns were analyzed and studied according to Suzuki and Tsuchihashi’s classification\(^1,4\).

**Suzuki and Tsuchihashi classification of lip print**

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type I</td>
<td>A clear cut groove running vertically across the lip</td>
</tr>
<tr>
<td>Type I'</td>
<td>Partial length groove of type I</td>
</tr>
<tr>
<td>Type II</td>
<td>A branched groove</td>
</tr>
<tr>
<td>Type III</td>
<td>An intersected groove</td>
</tr>
<tr>
<td>Type IV</td>
<td>A reticular pattern</td>
</tr>
<tr>
<td>Type V</td>
<td>Undetermined patterns</td>
</tr>
</tbody>
</table>

To determine sex using lip prints, a study conducted by Vahanwala et al\(^11,4\). was used. According to this study, Type I, I’ and type II – pattern dominant in females and type III and type IV – pattern seen in males.

**RESULT**

Throughout entire study of lip patterns, it revealed that no two or more individuals had similar lip print pattern. Each individual has a unique lip print, thereby confirming the uniqueness of lip print. When the lip print patterns were evaluated in all the lip compartments/ quadrants of study subjects i.e. 600 quadrants among 150 subjects, it was found that type I pattern 178 (29.6%) was the most predominant both in males 86 (28.6%) and females 92 (30.6%). This was followed in order by type II 128 (21.3%), type I’ 99 (16.5%), type III 73 (12.1%) and type IV 50 (8.3%). (Table no.1)

In males, type I 86 (28.6%) lip print pattern was predominant followed by type II 63 (21%) and type I’ 48 (16%). In females, type I 92 (30.6%) lip print pattern was most commonly found followed by type II 65 (21.6%) and type I’ 51 (17%). Therefore the most common cheiloscopy pattern in both sexes was type I 178 (29.6%). The least common was the reticular pattern seen in 22 (7.3%) of males and in 28 (9.3%) of females. (Table no.1) Analysis of lip print patterns in each quadrant was done.

Among males, type I pattern was the most common in compartment 3 (42.6%) followed in order by compartment 4 (38.6%), compartment 1 (37.3%) and least in quadrant 2 (30.6%) (Table no.2). Similarly in females also type I pattern was commonest in quadrant 2 (41.3%) followed by quadrant 4 (38.6%), quadrant 3 (36%) and quadrant 1 (32%) (Table no.3).
Table 1: Overall common lip pattern in males and females (600 quadrants)

<table>
<thead>
<tr>
<th>Lip print pattern</th>
<th>Males (75x4=300)</th>
<th>Females (75x4=300)</th>
<th>total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type I (vertical)</td>
<td>86 (28.6%)</td>
<td>92 (30.6%)</td>
<td>178 (29.6%)</td>
</tr>
<tr>
<td>Type I’ (partial vertical)</td>
<td>48 (16%)</td>
<td>51 (17%)</td>
<td>99 (16.5%)</td>
</tr>
<tr>
<td>Type II (branched)</td>
<td>63 (21%)</td>
<td>65 (21.6%)</td>
<td>128 (21.3%)</td>
</tr>
<tr>
<td>Type III (intersected)</td>
<td>39 (13%)</td>
<td>34 (11.3%)</td>
<td>73 (12.1%)</td>
</tr>
<tr>
<td>Type IV (reticular)</td>
<td>22 (7.3%)</td>
<td>28 (9.3%)</td>
<td>50 (8.3%)</td>
</tr>
<tr>
<td>Type V (undetermined)</td>
<td>42 (14%)</td>
<td>30 (10%)</td>
<td>72 (12%)</td>
</tr>
<tr>
<td>Total</td>
<td>300 (100%)</td>
<td>300 (100%)</td>
<td>600 (100%)</td>
</tr>
</tbody>
</table>

Table 2: Lip pattern in each quadrant in males

<table>
<thead>
<tr>
<th>Lip pattern</th>
<th>Quadrant 1 (RUQ)</th>
<th>Quadrant 2 (LUQ)</th>
<th>Quadrant 3 (LLQ)</th>
<th>Quadrant 4 (RLQ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type I</td>
<td>28 (37.3%)</td>
<td>23 (30.6%)</td>
<td>32 (42.6%)</td>
<td>29 (38.6%)</td>
</tr>
<tr>
<td>Type I’</td>
<td>18 (24%)</td>
<td>17 (22.6%)</td>
<td>20 (26.6%)</td>
<td>15 (20%)</td>
</tr>
<tr>
<td>Type II</td>
<td>14 (18.6%)</td>
<td>12 (16%)</td>
<td>12 (16%)</td>
<td>6 (8%)</td>
</tr>
<tr>
<td>Type III</td>
<td>09 (12%)</td>
<td>10 (13.3%)</td>
<td>08 (10.6%)</td>
<td>11 (14.6%)</td>
</tr>
<tr>
<td>Type IV</td>
<td>05 (6.6%)</td>
<td>05 (6.6%)</td>
<td>01 (1.3%)</td>
<td>04 (5.3%)</td>
</tr>
<tr>
<td>Type V</td>
<td>01 (1.3%)</td>
<td>08 (10.6%)</td>
<td>02 (2.6%)</td>
<td>4 (5.3%)</td>
</tr>
<tr>
<td>Total</td>
<td>75 (100%)</td>
<td>75 (100%)</td>
<td>75 (100%)</td>
<td>75 (100%)</td>
</tr>
</tbody>
</table>

Table 3: Lip pattern in each quadrant in females

<table>
<thead>
<tr>
<th>Lip pattern</th>
<th>Quadrant 1 (RUQ)</th>
<th>Quadrant 2 (LUQ)</th>
<th>Quadrant 3 (LLQ)</th>
<th>Quadrant 4 (RLQ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type I</td>
<td>24 (32%)</td>
<td>31 (41.3%)</td>
<td>27 (36%)</td>
<td>29 (38.6%)</td>
</tr>
<tr>
<td>Type I’</td>
<td>20 (26.6%)</td>
<td>16 (21.3%)</td>
<td>18 (24%)</td>
<td>18 (24%)</td>
</tr>
<tr>
<td>Type II</td>
<td>11 (14.6%)</td>
<td>09 (12%)</td>
<td>17 (22.6%)</td>
<td>11 (14.6%)</td>
</tr>
<tr>
<td>Type III</td>
<td>09 (12%)</td>
<td>14 (18.6%)</td>
<td>06 (8%)</td>
<td>3 (4%)</td>
</tr>
<tr>
<td>Type IV</td>
<td>00 (0%)</td>
<td>03 (4%)</td>
<td>02 (2.6%)</td>
<td>00 (0%)</td>
</tr>
<tr>
<td>Type V</td>
<td>11 (14.6%)</td>
<td>02 (2.6%)</td>
<td>05 (6.6%)</td>
<td>14 (18.6%)</td>
</tr>
<tr>
<td>Total</td>
<td>75 (100%)</td>
<td>75 (100%)</td>
<td>75 (100%)</td>
<td>75 (100%)</td>
</tr>
</tbody>
</table>

**DISCUSSION**

Cheiloscopy is the study of lip print patterns in the form of furrows/grooves located on the red part of human lip is an important tool in the forensic odontology and investigation, similar to DNA and fingerprint analysis. Lip prints have added evidence to the crime scene investigation that lacks other evidences like fingerprints. Potential places where lip prints may be found and used in crime probe are on a tape used to gag or bind victim, on a wine glass, love letters, private parts, cigarette butts or windows/glasses against which prints imprinted. Sometimes lip prints can be seen as lipstick smears. In recent era, lipsticks that do not leave any visible trace on a contact surfaces have been developed and are permanent and referred to as ‘persistent lip prints’ and can be lifted using aluminium powder or magnetic powder. The edges of lips have sebaceous glands with sweat glands in between, the secretion of which along with moisture from tongue enable the existence of latent lip prints. These latent prints can be obtained up to 30 days after being produced. The identification of latent lip prints may act as a starting point to solve the crime. Satisfactory identification results by lip prints have been obtained even in sex determination & in post mortem studies.

The most common lip print pattern in present study was typeI pattern 178 (29.6%) in both the genders. The result of the present study coincides with the study
comprising of 600 subjects conducted by Randhawa et al13.

Vahanwala and Parekh in their study found type I as the most frequently observed pattern followed by type II. Sandhu et al. found type I to be the most common pattern in both genders14,11,2. The present study also had similar findings. The results of our study was near to the study conducted by Sharma et al., Naik et al. and Ahuja and Manchanda where type I and type I’ patterns were predominant in females in their studies. The present study did not match with the study conducted by Sivpathasundharam et al. which concluded type III was the most predominant. In present study, type I and II patterns common in females which coincides with the study done by Vahanwala et al. in assessing the sex while type I lip pattern predominant in males which did not match with the study by Vahanwala et al. in determining sex efficacy. As the age advances, wrinkles on adjacent skin, thinning of lips and loss of tone affect the lip print patterns which in turn affect the lip contour. Also the inter-commissural distance increases and lip height decreases with age15. This could be the possible reason for lesser efficacy in sex determination in our study.

Practical applications: Suzuki and Tsuchihashi reported two cases where lip print application proved useful in identification of culprits. In first case the lip prints identified on envelope matched with those of suspects. While in second case, the lip prints were found on undergarments that were studied by color test and ultraviolet rays16,9. In 1987, FBI had successfully identified a male robber who used to dress female attire including lipstick. FBI took photographs of lip prints which were left by robber on glass door while robbing a bank, which were identified and matched with suspected robber. These cases suggest that lip prints can serve as identification tool and as good as fingerprints in probing the crime17.

Samples lipprints

Fig. 1 Type I in male

Fig. 2 Type I in female

Fig. 3 Lip pattern preserved with cellophane tape

CONCLUSION

The present study concluded that,

1. The most common lip print pattern was type I followed by type II, type I’, type III and type IV in both genders and was common across various compartments.

2. No individual had same type of lip print in all quadrants.

3. No gender wise distribution was observed among lip print pattern.

4. Lip print patterns are unique for every individual as no two or more lip prints are similar to each other.

The data obtained in this study is quite promising as it offers uniqueness and permanence of lip prints. Besides, the procedure of lip print analysis is very easy and affordable. So, it can be recommended that the patterns can be used as a tool of identification in forensic investigation. However, the use of the lip prints in criminal cases is limited because the veracity of lip prints could not be definitely established in legal procedures. As far as Indian legal system is concerned, there is a need of hour to consider the lip print analysis yet another important aid in human identification and disbursement of justice.

Acknowledgement- Nil

Source of Funding- Self
Conflict of Interest - Nil

Ethical Clearance- Not applicable

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ABSTRACT

Introduction: Snake-bite is a well known occupational hazard amongst the outdoor workers and also a known cause of increased mortality and morbidity in our country. Materials and method: A cross sectional study of a total of 102 cases of snake bite admitted in Krishna hospital, Karad was conducted over a period of 12 months from January 2014 to December 2014. Results: A total of 102 cases of snake bite were analysed. Out of 102 cases, 98 % (n=100) were from rural area and 2% (n=2) from urban area. Most common age group of cases of snake bite was 40-49 years. Males (57.8%) were commonly affected than females (42.2%). Highest number of cases were seen in the month of June (18.6%, n=19) followed by September (15.7%, n=16). In the study period, majority of cases of snake bite were improved (82.4%, n=84) where as death occurred in 5.9% (n=6) cases. Conclusion: Snakebite still remains a major occupational hazard affecting productive age group predominantly males in rural area.

Keywords: Snakebite, Morbidity.

INTRODUCTION

Snake bite, a major public health problem, results in approximately 250,000 venomous bites each year and 125,000 deaths worldwide1. Envenomation in India is estimated to be at 81,000/year, which is highest in the world. In India, Uttar Pradesh, Andhra Pradesh and Bihar are the worst affected states, with the majority of the deaths being reported in Andhra Pradesh2.

Currently, snakebite has been included along with other neglected non-tropical diseases such as strongyloidiosis, scabies, mycetoma etc2. Snakebite is an important and serious medical problem in many parts of India. However, reliable data for morbidity and mortality are not available since there is no proper reporting system3. People in countries like India prefer traditional healers rather than trained doctors, mainly because of ignorance and monetary issues as a result of which 77% of the snakebite victims in rural areas die outside the health care set up2.

The study of the pattern of snakebite is essential to provide pertinent information to the concerned authorities in order to manage snakebite appropriately4. The study was conducted to know the pattern of snake bites cases admitted in tertiary hospital Karad.

MATERIALS AND METHOD

A cross sectional study of a total of 102 cases of snake bite admitted in Krishna hospital, Karad was conducted over a period of 12 months from January 2014 to December 2014. The data regarding age, sex, residence, type of snake bite, hospital stay was collected. All the patients coming to casualty with the history of snakebite during the study period were considered. Data was collected and analysed with Microsoft excel and presented as descriptive statistics.

RESULTS

A total of 102 cases of snake bite were analysed. Out of 102 cases, 98 % (n=100) were from rural area and 2% (n=2) from urban area.
Most common age group of cases of snake bite was 40-49 years. Males (57.8%) were commonly affected than females (42.2%).

In the present study, highest number of cases were seen in the month of June (18.6%, n=19) followed by September (15.7%, n=16).

In 102 cases of snake bite, the most common type of venom was hemotoxic (52.9%).

In 102 cases of snake bite, the most common duration of hospital stay of cases of snake bite in the study period was 3-5 days (44%, n=45) followed by 6-10days (30%, n=31).

<table>
<thead>
<tr>
<th>Month</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>5</td>
<td>4.90</td>
</tr>
<tr>
<td>Feb</td>
<td>6</td>
<td>5.88</td>
</tr>
<tr>
<td>Mar</td>
<td>6</td>
<td>5.88</td>
</tr>
<tr>
<td>Apr</td>
<td>6</td>
<td>5.88</td>
</tr>
<tr>
<td>May</td>
<td>7</td>
<td>6.86</td>
</tr>
<tr>
<td>Jun</td>
<td>19</td>
<td>18.6</td>
</tr>
<tr>
<td>Jul</td>
<td>10</td>
<td>9.8</td>
</tr>
<tr>
<td>Aug</td>
<td>7</td>
<td>6.86</td>
</tr>
<tr>
<td>Sep</td>
<td>16</td>
<td>15.7</td>
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<tr>
<td>Oct</td>
<td>9</td>
<td>8.82</td>
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<td>Nov</td>
<td>7</td>
<td>6.86</td>
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<tr>
<td>Dec</td>
<td>4</td>
<td>3.92</td>
</tr>
<tr>
<td>Total</td>
<td>102</td>
<td>100</td>
</tr>
</tbody>
</table>
Table 4: Showing outcome of snake bite.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved</td>
<td>84</td>
<td>82.4</td>
</tr>
<tr>
<td>Death</td>
<td>6</td>
<td>5.9</td>
</tr>
<tr>
<td>Discharge against medical advice</td>
<td>12</td>
<td>11.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>102</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

In the study period, majority of cases of snake bite were improved (82.4%, n=84) where as death occurred in 5.9% (n=6) cases as shown in table 4.

**DISCUSSION**

A total of 102 cases of snake bite were admitted in the study period. The most common age group of snake bite was 40-49 years (18.6%) followed by 10-19 years (17.6%) and 20-29 years (17.6%) as shown in Table 1. The higher incidence of snake bite in middle age of 40-49 years and younger age 20-29 years could be due to active involvement of these age groups in outdoor occupation. This finding is similar to studies by Arun KS, Nagaraju K, Rao CP, Alirol E.

The incidence of snake bite was more common in males (57.8%) as compared to females (42.2%) with male to female ratio 1.37:1. This could be due to more active involvement by males in outdoor agriculture related activities than females. This finding is similar to observations made by Thapar R, Nagaraju K, Rao CP, Alirol E.

In the present study, 98% cases of snake bite were from rural area and 2% from urban area. Similar observations are found in studies by Joshi.

Farmers are more prone to accidental contact with snakes while working in the field barefooted, which is a phenomenon is observed in India. In our study, majority of victims of snake bite were farmers (71%) followed by labourers (19%). This observation could be due to Karad, being part of western Maharashtra where agriculture is the predominant occupation. This finding is similar to observations made by Singh A, Nagaraju K, Rao CP, Alirol E, Monteiro FN, Mondal R.

Majority of cases of snake bite were found during Monsoon (June-September). Similar observations were found in studies by Inamdar IF, Singh A, Joshi SC. In contrast to this, maximum incidence of snakebites was reported during the post-monsoon months of September to December by Thapar R. During the rainy season, rainwater floods their burrows and snakes then try to take shelter near human dwellings, which increases the chances of snakes feeling threatened or startled or provoked by human beings, and biting them in defence.

Most of the snakebites in India are a result of bites of Cobra, Russel’s Viper and Common Krait that are the more commonly encountered species among the 13 known species of poisonous snakes. In 102 cases of snake bite, the most common type of venom was hemotoxic (52.9%) followed by neurotoxic (24.5%). Our observations are in accordance with the studies conducted by Thapar R, Meenatchisundaram S. In contrast to this, neurotoxic snakebite was observed in study conducted by Joshi SC.

The most common duration of hospital stay of cases of snake bite in the study period was 3-5 days (44%, n=45) followed by 6-10 days (30%, n=31). Similar observation of average hospital stay was found by Sam K.

In the study period, majority of cases of snake bite were improved (82.4%) where as death occurred in 5.9% cases as shown in table 4. Similar observation were found in studies by Inamdar IF, Singh A, Nagaraju K, Alirol E. This could be due to early proper management of cases of snake bite in tertiary hospital.

**CONCLUSION**

Snakebite still remains a major occupational hazard affecting productive age group predominantly males in rural area. People must be advised to use protective measures like long pants and gumboots while working outdoors. People must be educated regarding early visit to hospitals for treatment in cases of snake bite.

**Conflict of Interest:** No

**Source of Funding:** Nil

**Ethical Clearance:** The study was approved by Institutional Ethical Committee of Krishna Institute of Medical Sciences Karad, Maharashtra.

**REFERENCES**

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Study on the Profile of Sexual Assault Survivors for a Period of 2 Years in Victoria Hospital, Bangalore

Yogesh C¹, Shashikanth Naik C R²

¹Asst Prof, Dept of Forensic Medicine, PSG Institute of Medical Sciences & Research, Coimbatore,
²Asst Prof, Dept of Forensic Medicine, St John’s Medical College, Bangalore

ABSTRACT

Objective: This study was undertaken to estimate the profile of sexual assault survivors based on the cases reported to Victoria Hospital, Bangalore between 2012 and 2013. Marital status, place and time of assault, relationship between the assailant and the survivor and occurrence of pregnancy some of the criteria discussed in this study.

Method: It is a cross sectional study done by collecting information from the patients directly during the period of 2 years in Victoria Hospital, Bangalore. The data collection was done as per pro forma.

Result: The maximum population of cases- 34.8% were between 16-20 years of age, most of them (57%) being students. Of the 89 cases taken into consideration, 39% turned out to be positive for pregnancy test.

Interpretation & Conclusion: About 63 cases were reported in 2012 alone, followed by 26 cases in 2013. The lack of convictions, low public and domestic safety, lack of strict marital rape laws and the stigmatisation of the survivors are some of the causes.

Keywords: sexual assault, domestic safety, marital rape laws

INTRODUCTION

The word rape is legally defined u/s 375 of Indian Penal Code. Whenever a man penetrates or does sexual intercourse with a woman without her consent or will it amounts to rape. Penetration here means that only a slightest of the touch of penis to vagina amounts to rape, unruptured hymen of woman does not prove that rape was not committed. There are exceptions to it also i.e. when a man does sexual intercourse with his wife who is above 15 years of age.

(Section 375 of the Indian Penal Code, 1860).
A man is said to commit “rape“ if he a) penetrates his penis, to any extent, into the vagina, mouth, urethra or anus of a woman or makes her to do so with him or any other person

b) inserts, to any extent, any object or a part of the body, not being the penis, into the vagina, urethra or anus of a woman or makes her to do so with him or any other person

c) manipulates any part of the body of a woman so as to cause penetration into vagina, urethra, anus or any part of body of such woman or makes her to do so with him or any other person under circumstances falling under any of the seven following descriptions :

1) Against her will.

2) Without her consent

3) With her consent, when her consent has been obtained by putting her or any person in whom she is interested in fear of death or of hurt

4) With her consent, when the man knows that he is not her husband, and that her consent is given because she believes that he is another man to whom she is or believes herself to be lawfully married

5) With her consent, when, at the time of giving such consent, by reason of unsoundness of mind or intoxication or the administration by him personally or through another of any stupefying or unwholesome substance, she is unable to understand the nature and
consequences of that to which she gives consent.

6) With or without her consent, when she is under eighteen years of age.

7) When she is unable to communicate consent.¹

In India, rape is the fastest growing crime and reports indicate that rape of women and young girls in India has increased considerably especially in recent years. However, experts claim that the actual number of instances of rape is far from being recorded since the unreported number of cases is extremely high². Rape is the fourth most common crime against women in India.³ According to the National Crime Records Bureau 2013 annual report, 24,923 rape cases were reported across India in 2012.⁴

Out of these, 24,470 were committed by someone known to the victim (98% of the cases).⁵ According to 2012 statistics, New Delhi has the highest number of rape reports among Indian cities.⁶

**METHOD**

A cross-sectional study was done, by giving the patients a pro forma. A written consent was also obtained from them. The sample size for this study was 89 and included females between the ages of 0 and 40. The duration of this study was 24 months, between January 2012 and November 2013 in Victoria Hospital, BMCRI. In the pro forma, details regarding their biodata, menstrual history, event of sexual assault and the assailant were collected. These data along with the details obtained from their general examination, bodily injury analysis, local examination, treatment during their stay in the hospital and NGO support were collected in an orderly manner and tabulated. From this, the various statistics regarding this study was obtained.

**RESULT**

Majority of the cases, about 34.83% were between the age group of 16-20 years. In 2012, the maximum number of cases reported in a month was 4 (June, July and October) but this drastically increased to almost 4 times in 2013- where the maximum number of cases reported in a month was 15 (April). 70.7% of the total cases were reported in 2013. Among the 89 cases collected, 50 (57%) were students and 23 (25.82%) were commercial sex workers. Majority of the cases, about 86.25% were Hindus, 20% were Muslims, 2.5% were Christians and 2.5% belonged to the unknown category. About 80% of the women were single, and 57.3% were females who attained puberty. According to the data obtained from the pro forma, 33.7% of the incidents took place in a hotel and 14.6% at a friend’s house; out of these, 61.7% of the survivors were assaulted by people known to them (39.3% were attacked by their friends) and 29.2% had strangers as their assailants. Consent had been asked to about 68.5% of the survivors, however 57.3% of the consents had been a forceful act by the assailant. In 42 of the 89 cases, pregnancy test was undertaken out of which 16.67% turned out to be positive.
DISCUSSION

To deal with child sexual abuse cases, the Government has brought in a special law, namely The Protection of Children from Sexual Offences (POCSO) Act, 2012, which is a comprehensive law to provide for the protection of children from the offences of sexual assault, sexual harassment and pornography, while safeguarding the interests of the child at every stage of the judicial process by incorporating child-friendly mechanisms for reporting, recording of evidence, investigation and speedy trial of offences through designated Special Courts. Section 375 of the Indian Penal Code (IPC) considers the forced sex in marriages as a crime only when the wife is below age 15. Thus, marital rape is not a criminal offence under the IPC. Marital rape victims have to recourse to the Protection of Women from Domestic Violence Act 2005 (PWDVA).

Sexual assault is significantly underreported worldwide. Most of the rape victims do not disclose the assault because of being accused or exposed to repeated assaults. Underreporting of sexual assault “might arise from the fear of being re-victimized in the
criminal justice system, of not being believed, from self-blame and from failure by rape victims to equate their experience with the legal definition of rape.”

CONCLUSION

It is important that sexual assault Prevention strategies and messages be designed such that undergraduates are educated (and as soon after enrollment as possible) about these facts. Programs should focus on both primary prevention for women who have not experienced sexual assault and secondary prevention in an effort to prevent re-victimization (although more research is needed to guide the development of effective secondary prevention programming). The important causes of rape in India are a lack of public safety, blaming provocative clothing, availability of fewer female police, acceptance of domestic violence, encouraging the victims to compromise specially in the rural areas, fewer convictions and a sluggish court system. The survivors must be treated with proper care and should be given counselling to overcome the trauma faced by her. While many rape victims heal from rape without the aid of therapy, it is also common to receive professional rape therapy. Therapy for rape victims can include one-on-one therapy, group therapy and even, in some cases, pharmacotherapy (medication) used alongside other therapies. The type of rape therapy used depends a lot on the individual and their circumstance but common rape therapies include: Stress inoculation therapy, Prolonged exposure therapy, Cognitive processing therapy, Eye movement desensitization reprocessing (EMDR) and Supportive counselling. Many treatments for rape victims focus on treating the symptoms of post-traumatic stress disorder (PTSD) as that is what women typically suffer from if trauma from the sexual assault is experienced long-term.

Conflict of Interest – NIL
Source of Funding – NIL
Ethical Clearence – NA

REFERENCES
A Cross Sectional Study of Pattern of Injuries in Road Traffic Accidents in Surat, Gujarat Region

Shyam Patel¹, Pranav Prajapati²

¹Tutor cum Post graduate Student, ²Associate Professor, Forensic Medicine & Toxicology Dept, Surat Municipal Institute of Medical Education and Research, Umarwada, Surat

ABSTRACT

The aim of this study was to observe the various features like type of vehicle, status of helmet, possibility of different type of injuries over body, pattern and distribution of injuries, viscera involved, survival period and cause of deaths in Surat region of Gujarat. The present cross sectional study was carried out in the Forensic Medicine & Toxicology Department, SMIMER, Surat, Gujarat. 164 cases of road traffic accidental death were studied in the year of 2015. The commonest age group involved was 30-39 years (28%). Males outnumbered females in ratio 8.5:1.5. Two wheeler riders were the commonest victims of road traffic accident while 39.6% of victims belongs to pedestrian group. Four wheeler was the commonest opposite vehicle. Head and face were the most affected region followed by both extremities. Abrasions were the commonest seen in 89.6 % followed by lacerations(72%). Head injury was the commonest incidence and cause of death, where the victims had not worn the helmet.

Keywords: Collision, Fatality, Counter-coup injury, Cranio-cerebral damage.

INTRODUCTION

The term “Accident” has been defined as an occurrence in the sequence of events which usually produces unintended injury, death or property damage.¹ Among all types of accidents, those caused by motor vehicles claim the largest toll of life and tend to be most serious. The Global status report on road safety 2013 estimates that more than 231 000 people are killed in road traffic crashes in India every year. There is one death every four minutes due to a road accident in India.

Indian roads were at their deadliest in 2014 claiming more than 16 lives every hour on average. Over 1.41 lakh people died in crashes, 3% more than the number of fatalities in 2013.² Studies done by WHO show that road accidents account for 2.5% of total deaths. But in age group of 5-44 years, it is as high as 10% and is among six leading causes of death.¹

According to the latest data released by the National Crime Records Bureau (NCRB), speeding and dangerous driving were the biggest reasons for road fatalities. Accidents involving two-wheelers and trucks & lorries accounted for nearly half of the lives lost in road crashes. Fast moving vehicular traffic with changing social status contributed to increase the incidence of road traffic accidents leading to regional injuries. Head injury with internal damage to skull and brain occurs with the incidence of 20 to 40 cases per 1 lakh population per year.

The etiological factors are classified into human and environmental factors .Human factors like lack of adequate traffic awareness, consumption of alcohol, overspeeding, lack of education and environmental factors like urbanization, condition of road and vehicle, tremendous growth of rural and urban segments etc.

MATERIAL AND METHOD

164 cases of fatal road traffic were accidents brought to the mortuary of Department of Forensic Medicine & Toxicology, SMIMER, Surat in 2015. Various demographic and epidemiological characters were collected from police records, or relatives and friends of deceased. In this study various parameters of fatal road accident cases like type of injury, pattern and distribution of injuries, viscera involved, survival period and cause of deaths were noted in autopsy examination. Information regarding the verbal autopsy
of these cases were taken from the relatives of victims. The data/findings by examinations were recorded in the proforma, coded into a chart and analyzed. The analysis was done using SPSS (Statistical Package for Social Science)11.5 version.

**RESULTS**

164 cases of fatal road accidents which occurred during one year period, constituted 7.47% of total medico-legal autopsies (2195 cases) in 2015.

**Table 1: Age and sex wise distribution of victims in road traffic accident.**

<table>
<thead>
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<th>Age Group</th>
<th>SEX</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male (%)</td>
<td>Female (%)</td>
</tr>
<tr>
<td>0 - 9</td>
<td>3(1.85)</td>
<td>3(1.85)</td>
</tr>
<tr>
<td>10-19</td>
<td>4(2.4)</td>
<td>10(6.1)</td>
</tr>
<tr>
<td>20-29</td>
<td>6(3.6)</td>
<td>28(17.1)</td>
</tr>
<tr>
<td>30-39</td>
<td>4(2.4)</td>
<td>42(25.6)</td>
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<td>40-49</td>
<td>1(0.6)</td>
<td>28(17.1)</td>
</tr>
<tr>
<td>50-59</td>
<td>1(0.6)</td>
<td>16(9.7)</td>
</tr>
<tr>
<td>60-69</td>
<td>3(1.9)</td>
<td>9(5.4)</td>
</tr>
<tr>
<td>70-79</td>
<td>0(0)</td>
<td>4(2.4)</td>
</tr>
<tr>
<td>80-89</td>
<td>1(0.6)</td>
<td>1(0.6)</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>23(14.1)</strong></td>
<td><strong>141(85.9)</strong></td>
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</tbody>
</table>

The commonest age group involved was 30-39 years (28%) followed by 20-29 years (20.7%) and 40-49 years (17.7%). Males outnumbered females ratio was 8.5:1.5. The commonest age group involved in road traffic accident was the second, third and fourth decade.

**Table 2: Distribution of cases according to vehicle driven, opposite vehicle and status of helmet concerning injuries over body.**

<table>
<thead>
<tr>
<th>Vehicle driven</th>
<th>Opposite Vehicle/object</th>
<th>Road/divider (%)</th>
<th>Two wheel (%)</th>
<th>Three wheel (%)</th>
<th>Four wheel (%)</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedestrian</td>
<td></td>
<td>0(0)</td>
<td>8(4.8)</td>
<td>7(5.4)</td>
<td>51(30.6)</td>
<td>66(39.6)</td>
</tr>
<tr>
<td>Two wheeler</td>
<td></td>
<td>24(14.4)</td>
<td>4(2.4)</td>
<td>2(1.2)</td>
<td>45(27)</td>
<td>75(45)</td>
</tr>
<tr>
<td>Three wheeler</td>
<td></td>
<td>8(4.8)</td>
<td>0(0)</td>
<td>0(0)</td>
<td>1(0.6)</td>
<td>9(5.4)</td>
</tr>
<tr>
<td>Four wheeler</td>
<td></td>
<td>7(5.4)</td>
<td>0(0)</td>
<td>1(0.6)</td>
<td>6(3.6)</td>
<td>14(8.4)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>39(23.4)</strong></td>
<td><strong>12(7.2)</strong></td>
<td><strong>10(6)</strong></td>
<td><strong>103(61.8)</strong></td>
<td><strong>164(100)</strong></td>
</tr>
</tbody>
</table>

**Analysis of two wheeler driver with helmet status concern with injuries**

<table>
<thead>
<tr>
<th>Helmet</th>
<th>Head Injury</th>
<th>Percentage</th>
<th>Other Injury</th>
<th>Percentage</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presence</td>
<td>2</td>
<td>2.67%</td>
<td>7</td>
<td>9.33%</td>
<td>9(12.0%)</td>
</tr>
<tr>
<td>Absence</td>
<td>55</td>
<td>70.67%</td>
<td>13</td>
<td>17.33%</td>
<td>66(88.0%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>55</td>
<td><strong>73.34%</strong></td>
<td><strong>20</strong></td>
<td><strong>26.66%</strong></td>
<td><strong>75 (100%)</strong></td>
</tr>
</tbody>
</table>
Two wheeler riders were the commonest victim of road traffic accident (45%), followed by pedestrian (39.6%). Four wheeler was the commonest opposite vehicle (61.8%) to stuck the victim as pedestrian (30.6%) followed by two wheeler (27%). Among the two wheeler driver, only 12% worn helmet while remaining were not worn helmet (88%) showing the highest number of head injury (70.67%).

Table 3: Distribution of cases according to region of body and type of injury.

<table>
<thead>
<tr>
<th>Injuries over region of body</th>
<th>Head</th>
<th>Chest</th>
<th>Abdomen</th>
<th>Upper limbs</th>
<th>Lower limbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of cases*</td>
<td>144</td>
<td>80</td>
<td>71</td>
<td>110</td>
<td>101</td>
</tr>
<tr>
<td>Percentage</td>
<td>87.8%</td>
<td>48.8%</td>
<td>43.3%</td>
<td>67.1%</td>
<td>61.6%</td>
</tr>
</tbody>
</table>

Analysis of type of injuries in road traffic accident cases

<table>
<thead>
<tr>
<th>Type of injuries</th>
<th>Abrasion</th>
<th>Contusion</th>
<th>Laceration</th>
<th>Fracture</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of cases</td>
<td>147</td>
<td>112</td>
<td>118</td>
<td>94</td>
</tr>
<tr>
<td>Percentage</td>
<td>89.6%</td>
<td>68.3%</td>
<td>72%</td>
<td>57.3%</td>
</tr>
</tbody>
</table>

*Multiple body parts were involved in each case.

The commonest region of body involved was head (87.8%) followed by both limbs.

Abrasions were commonest seen in 89.6 % followed by lacerations (72%).

Table 4: Distribution of cases according to Survival period

<table>
<thead>
<tr>
<th>Survival period</th>
<th>No of cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1 day</td>
<td>124</td>
<td>75.6</td>
</tr>
<tr>
<td>1-2 day</td>
<td>16</td>
<td>9.8</td>
</tr>
<tr>
<td>2-3 day</td>
<td>5</td>
<td>3.0</td>
</tr>
<tr>
<td>3-4 day</td>
<td>4</td>
<td>2.4</td>
</tr>
<tr>
<td>&gt;4 day</td>
<td>15</td>
<td>9.1</td>
</tr>
<tr>
<td>Total</td>
<td>164</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Most of the victims of road traffic accident died within 24 hours (75.6%) followed by survival period of 48 hours (9.8%).

Table 5: Distribution of cases according to involvement of vital organ.

<table>
<thead>
<tr>
<th>Organ involved</th>
<th>No of cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brain</td>
<td>122</td>
<td>74.4</td>
</tr>
<tr>
<td>Spleen</td>
<td>20</td>
<td>12.2</td>
</tr>
<tr>
<td>Liver</td>
<td>31</td>
<td>18.9</td>
</tr>
</tbody>
</table>

Brain was the commonest internal organ showing injuries/damages in road traffic accident (74.4%), followed by lungs (20.7%) and liver (18.9%).

Table 6: Distribution of cases according to Cause of death

<table>
<thead>
<tr>
<th>Cause of death</th>
<th>No of cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head injury</td>
<td>94</td>
<td>57.3</td>
</tr>
<tr>
<td>Multiple injury</td>
<td>62</td>
<td>37.8</td>
</tr>
<tr>
<td>Septicemia</td>
<td>8</td>
<td>4.9</td>
</tr>
<tr>
<td>Total</td>
<td>164</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Head injury was the commonest cause of death (57.3%) followed by multiple injuries (37.8%) and septicemia (4.9%).

DISCUSSION

Motor vehicle accidents rank first among all total accidents throughout the world. In year 2015, road accident deaths constituting 7.47% cases which was consistence with the study of Srivastav AK et al done in Kanpur region as both cities are developed, more industrialization and urbanization.
The most common age group involved was 30-39 years. A study conducted by Kochar et al in 2002 had similar statistics. Almost 53% of victims were in the 20-49 years age group, which is in accordance with other studies. Due to the fact that this is one of the most active phase of life in male group who worked outdoor as they were most commonly exposed to traffic accident. Males outnumbered females in ratio of 85:15. Because males are more involved in road transportation so more prone to accident, which is common with other study.

Two wheeler riders were the commonest (45%) followed by pedestrian (39.6%). Four wheeler was the commonest among opposite vehicle (61.8%). Pedestrians have a 90% chance of survival if hit by a car travelling at a speed of 30km/h or below, but less than a 50% chance of surviving an impact of 45km/h or above. So there should setting the speed limit and alcohol ban. This data is consistence with study conducted by Nilamberjha et al.

Two wheelers were the commonest one and head injury was the most common cause of death. Head injury was more common among who weren’t wearing helmet (53 cases) than who was wearing helmet (2 case). According to the Brain Injury Association, traumatic brain injuries were commonest in RTA is the leading cause of death in youngsters. Setting and enforcing mandatory helmet use is an effective intervention for reducing injuries and fatalities among two-wheeler users. Wearing a helmet decreases the risk and severity of injuries by about 72% and likelihood of death by 39% as per WHO.

Head and neck was the commonest region (87.8%) followed by upper limb(67.1%) and lower limb(61.6%). In the study conducted by Verma et al, both limbs followed by head were commonly affected. Abrasions were most common injury (89.6%), which is common with study by Jamebaseer M Farooqui at al, Which followed by laceration (72%) Most of the patients were survived for less than 24 hrs. (75.6%) which is consistence with the study conducted by Singh YN et al. There should be traffic aid posts at suitable distances on the highways to assist injured in case of accidents and quick transport of injured. Policeman at such posts should be trained in first aid procedures and ambulance with para-medical staff, oxygen, and life saving drugs at strategic points must be ready. Hospitals along major highways should be equipped with experienced surgical team, trauma centers with integrated facility of surgical, orthopedics and neuro-surgical, anesthetic experts with modern investigative procedures as C.T. Scan and Blood Banks is best solution for treatment.

This includes maintaining existing roads, improving road surface, removing obstacles, constructing guards, rails, proper signs and widening or narrow sections of roads. There should be good road lighting. pedestrians from highways and use of Zebra crossing, sub ways for pedestrians.

Source of Fund: Self
Approved by: SMIMER Ethical Committee
Conflict of Interest: Nil

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Characteristics of Suicides Caused by Drug Overdose in the Secunderabad Region

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ABSTRACT

Introduction: Suicidal drug overdose is a major public health issue in India.

Aim: is to focus on the characteristics of suicide victims in the Secunderabad region.

Material and method: This study was a retrospective review of autopsy cases of all suicide deaths caused by drug(s) or drug(s) with alcohol intoxication investigated over a 3-year period from January 2012 to December 2014. All detected drugs and/or metabolites were confirmed using GC-mass spectrometry (GC-MS).

Results: From 2011 to 2014, 334 deaths were certified as suicide. The male and female ratio was almost equal. Their ages ranged 15-75 years. Of the 134 suicidal drug overdose deaths, 87 victims (63.8%) consumed a single drug type and 47 (36.2%) consumed more than one type of drug. Of the 87 single-drug overdose cases, 71.1% suicides were due to prescription drugs, 23.5% due to over-the-counter drugs, and 5.4% due to street/recreational drugs. Among single-type prescription drugs, analgesic (N = 26), antidepressant (N = 22), and neuroleptic (N = 09) classes were the three leading type of drugs used in suicidal deaths. Morphine, quetiapine, and amitriptyline were the most common prescription drugs in suicidal overdose. Of the multiple-drug overdose suicides, 66.2% cases involved antidepressants.

Conclusion: Our study indicates that prescription drugs, such as those in the opioid analgesic, neuroleptic, and antidepressant class (e.g., morphine, quetiapine, amitriptyline and citalopram), are of special concern in the context of suicidal overdose deaths. Therefore, addressing the problems of intentional drug overdose in our society is worthy of public attention.

Keywords: Antidepressants, drug overdose, epidemiology, forensic autopsy.

INTRODUCTION

The World Health Organization (WHO) estimates that more than 800,000 people die globally every year from suicide; it is the second-leading cause of death in 15-29-year-olds. This indicates an annual global age-standardized suicide rate of 11.4 per 100,000 population. About 800000 people commit suicide worldwide every year, of these 135,000 (17%) are residents of India, a nation with 17.5% of world population. Suicide is found to differing degrees in every age, racial, and ethnic group.

International studies on suicide indicate that suicidal behavior and, in particular, the preferred suicide method, varies between countries. In most countries, hanging was the most frequently reported method of suicide, followed by poisoning and drowning or jumping from heights. Seventy-five percent of suicides by poisoning were due to drugs and/or alcohol overdose versus other types of poison, such as carbon monoxide.

The objective of this study was to document the epidemiologic characteristics of victims of suicide in the state of Secunderabad from 2012 to 2014 due to drug overdose in our forensic autopsy population.
METHOD

This study was a retrospective review of autopsy cases of all suicide deaths caused by drug(s) or drug(s) with alcohol intoxication investigated by the Department of Forensic Medicine, Gandhi Medical College, Secunderabad over a 3 years period from January 2012 to December 2014. Cases due to alcohol intoxication alone were excluded from this study. The cases were analyzed as to (i) manner of death in context of all drug(s) or drug(s) with alcohol intoxication; (ii) general characteristics of the victims (age, gender, and race); (iii) personal information including any medical or drug history; and (iv) autopsy findings with focus on the types of drugs detected by toxicology testing.

RESULTS

Of the 880 cases from 2012 to 2014, 334 deaths were certified as suicide, 175 (3.1%) deaths as accident, 8 (0.2%) deaths as homicide, and 113 (88.9%) deaths with manner of death classified as “undetermined” (table 1). Of the deaths due to street/recreational drugs, about 95% of the cases were classified as “undetermined” because of drug abuse, most likely due to accidental overdose rather than being intentional deaths. The street/recreational drugs made up only 5% of the suicide. The most common method of suicide was firearm injuries, followed by asphyxia due to hanging/ligature strangulation/plastic bag over head, and drug overdose. Their ages ranged 15-75 years, with the majority of victims in their 40s and 50s. More males (N = 101) committed suicide than females (N = 33) in Secunderabad between 2012 and 2014. The distribution of suicidal drug overdose deaths by month showed higher frequencies in May, August, and December in Secunderabad.

Of the 134 suicide drug overdose deaths, 87 (63.8%) victims consumed a single drug type and 47 (36.2%) consumed more than one type of drugs. Of the 87 single drug overdose cases, 71.1% suicides were due to prescription drugs, 23.5% due to over-the-counter drugs, and only 5.4% due to street/recreational drugs. Among single-type prescription drugs, analgesic, antidepressant, and neuroleptic classes were the three leading types of drugs used in suicide deaths. Of the analgesics, oxycodone (N = 24), morphine (N = 22), and tramadol (N = 8) were the three leading drugs. Of the antidepressants, amitriptyline (N = 12), doxepin (N = 8), and citalopram (N = 5) were the three leading drugs. Quetiapine (N = 22) was the leading neuroleptic drug. Of the over-the-counter drugs, diphenhydramine (N = 47) was the leading drug.

47 victims consumed more than one drug; there were 54.1% cases of combined prescription drugs overdose, 29.3% cases of mixed prescription and over-the-counter drugs overdose, and prescription drugs/over-the-counter drugs and street drugs overdose in 17.6% cases. Of the 134 cases, 66.2% involved antidepressants, 61.1% involved prescribed analgesic drugs, and 35.7% involved neuroleptic drugs. Of the 64 antidepressants, tricyclic antidepressants (N = 42) and selective serotonin-reuptake inhibitors (N = 22) were the main types of drugs. Deaths were due to combined drug(s) and alcohol intoxication in 18 cases.

Investigation revealed that the majority (82.2%, 120/134) of the victims had a history of depression or bipolar disorder and/or anxiety disorders, posttraumatic distress disorder, or schizophrenia.

DISCUSSION

According to newly published data, drug overdose deaths in the India, either intentional or unintentional, increased for the 11th straight year in 2010. Suicidal drug overdose is still a major public health issue. Opioid analgesics and antidepressants are of special concern in the context of suicidal overdose deaths in the India. Therefore, addressing the problems of intentional drug overdose in our society is worthy of public attention.

There are significant differences in the nature of the agents involved in the suicide drug deaths between developing countries and developed countries. Ingestion of organophosphorus pesticide was the most commonly used method for suicide in many Asian countries and in Latin America, whereas pharmaceutical drugs were the most common means of suicidal overdose in the developed countries. It has been reported that minor tranquilizers such as benzodiazepines were the drugs most commonly involved in intentional drug overdose cases in Ireland and Spain, while paracetamol was the most commonly used drug in intentional drug overdose cases in England.

According to CDC reports from the National Violent Death Reporting System, prescription drugs such as
those in the opioid, benzodiazepine, and antidepressant class (e.g., oxycodone, diazepam, and fluoxetine) were the leading type used in suicide deaths in the USA, while over-the-counter drugs such as acetaminophen were the second-leading substance type used in suicides. Our study showed a similar pattern to that reported by the CDC. The majority of suicidal drug overdose deaths in Secunderabad were due to prescription drugs. Among prescription drugs, the analgesic, antidepressant, and neuroleptic classes were the three leading types of drugs used in suicide. Oxycodone, morphine, quetiapine, amitriptyline, doxepin, and citalopram were the common prescription drugs in suicidal overdose. But diphenhydramine was the most common over-the-counter drug used in suicide. The drugs used in suicide are generally thought to reflect the availability/ease of access for the population or prescription patterns of that country.

Many of the drugs used in suicides are either easily available, as in the case of over-the-counter drugs such as diphenhydramine, or are commonly prescribed to treat various physical and mental health conditions, such as analgesics, antidepressants, and neuroleptics/benzodiazepines. Our data revealed that the majority (82.2%) of suicide victims had a history of depression or bipolar disorder and/or anxiety disorders, posttraumatic distress disorder, or schizophrenia. More than 62% suicide victims tested positive for antidepressants and/or neuroleptics/benzodiazepines. Many of these deaths could have been prevented by limiting access to those substances. If lethal substances are not available when people are under psychological or emotional stress and despair, the ability to commit suicide is limited. It has been reported by many studies that a history of affective disorder or psychiatric morbidity and previous suicidal ideation or attempt(s) greatly increase risk of death from suicide. Our study also indicated that although fewer than 20% of suicide victims left suicide notes, more than one-third (37.3%) of them had history of previous suicide ideation or attempt(s).

CONCLUSION

This study indicates that prescription drugs, such as those in the opioid analgesic, neuroleptic, and antidepressant class (e.g., oxycodone, morphine, quetiapine, amitriptyline, doxepin, and citalopram), are of special concern in the context of suicidal overdose deaths in the region of Secunderabad. Therefore, addressing the problems of intentional drug overdose in our society is worthy of public attention.

**Ethical Clearance**- Taken from institutional ethical committee

**Source of Funding**- Self

**Conflict of Interest** - NIL

**REFERENCES**


Os Inca in Human: A Case Report

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ABSTRACT

Os Inca, also known as interparietal bones, are supernumerary bones found in the interparietal region of the occipital bone, adjacent to the lambdoid suture. They are found due to incomplete fusion of the ossification centres of the interparietal region of the squamous part of occipital bone. In the present case, two such additional ovoid bones were seen in the skull, immediately to the right of the apex of the occipital squamosa, intervening between the occipital and the right parietal bones. These two bones, identified as interparietal bones, were articulated by interdigitating sutures, to both of the adjacent bones as well as to each other. The presence of such bones is common in lower animals including lower mammals like rodents and marsupials but is rare in man. Os Incae have considerable clinical significance because they can be mistaken for fracture fragments during skull roentgenogram as well as during medico-legal autopsies. Besides, they can pose as a problem during neurosurgery. Sexual dimorphism, race and ethnicity cause significant variations in their incidence and hence, they are of considerable interest to anthropologists.

Keywords: Interparietal bone, Os Inca.

INTRODUCTION

Os Incae are supernumerary bones that are sometimes found in interparietal region. These bones are a result of anomalous ossification of the occipital bone.¹ The occipital bone has three parts: squamous, basilar and condylar. The squamous part can again be subdivided into an interparietal part and a supraoccipital part.² The two parts have different modes of morphogenesis. The interparietal part develops intramembranously from multiple centres of ossification whereas the supraoccipital part develops from both cartilage and membranes. In due course of embryological development, the two parts fuse together to form the smooth scale like squamous part of the occipital bone.³ However, due to faulty fusion, the interparietal part may remain separated from the supraoccipital part, either totally by a transverse suture or partially as two or multiple separate pieces of bones. This type of anomalous bone is known as interparietal bone. It is also known as Os Inca because its occurrence was first described among the Inca population by Rivero and Tschudy in 1851.⁴ It was found that the members of the royal family of the Inca tribe had interparietal bones in their skulls which resulted in their typical crown shaped heads. The occurrence of Os Inca is also of considerable evolutionary significance.⁵

CASE REPORT

The present case was noted during autopsy of the cadaver of a 34 year old male at the mortuary of North Bengal Medical College and Hospital, Darjeeling in the month of August, 2016. In due course of the autopsy, when the scalp was stripped off the cranial vault, two additional irregular, well demarcated, ovoid pieces of bone were noted immediately to the right of the apex of the occipital bone and seemed to be intruding into the territory of the right sided parietal bone. The two bones were adjacent to one another almost vertically. These bones were identified as the interparietal bones or Os Incae. They had interdigitating sutural articulation...
to both the occipital and the parietal bones as well as to each other. Any possibility of traumatic fracture involving the concerned bones was excluded after careful examination.

Each of the interparietal bones measured 1.5” x 1” approximately.

**DISCUSSION**

The incidence of Os Inca is rare. [6] Srivastava et al. conducted a study on 620 human skulls and calculated the incidence at 0.8%. [7] However the frequency has been found to be higher among the Nepalese, Sikkim and Assam population. [8]

The morphogenesis of the Os Incae or interparietal bones can be understood in details with the knowledge of how the occipital bone ossifies. The membranous part of the occipital squamosa develops from three pairs of ossification centres. [7, 9] The first pair forms the intermediate segment (IS), i.e. the part of occipital bone between the highest nuchal line and the superior nuchal line. It always fuses with the cartilaginous supraoccipital part (SO). The part of bone above the highest nuchal line arises from the second and third pairs of ossification centres (denoted as II & III respectively). On either side, the medial and lateral nuclei of II give rise to the lateral plate whereas the upper and lower nuclei of III form the medial plate (Vide figure - 2).

Os Incae also have anthropological significance. The human skull, like that of all other vertebrates, is a composite structure, consisting of three major parts:

1. A dermal or membranous roof.
2. A cartilaginous base.
3. A viscero-palatal complex which gives rise to the upper jaw and roof of the mouth.

In cyclostomes and shark like fishes, the primitive brain lies at the base of the skull, protected by a single plate of cartilage which also gives attachment to the otic and olfactory capsules. With further evolution, membranous bones appear in the primitive vertebrates, which are derived from the bony scales of fishes. These bones form the vault of cranium. The pattern is again repeated in higher vertebrates. However, at primate level, drastic changes are noticed. Due to remarkable cerebral growth in man, the cartilaginous brain case is rendered inadequate to house the entire brain and is only capable to cover the floor and the lower back. The rest of the protective covering is derived from the newly ossified mesenchyme surrounding the brain. [12]

Os Incae have clinical significance. On X-Ray skull
as well as during autopsy, these bones can be mistaken as fracture fragments. They also pose as a challenge in burr-hole surgeries. In cases of cranial trauma, the fracture lines may extend into them, thereby destabilizing the vault of the skull. Besides, factors such as the incidence, sexual dimorphism and ethnicity affecting the presence of Os Incae have been the subjects of academic interest over years. [6,8]

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**Ethical Clearance** – Ethical clearance was obtained from the Ethics Committee, North Bengal Medical College, Darjeeling.

**Conflict of Interest** – No conflict of interest.

**REFERENCES**

A Comparative Study about Aggression in Self-defense between Iranian and British Criminal Law

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ABSTRACT

One of issues that are predicted in criminal law to protect the individuals’ right is legal self-defense. It entered in criminal laws of most countries around the world and is also recognized in UK. Self-defense is the most important example of permitted crime that is eroded the legal part of crime. So, when the conditions of self-defense exist, the defendant act shall not be considered as crime. But it is permissible that the defender is done and base on that, not only has no criminal liability but also has no civil liability. England, like Iranian legal system, recognizes self-defense and in certain situations and circumstances and considers the use of force and legal violence. In legal system of England, like Iranian one, self-defense is recognized and in certain situations and circumstances, it considers the use of force and violence as a permissible measure. In justifying its philosophy, different comments and theories have been proposed and base of self-defense is expressed by these views. The controversial issue of self-defense isn’t limited to criminal law of Iran. All legal systems allow their followers in term of serious violations of their rights or others, if is necessary even by force, to protect themselves or others. In various legal systems, there are different approaches to range and subject of belligerency. Therefore, in this paper, a comparative study about aggression in defense issues in Iran and England is performed and theoretical foundations of criminal law in these countries are presented. In This type of detailed comparative study of legal systems, the useful results and conclusions are presented; so many ambiguities in the legal system are cleared.

Keywords: Defense, Permissible self-defense, Aggression, Criminal law of Iran, Criminal law of England

INTRODUCTION

The ultimate goal of self-defense is to protect the rights that are supported by law and in different legal systems; different approaches about this issue are presented. Apart from similarities among supported issues, the position of each legal system in this regard is depended on culture, customs and traditions and its view about people and society¹. To exempt criminal action of self-defense against prosecution and punishment, this defense should be done against some attacks that are defined in law. These cases, unlike English law, have been determined in law of Iran precisely. The common part of such attacks in all legal systems is that these attacks are necessitated the need of defend themselves and threaten rights of human². These aggressions as stipulated in Article 156 of Islamic Penal law are against the health, honor or freedom of persons.

Most legal systems such as UK system on offensive actions against dignity, honor and freedom are not clear. According to English lawyers view, sometimes a person may require using his defense, in cases where he used violence measures in defense against his dignity, property, or to prevent the commission of a crime, facing some charges. In common law defense is allowed for centuries and that allow a person to defend himself, others and property even by using violence³. But there is no clear guideline about issue of defense and its conditions so that different view about it is presented. If article 3(1) is considered as a criterion: “Avoid committing any crime”, this crime will be against person, property, security or any other matter. In England, someone who defends against an offensive attack also tries to prevent criminal measures simultaneously. Due to article 3 this situation has a legal
base. It seems defense base on law is an abroad issue. In following parts the comparative study of aggression are discussed.

**Defense against life**

Maybe one of important issue about individual right that had been considered from many times ago is self-defense. It is obvious that for human beings nothing is more valuable than life. When human life is threaten so any measure as self-defense is permissible and with some conditions, it is non-punishment. In article 156 of Islamic penal law, self-defense is permitted. One issue that has been recognized by law of England is self-defend. But it isn’t clear that in attacks with beatings, deprivation of life is prescribed or not. From the thirteenth to the fifteenth century, the only known defense in the legal system of England had been recognized as defense against life. This form of defense was in accordance with the principles of Christianity. Self-defense in some cases had been used that one side of quarrel as much as possible tried to stop that quarrel and then because of desperation and urgency, he had to defend himself. Therefore all accusers’ properties had been seized for taking someone’s life. Killing someone in self-defense was named as negligible murder, because despite occurrence of manslaughter, condition was in a way that creates a personal that was freed involuntary manslaughter from the death penalty. In 1532 British Parliament expressed that self-defense in certain cases can be considered as a permissible reason. The result was that the defense by using deadly force was acquitted and other news of seizures of property to show illegal nature of the killing was eliminated. So the fundamental part in legitimate defense was defense against attack of the offensive in order to save life. Later this initial part gradually has been developed to protect sexual and physical values or property and to save third parties who exposed to similar situation.

**Defense against honor**

Invasion of honor is defined as sexual assault on women in a family including wife, mother, sister and daughter to defame their chastity and purity. Also brother and son are considered as family honor. The honor, honesty and reputation are necessities of social life for every person. It is evident that in case of aggressions on this aspect of human life, a person must be able to use a protective force in order to defend against them. Unlike self-defense, prescribed limits to such defenses are determined by culture and values through societies. In Islamic law because of the sovereignty of divine values, honor and dignity along with self-defense the necessity of such defenses are considered. So these sexual assaults with regard to customs and people characters in every society may have different instance. The subjects of defense against honor include: 1. sexual assault through illegal sexual relationship. 2. Sexual assault in order to defame someone. 3. Physical sexual assault. As mentioned above, in most of legal systems as England system about aggression against honor, dignity and chastity there isn’t a clear explanation. But according to article 3 of England law that says: “to avoid committing any crime”, may be argued that this article can be excused on all cases of defense.

**Defense of property**

Due to the legitimate right to defend so legislators are considered to right of property defense. Most differences in field of defense to comply with legal support belong to aggression against property because it’s less important than other issues and the possibility of compensation in many cases. In some of legislations including legislations of Iran, using deadly force under certain circumstances to protect property against offender is permitted, while in other legislations, for possibility of compensation such deadly defense is prohibited. So in Islamic Penal Law defending against property is presented in the line of defense against life, reputation and honor. Protection of property as one of the main topics in England law has been recognized. Russell Heaton in term of the defense of property said: “its principle is similar to defense against life, but in compare with it using lesser violence is reasonable”. However, in UK law there are some restrictions about this issue. In England law the rate of violence against aggregation on property isn’t determined but is obvious that using deadly defense in term of this protection isn’t allowed. However, in England the defense of property is an important issue and some legislations is defined about it. For example, in criminal damage of 1971 some defenses for property are expressed.

**Defense of freedom**

The creation of human being on the basis of
freedom is one of necessities for the social and personal life so any restrictions such as illegal arrest and imprisonment allow the right of defense, except in cases where the law determined special limits for it. Human being is born free except in legal cases, no one can deny human’s freedom. Otherwise, with defense conditions, such right can be defended. Deprivation of personal freedom or limiting it, such as arrest, imprisonment and any act that prevents human mobility considered aggression against human freedom. In this regard, there is no talk in British legal system. But as was said in article 3, which says: ‘avoid the commission of any crime’, the crime can be against a person, property, national security or any other issue then may be argued that this article of defense can be applied in all cases about defense.

Defense against life, honor, property and freedom

In Islamic society, people with faith have been likened to parts of a building that every part holds other part. Some lawyers have been explained the necessary to defend against life and property. Note 1 of article 156 is about this issue.

In UK legal system, what was clear in the past was that an innocent person, whom was attacked, should be able to defend himself and should be able to help family members and close relatives. In case of Dolin against Armstrong the relationship between defender and third person has been shown. But it is now clear that there are no such restrictions in British rights. So now in UK, in addition to private aspect of self-defense, the public aspect of it is also recognized. In the case of Dufavi, this issue is cleared. In this case, that action against his sister was justified, not because they were sister, but because of public allowance among strangers that exists in defense of each other to prevent crime. In fact, in British law, when violence is used to defend others the rules are same as self-defense rules. In the case of defense of property they are also same.

Explain theoretical bases

In different historical periods, this principle is accepted that when a person defending against illegal invasion, offenses should not be punished, or at least tolerate a less severe punishment. Today, many countries have recognized right of self-defense for people but to justify it different views have been expressed. In philosophy of self-defense and aggression issues in self-defense, various theories have been presented.

Theory of defense as a natural right

The oldest view about legitimacy of defense is theory of natural right. The followers of this view believe that natural law, has obviously an acceptable reason so defend against it is reasonable. Due to their view keeping life, is a natural right for human being. Due to restrictions of natural rights, this approach supports only a part of human rights. Those legal and natural aspects of defense of property, according to those who don’t know the natural right of property isn’t enough.

Theory of defense action necessity

The first case of self-defense in some legislation, expressing limitations when dealing with an unfair attack for defense. This legislations were based on Christianity. If someone performed murder action he should pardon from king, and each time was proved the necessity of self-defense, killer’s appeal was accepted. In UK law generally self-defense is known as a necessity. According to the theory of self-defense that is a special case of necessity and it includes personal injury, mayhem and killing. This theory is unacceptable, because the person who committed crime in a state of necessity to save herself may injury innocent third party that has no effect on the risk.

Aggression theory as the main cause

The focus of some theories about legitimate defense is on the aggression. According to one of these views that has been proposed by Mentagive; defender chooses between his life and offender’s life so he can ignore the aggressor’s life. As the theory limiting range of self-defense to those who have no moral responsibility, while restricting legitimate defense against some of attacks, but it would bring the right to defend for person who is in front of reprehensible attacks that can threat his life.

Aggression theory and social support

Some of mentioned theories considering a situation that society isn’t able to support citizens by providing security measures front of the aggressions, so the third person is authorized to act on aggression behalf of society to repel attackers. Rousseau justified
legitimate defense base on his theory about social contract. The view that emerged in the eighteenth century, during illegal invasion of a social contract by which human society has assigned its rights, including the right to defense, before the contract is inapplicable; its result is allowed the exercise of right.

**Dignity theory and its requirements**

Human’s dignity is base on immune from any kind of unjust aggression. This aggression includes subjects like; human life, privacy, honor or property rights. Although, value of these issues is different but any aggression on human dignity due to principles of freedom is illegitimate. Human being is born with freedom and has the right to live so everyone must be safe from aggression and abuse. According to this theory, human being has the right to defend herself against any aggression.

**CONCLUSION**

In law has recognized that every death, even deliberately, can occur in different conditions, so that all of them are not reprehensible. The right to defend against life, honor, property and freedom is recognized from many times ago. In British criminal law, in certain situations, using violence through self-defense as a legitimate practice is recognized. In some situations, a person in order to deal with an illegal aggression against interest that law considered as legitimate issue can use violence. These interests in England include; defending themselves or others, prevention of crime, protection of their property or another property and legal arrest of offenders. In UK arresting of offenders and prevention of crime, for common citizens is legally justified. But in Iranian law citizens can perform necessary measures to prevent offender’s escape and maintain crime scene only in absence of justice officers. In Islamic Penal law of 2013, certain regulations about self-defense are determined. But in England, self-defense, including his defense or else be subject to rules of criminal law. The defense of property provisions is under Criminal Damage Act of 1971. Arresting and preventing crime are determined in criminal law of England. So that in article 3 of 1967 UK law, this issue is discussed. The evolution of self-defense in UK is passed irregular process.

In Iranian law despite UK law, the statute of self-defense has been determined precisely. Of course, in most legal systems, such as UK system there isn’t a clear explanation about aggression. The defendable interests that supported by law of UK include; self-defense, defense of others and property. But according to Article 3 that says:’avoid committing any crimes”it can be against the person’s life, property and security of country or any other issue. The base of defense in legal systems through the world remained unclear and this uncertainty on the basis of legal entity has caused confusion in other dimensions. So range of self-defense in legal systems is a controversial issue. Therefore, legitimate defense should support individual rights and ensure social discipline. So it must be cleared for practitioners of justice system, especially judges. Therefore, legislative and judicial authorities should support and encourage the spread of this principle.

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**Ethical Clearance:** this article is ethically verified by Islamic Azad University of Kerman, Law Department.

**REFERENCES**

Profile of Traumatic Spinal Injuries at a Tertiary Care Hospital

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ABSTRACT

Spinal injury is a devastating injury, with its effect going beyond the injured patient to the care givers and family. The present study was carried out with an aim to know the pattern of traumatic injury to the spine in cases attending the emergency department of a tertiary care center in north Karnataka. During the study period, out of 3612 trauma cases which reported to the emergency department 40 cases had spinal injuries. Majority of traumatic spinal injuries were noticed in males, injuries were common in the age group of 21-30 years followed by equal proportion in the age group of 31-40 years and 41-50 years, road traffic accidents were the commonest cause of spinal injuries. 127 abnormal radiological findings related to spinal trauma were reported in 40 cases which were more common in cervical region followed by lumbar and thoracic region. Fractures and intervertebral disc bulge were the most common radiological findings. Fractures were more common in cervical region. Compression of the cord, epidural spinal hematoma, contusion of the cord, intervertebral disc annular tear, neuronal compression and thecal compression formed the various types of spinal injuries.

Keywords: Spinal injury, Road traffic accident, Radiological findings.

INTRODUCTION

In the world traumatic injuries form a significant and growing disease burden, and it is one of the leading causes of death in actively working population in many low and middle income countries. Five of the top 15 causes of mortality in adults aged 15 to 29 years result from injuries. In low-income countries long-term morbidity from injuries, as defined by disability associated life years (DALY), is higher than morbidity caused by either cardiovascular conditions or malignancies. This trend will continue as road traffic injuries (RTI) alone are projected to be the sixth leading cause of death and third highest cause of DALY by 2020. Trauma may cause injury to various part of the body including head, extremities, chest, abdomen etc. The present study was carried out with an aim to know the pattern of traumatic injury to the spine in cases attending the emergency department of a tertiary care center in north Karnataka. The term ‘spinal injury’ refers to damage to the spine or spinal cord resulting from trauma or from disease or degeneration. There is no reliable estimate of global prevalence, but estimated annual global incidence is 40 to 80 cases per 10 lakh population. Up to 90% of these cases are due to traumatic causes. People with a spinal cord injury are two to five times more likely to die prematurely than people without a spinal cord injury; with worse survival rates in low- and middle-income countries. Spinal injury is a devastating injury, with its effect going beyond the injured patient to the care givers and family. Spinal injury is associated with a risk of developing secondary complications such as deep vein thrombosis, muscle spasms, pressure ulcers, urinary tract infections, respiratory complications, osteoporosis and chronic pain.

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Phone no: 9620507547
MATERIALS AND METHOD

A retrospective study was carried out at SDM Medical College, Dharwad. The study included patients who visited the hospital with spinal injuries during 2 years from January 2014 to December 2015. First a list of patients with traumatic spinal injuries was sorted out from the medicolegal register through a computerized record system. Later with the help of picture archiving and communication system (PACS) of the hospital, computerized tomography (CT) and magnetic resonance imaging (MRI) radiological reports of the respective cases were accessed and the findings were documented in a prestructured format. Information was also obtained regarding the age, gender, cause of injury, from the medicolegal register. Those who succumbed to injuries were identified by the mortality list of the hospital. The data collected was tabulated and analyzed.

RESULTS

During the study period, out of 3612 trauma cases which reported to the emergency department 40 cases had spinal injuries. Majority of traumatic spinal injuries were noticed in males accounting for 77.5% cases, females accounted for 22.5% of cases (Table 1). Injuries were common in the age group of 21-30 years (30%) followed by equal proportion in the age group of 31-40 years and 41-50 years (20%), least common in people aged below 10 years (Table 2). Road traffic accidents were the commonest cause of spinal injuries (73%) followed by fall (28%) (Table 3). A total of 127 abnormal radiological findings related to spinal trauma were reported in 40 cases. Abnormal radiological findings related to spinal injuries (Table 4) were more common in cervical region (51.18%) followed by lumbar (25.99%) and thoracic region (22.83%). Fractures (28%) were the leading radiological finding followed by intervertebral disc bulge (26%). Fractures were more common in cervical region followed by thoracic and lumbar region. Compression of the cord was seen in 10% of cases. Epidural spinal hematoma was seen in 9% cases. Contusion of the cord was appreciated in 6% cases, intervertebral disc annular tear in 3% cases, neuronal compression was seen in 2% and thecal compression in 7% cases.

### Table 1: Distribution of cases based on Gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>No. of cases</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>31</td>
<td>77.5%</td>
</tr>
<tr>
<td>Female</td>
<td>09</td>
<td>22.5%</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>100%</td>
</tr>
</tbody>
</table>

### Table 2: Distribution of cases based on age

<table>
<thead>
<tr>
<th>Age in yrs</th>
<th>No of cases</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10</td>
<td>01</td>
<td>03%</td>
</tr>
<tr>
<td>11-20</td>
<td>02</td>
<td>05%</td>
</tr>
<tr>
<td>21-30</td>
<td>12</td>
<td>30%</td>
</tr>
<tr>
<td>31-40</td>
<td>08</td>
<td>20%</td>
</tr>
<tr>
<td>41-50</td>
<td>08</td>
<td>20%</td>
</tr>
<tr>
<td>51-60</td>
<td>04</td>
<td>10%</td>
</tr>
<tr>
<td>&gt;61</td>
<td>05</td>
<td>13%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>40</td>
<td>100%</td>
</tr>
</tbody>
</table>

### Table 3: Distribution of cases based on cause of spinal injury

<table>
<thead>
<tr>
<th>Cause</th>
<th>No of cases</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road traffic accidents</td>
<td>29</td>
<td>73%</td>
</tr>
<tr>
<td>Fall</td>
<td>11</td>
<td>28%</td>
</tr>
<tr>
<td>Fall of weight on head</td>
<td>01</td>
<td>03%</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>100%</td>
</tr>
</tbody>
</table>

### Table 4: Findings based on radiological report

<table>
<thead>
<tr>
<th>Findings</th>
<th>Cervical</th>
<th>Thoracic</th>
<th>Lumbar</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fracture</td>
<td>14</td>
<td>12</td>
<td>06</td>
<td>32</td>
<td>28%</td>
</tr>
<tr>
<td>Compression of the cord</td>
<td>07</td>
<td>02</td>
<td>02</td>
<td>11</td>
<td>10%</td>
</tr>
<tr>
<td>Prevertebral fluid collection</td>
<td>06</td>
<td>02</td>
<td>-</td>
<td>08</td>
<td>07%</td>
</tr>
<tr>
<td>Cord edema</td>
<td>10</td>
<td>03</td>
<td>02</td>
<td>15</td>
<td>13%</td>
</tr>
<tr>
<td>Epidural hematoma</td>
<td>05</td>
<td>03</td>
<td>02</td>
<td>10</td>
<td>09%</td>
</tr>
<tr>
<td>Contusion of the cord</td>
<td>04</td>
<td>02</td>
<td>01</td>
<td>07</td>
<td>06%</td>
</tr>
<tr>
<td>Intervertebral disc bulge</td>
<td>15</td>
<td>03</td>
<td>12</td>
<td>30</td>
<td>26%</td>
</tr>
<tr>
<td>Intervertebral disc annular tear</td>
<td>04</td>
<td>-</td>
<td>-</td>
<td>04</td>
<td>03%</td>
</tr>
<tr>
<td>Neuronal compression</td>
<td>-</td>
<td>-</td>
<td>02</td>
<td>02</td>
<td>02%</td>
</tr>
<tr>
<td>Thecal sac compression</td>
<td>-</td>
<td>02</td>
<td>06</td>
<td>08</td>
<td>07%</td>
</tr>
<tr>
<td>Total</td>
<td>65(51.18%)</td>
<td>29(22.83%)</td>
<td>33(25.99%)</td>
<td>127</td>
<td></td>
</tr>
</tbody>
</table>
Table 5: Prognosis of the patient

<table>
<thead>
<tr>
<th>Prognosis</th>
<th>No of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death</td>
<td>03(7.5%)</td>
</tr>
<tr>
<td>Discharged</td>
<td>37(92.5%)</td>
</tr>
<tr>
<td>Total</td>
<td>40 (100%)</td>
</tr>
</tbody>
</table>

DISCUSSION

In the present study spinal injuries were more common in males than females similar findings were noted in other studies.4–6 It can be attributed to males being more exposed to the circumstances which cause spinal injuries. Spinal injuries were more common in the age group of 21-30 years, 31-40 years and 41-50 years. Similar inference is drawn by other studies.4, 6 But a study in Austria reported people aged more than 65 years have a higher risk. This is due to the high incidence of spinal injuries caused by fall in Austria, compared to India as aged people are more vulnerable to traumatic spinal injuries due to fall.7 Road traffic accidents were the major cause of spinal injuries followed by fall. Same has been noted in other studies.8 Few other studies also noted sports related injuries and violence resulting in spinal injuries.4, 10 Injuries to the cervical region were most common, same finding noted in other studies.4, 11 It is attributed to increased range of mobility of the cervical spine. In the thoracic spine we noticed less injury related findings radiologically since thoracic spine is well protected by additional support of the rib cage. The mortality rate was 7.5% compared to another study which reported 16%. In the present study we noted intervertebral disc bulge which included both diffuse and localised.

CONCLUSION

Spinal injury is an annihilating injury that affects mainly the productive population of our country. With road traffic accident (RTA) being the major cause of this injury, efforts must be made to reduce it by directly reducing RTAs. This study gives the reader information regarding the magnitude of the problem, causes and pattern of spinal injuries. Such studies in this part of the world are scarce, so studies can be taken up which may include other clinical parameters.

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Source of Funding: No source of financial assistance was obtained from any individual or agency.

Ethical Clearance: Obtained from ethical committee.

REFERENCE

Between Eye Difference in Vitreous Electrolytes after Death; for Identical Postmortem Intervals

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ABSTRACT

Estimation of time since death is a very important part of routine medicolegal postmortem work. Recently vitreous humour biochemistry is been considered as one of the best methods for estimation of this postmortem interval. However studies have shown that there appears a significant between eye differences in the values of vitreous electrolytes in samples obtained from the same individual at identical postmortem interval; questioning its usefulness. The current study done on 67 dead bodies has shown that there has been no any significant eye difference.

Keywords:- Between eye difference, vitreous electrolytes, time since death, identical post-mortem intervals.

INTRODUCTION

The accurate estimation of time since death carries great value in medico legal investigations of serious crimes. Hence several workers have studied and reported that the accurate prediction of time since death i.e. even within two hours, can be possibly made from vitreous humour potassium.

The various factors may have a key role in the various disagreements regarding the utility of vitreous humor in TSD estimations. However, perhaps the most important concern in utilizing vitreous biochemistry for crucial forensic pathology determinations arises from the observed between eye differences in the same pair of eyes at identical TSD. Many researchers have assumed that the vitreous biochemical concentrations are identical and postmortem changes occur at the same rate in both the eyes. Recent observations have indicated that these presumptions may not be entirely true and between eyes differences at the same TSD have been documented. If these differences were to exist, it would grossly undermine the value of vitreous biochemistry in various forensic pathology applications.

Considering the above doubt regarding the utility of vitreous humour biochemistry we conducted the present study to see any between eye difference for vitreous humour potassium, sodium and glucose.

AIMS AND OBJECTIVES

To find the difference between levels of vitreous humour sodium, potassium and glucose, when samples from both the eyes of same individual are drawn at same time and examined as separate sample.

MATERIAL AND METHOD

The study was done in the Department of Forensic Medicine and Toxicology, B J Govt. Medical College and Sassoon General Hospitals, Pune. The cases brought for postmortem examination during January 2015 to June 2015 formed the material for collection of vitreous humour. Total 67 cases (134 samples) of vitreous humour were studied. Cases where exact time of death was known and it correlated with postmortem changes like postmortem lividity, rigor mortis and putrefaction were included. While cases where exact time of death was not known, cases with known ocular disease or trauma, cases whose time of death on enquiry from different sources was found to differ by more than + 15 minutes, hospitalized cases where electrolytes or diuretics were given prior to death, cases with known electrolyte disturbances prior to death and cases kept in cold storage prior to postmortem examination were excluded from study.

The information regarding age, sex, cause of death, date and time of death was gathered from police
records, hospital records and from eye witnesses, relatives, friends and attendants of the deceased. Two samples were drawn. Samples from both the eyes of an individual constituted a pair. In the above 67 selected cases, samples were drawn at same time from both eyes of an individual. This was done to find out any difference in the values of vitreous potassium, sodium and glucose within a pair of samples.

After collecting the samples only the clear samples were processed further. Samples having any particulate matter, cloudy, discolored or hemorrhagic were discarded and were not included in the study. The two samples taken from the same individual were referred to as pair. Samples from right eye were labelled as SAMPLE I and those from left eye were labelled as SAMPLE II. Vitreous humour was collected from the posterior chamber of the eye, slowly and gradually avoiding tearing of loose fragments of tissues by needle aspiration through a puncture made 5-6 mm away from the limbus near outer canthus using 10 ml sterile syringe and 21 gauze needle, directed in such a position that the tip of needle is near retina. Vitreous humour was then slowly aspirated. As much of the vitreous humour as can be aspirated was removed because the vitreous humour next to the retina has a different concentration of solutes than in the central portion of the globe. Once the sample was aspirated, the syringe was detached from needle. The needle was kept in situ to inject sterile water in the posterior chamber of eye to restore the eyes for cosmetic purposes. The aspirated vitreous humour sample was divided into two parts. Two third was poured in a rubber stoppered glass vial for potassium and sodium estimation and remaining one third was poured in a fluoride bulb for glucose estimation. The samples were taken immediately to the Department of Biochemistry, of this institute for analysis. Each sample was centrifuged at 3000 revolutions per minute for 10 minutes and the supernatant fluid was used to estimate sodium and potassium by flame photometry and glucose by glucose oxidase method.

**OBSERVATIONS AND RESULTS**

In the current study total 67 cases were studied during the study period. There was a female preponderance in the sample with 38 females and 29 males. Majority of cases were from age group less than 20 years when both the sexes were considered together. (Graph 1)

The distribution of cases with respect to time since death (TSD) was almost equal in the three groups with slight inclination in TSD range of 12 hrs to 24 hrs. (Table1).

The Table 2 shows that when the parameters of vitreous electrolytes were considered to find the between eye difference the ‘P’ value was not significant for all the three parameters i.e. vitreous potassium, sodium and glucose. This means there is no any significant difference between the vitreous humour electrolytes of two eyes of same individual when samples from both the eyes are collected at identical post-mortem intervals.

**DISCUSSION**

Estimation of time since death has always remained an important requirement in medico legal autopsies. Estimation of time since death can directly or indirectly help to find out the time of assault. Time passed between death and postmortem examination and time for which deceased survived after say, sustaining fatal injury considered together give the time of assault. In civil cases also the matter concerning transfer of estate or property may depend upon the time since death.

Various chemical tests to estimate the time since death have been largely developed in last few years. Body fluids which are available for such chemical examination are whole blood, serum, cerebrospinal fluid, aqueous humour and vitreous humour. Amongst all these available body fluids, the vitreous humour has been largely utilized and vitreous potassium concentration has become most widely used method to predict the time since death.

Aqueous humour in the anterior and posterior chambers of the eyes and vitreous humour which is contained within the vitreous body constitutes the intraocular fluid. Because of larger volume, easy availability and lesser or no contamination, vitreous humour was preferred in this study. Also vitreous humour is relatively inert and slightly influenced by sudden changes in the human blood chemistry. However many researchers have raised the question regarding the use of this method stating the significant between eye difference as the cause.

In present study it was also tried to find any difference in the values of vitreous potassium, sodium and glucose of right eye from values of vitreous
potassium, sodium and glucose of left eye of an individual. After doing the comparison as described in table no. 3, it was clear that there was no any significant variation in the levels of vitreous potassium, sodium and glucose within a pair of samples.

Regarding vitreous potassium, this finding is in agreement with observations made by Mulla A et al, Adelson et al, Sturner and Gantner, Hughes, Lie, Coe, Tagliaro et al and Garg V et al. But some investigators like Balasooriya et al, Madea et al and Pounder et al who found a difference of more than 10% in the levels of vitreous potassium within a pair of samples when samples were taken from each eye at the same time. Regarding vitreous sodium the study is in agreement with the observations of Mulla A. et al and Pounder et al but not in agreement with study of Balasooriya et al (1984). Regarding glucose it is in agreement with observations made by Mulla A et al.

A possible explanation for the ambiguous reports regarding between-eye differences at similar time since death was said to be either the variations in study methods or sample manipulations before analyses. A major variation was found in the aspiration techniques adopted by various investigators. Bito in 1977 reported that there is difference in concentrations of many solutes of the vitreous humor between anterior and posterior vitreous chambers. According to Coe in 1989 the concentration of vitreous solutes next to the retina differed from the concentration in the central portion of the globe, and hence it is very important to aspirate vitreous humor as completely as possible. Such completely aspirated vitreous humour sample can reflect accurately the concentration levels of all solutes, and serves to eliminate any ambiguity that may occur due to selective vitreous humor aspiration. Hence in present study maximum of vitreous humour was aspirated to reduce the sampling error. Further it can be said that the aspiration technique used by Balasooriya et al could highly give distorted values in each eye as they aspirated only the initial 1 mL volume of fluid. It is also interesting to note that, investigators like Coe (1969) who removed all the available vitreous humor from both the eyes succeeded in demonstrating near identical concentrations for both eyes.

However recently in a study by Tagliaro et al it was found that no statistically significant differences existed for potassium concentrations in the two eyes of the same individual when a micro sampling technique was used for sample collection. The micro sampling technique i.e. aspiration of microliter amounts of fluid, used in their study was different from the technique of complete fluid aspiration employed in the present study. Hence it can be proposed that the difference in sampling technique may not be the sole reason that stands for the reported between-eye differences. This was authenticated by two previous studies of Madea et al and Pounder et al who assessed the effect of the sampling technique of the vitreous humor by aspirating the fluid in two installments and found no any significant influence of the sampling technique on the observed between-eye differences.

Hence it can be said that, even though the complete aspiration technique is ideal to give accurate vitreous solute concentration levels, certain other factors may also be responsible for the between-eye differences. Such other factors may be like the different instrumentation methods used in different studies. It has been suggested that the concentration of vitreous humor constituents will vary with different instruments. It is found that in studies that have proposed significant differences between the same pair of eyes, the method of sample analysis was direct or indirect potentiometry. While studies in which near-identical concentration for various vitreous humor solutes were obtained, samples were analyzed by using flame photometry. This was a similar technique as used in the present study.

Also it is interesting to find that most of the analytical instruments used in various studies have been used for a clinical range of analysis where compensatory dilution has been an essential procedure in estimating a value for most of the postmortem vitreous humor constituents. Pounder et al. hypothesized that sample dilution prior to analysis can be reason for the between-eye differences in the same pair of eyes, and therefore they suggested measuring the samples undiluted. However, other studies including the present study, that have reported no significant between-eye differences for vitreous constituents have performed the required dilutions.

According to few investigators the long time gap between vitreous-humor sample collection and analysis of the sample may be another responsible factor for the reported between-eye differences in the same pair of eyes. In some studies, the sample was kept frozen at -70°C before biochemical analysis. The improper
storage conditions may have impacted the results little bit and it is argued that after indefinite storage at low temperatures, one cannot get accurate results regarding the biochemical concentrations of the vitreous humor.\(^5\) In the present study, immediate biochemical analyses of the samples were done without any prior freezing to eliminate the questioned influence of sample storage on vitreous humor biochemical values. The present study technique of immediate analysis post-collection is in line with the technique used by Pounder et al\(^6\). However they reported significant between-eye differences for potassium. The present study method and data are comparable with their findings for sodium but not for potassium.

**Graph 1:** Distribution of cases in relation to age and sex. (on y axis – no of males/females, on x axis - age gropus in years)

**Table 1:** Percentage distribution of cases depending upon time since death (TSD)

<table>
<thead>
<tr>
<th>S. No.</th>
<th>TSD (in hrs.)</th>
<th>No. of cases</th>
<th>Percentage distribution.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>00 hrs - 12 hrs.</td>
<td>22</td>
<td>32.84%</td>
</tr>
<tr>
<td>2.</td>
<td>12 hrs – 24 hrs.</td>
<td>23</td>
<td>34.32%</td>
</tr>
<tr>
<td>3.</td>
<td>&gt; 24 hrs.</td>
<td>22</td>
<td>32.84%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>67</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Table 2:** Showing comparison of vitreous potassium, sodium and glucose of sample I and sample II of cases having same time since death.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Sample</th>
<th>No. of cases</th>
<th>Mean</th>
<th>SD</th>
<th>Paired T</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potassium (mEq/L)</td>
<td>1</td>
<td>67</td>
<td>12.89</td>
<td>2.23</td>
<td>1.419</td>
<td>0.161 NS</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>67</td>
<td>12.81</td>
<td>2.35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sodium (mEq/L)</td>
<td>1</td>
<td>67</td>
<td>174.98</td>
<td>71.49</td>
<td>0.601</td>
<td>0.550 NS</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>67</td>
<td>174.94</td>
<td>71.49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glucose (mg/L)</td>
<td>1</td>
<td>67</td>
<td>8.76</td>
<td>7.98</td>
<td>1.595</td>
<td>0.116 NS</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>67</td>
<td>8.24</td>
<td>7.73</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CONCLUSION**

There are various reasons for the between eye difference like amount of sample collected, time delay between collection of sample and analysis and the method of analysis. However all these can be controlled. Hence it can be said that vitreous biochemistry, particularly vitreous potassium is useful in time since death estimation; and its utility cannot be doubted exclusively on the basis of these reported between eye differences.

**Ethical Clearance:** Obtained from Institutional Ethics Committee.

**Conflict of Interest:** None

**Source of Fund:** Self

**REFERENCES**


Profile of Unnatural Deaths - A Retrospective Study Conducted in and around Davangere

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ABSTRACT

A two-year retrospective study on the cases of unnatural deaths subjected to medico-legal autopsy during the period from 1st November 2010 to 31st July 2013 was carried out in the department of Forensic Medicine at SSIMS&RC, Davangere, to elucidate the trends in unnatural deaths. Total number of unnatural deaths were 549 in the study period, of which males (377 cases) outnumbered the females (172 cases). Road traffic accidents being the commonest cause of death, (n=244, 44.60%), followed by deaths due to poison consumption (n=134, 24.49%), deaths due to burns (n=95, 17.36%), deaths due to fall from height (n=28, 5.11%) followed by snake bite (n=12, 2.19%), assault (n=10, 1.82%), hanging (n=11, 2%). The rest of the cases were due to drowning, bull goring injury, electrocution, occupational injuries and others, which accounted 2.74% of total unnatural deaths.

Keywords: Unnatural deaths; RTA; Autopsy;

INTRODUCTION

Natural death means death occurring due to some natural disease or pathological condition, old age, debility or devitalization; here the death is not intended or attempted and also does not occur accidentally. Whereas unnatural death means a death that is not from natural causes and it accounts for more than 5 million deaths globally. Road traffic accidents, poison consumption, burns, falls and deliberate acts of violence against oneself and others are among the causes of unnatural deaths. On the average all these major causes of unnatural deaths show an increasing trend for incidence, whereas considering percent share traffic accident and sudden deaths show an increasing contribution. Present study was carried out to know the profile of unnatural deaths with reference to age, sex, and cause of death.

MATERIALS AND METHOD

The present retrospective study was conducted in the department of Forensic Medicine at SSIMS&RC, Davangere, Karnataka. All the cases of unnatural death brought for medico-legal autopsy during the period from 1st November 2010 to 31st July 2013 were studied. Detailed information was obtained from the postmortem records and data was analyzed with reference to age, sex, and cause of death. Causes of death were grossly classified as road traffic accident, poison consumption, thermal injuries, fall from height, assault, hanging, snakebite etc.

RESULTS AND OBSERVATION

In present study a total of 549 unnatural deaths were studied, among them there were 377 males (68.67%) and 172 females (31.32%). Most common age group was being 21-40 years. Trauma holds the commonest cause of death, that is due to Road Traffic Accidents (n=244, 44.60%), with most common age group being 21-30 years. Among the cases males (n=220, 90.16%)
are the highest in numbers when compared to females (n=24, 9.83%).

The second among the most common cause of death was due to poison consumption (n=134, 24.40%), in which the common age group being 21-30 years, followed by the age group 31-40 years. Among the cases males (n=84, 62.68%) predominated females (n=50, 37.31%). Following poison consumption, the next commonest cause of death was due to burns (n=95, 17.30%), where in commonest age group involved was 21-30 years, with males (n=21, 22.10%) outnumbered by females (n=74, 77.89%).

Next commonest cause of death was due to fall from height (n=28, 5.10%), in which commonest age group involved was 31-40 years. Here males (n=24, 85.71%) outnumbered females in number of cases (n=4, 14.28%). This is followed by deaths due to snake bite (n=12, 2.18%) among which males were 7 cases (58.33%), and females were 5 cases (41.66%). The commonest age group involved was 21-30 years.

Assault was the next most common cause of death, which accounted for 10 cases (1.82%) of which males were 9 in number (90%) and one female case (10%). The next commonest cause of death was due to hanging (n=11, 2%), of which males were two in number (18.18%) and females were 9 in number (81.81%). In case of deaths due to hanging, females outnumbered males in number of deaths. Commonest age group involved in females was 21-40 years.

The rest of the cases where the cause of death was due to drowning, bull gore injury, electrocution, occupational injuries were grouped together as other causes of death. This accounted 15 cases (2.73%) among which males were 10 (66.66%) in number and females were 5 in number (33.33%).

Table no. 1: Distribution of unnatural deaths according to sex

<table>
<thead>
<tr>
<th>Sex</th>
<th>Count</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>377</td>
<td>68.67%</td>
</tr>
<tr>
<td>Female</td>
<td>172</td>
<td>31.32%</td>
</tr>
<tr>
<td>Total</td>
<td>549</td>
<td>100%</td>
</tr>
</tbody>
</table>

Chart No. 1: Pattern of unnatural deaths

Table no. 2: Distribution of unnatural deaths according to cause and sex.

<table>
<thead>
<tr>
<th>Cause of Deaths</th>
<th>Sex</th>
<th>Total</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td></td>
</tr>
<tr>
<td>Road traffic accidents</td>
<td>220(90.16%)</td>
<td>24(9.83%)</td>
<td>244</td>
</tr>
<tr>
<td>Poisoning</td>
<td>84(62.68%)</td>
<td>50(37.31%)</td>
<td>134</td>
</tr>
<tr>
<td>Burns</td>
<td>21(22.10%)</td>
<td>74(77.89%)</td>
<td>95</td>
</tr>
<tr>
<td>Fall from height</td>
<td>24(85.71%)</td>
<td>4(14.28%)</td>
<td>28</td>
</tr>
<tr>
<td>Snake bite</td>
<td>7(58.33%)</td>
<td>5(41.66%)</td>
<td>12</td>
</tr>
<tr>
<td>Assault</td>
<td>9(90%)</td>
<td>1(10%)</td>
<td>10</td>
</tr>
<tr>
<td>Hanging</td>
<td>2(18.18%)</td>
<td>9(81.81%)</td>
<td>11</td>
</tr>
<tr>
<td>Others</td>
<td>10(66.66%)</td>
<td>5(33.33%)</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>377(67.74%)</td>
<td>172(32.25%)</td>
<td>549</td>
</tr>
</tbody>
</table>
DISCUSSION

As per our study, trauma holds the commonest cause of unnatural deaths. A number of studies on various aspects of unnatural deaths reported that road traffic accidents to be the major cause of mortality arising from non-natural causes in different regions of India. A similar study conducted by Rahim et al showed a total of 85.33% persons lost their lives in road traffic accident, followed by poisoning 45.66% which is similar to the results of our study. A study conducted by Kumar A shows that road traffic accidents (44.11%) constitutes most common cause of unnatural deaths with males (68.60%) outnumbering females (31.40%) and the commonest age group was between 21-30 years which coincides with our study. Bansude et al in their study found that, trauma was most common cause of death (38.09%) followed by thermal injuries (26.73%), poisoning (25.21%) and asphyxia (9.83%). In traumatic deaths, Road traffic accident (34.07%) was the commonest cause of death. In the study conducted by CK Pawar et al burns (45%) accounted for maximum number unnatural death, which was followed by poison consumption (30%), vehicular accidents (18%) which is contradictory to our study.

CONCLUSION

The pattern of deaths due to unnatural causes differs from one region to other because of many geographical influences. In the present study, road traffic accidents stand as the most common cause of deaths with male predominance, and commonly involving younger age group (21-30yrs). Next commonest cause of death was due to poisoning with male preponderance in this region and death due to burns holds third most common cause of death with highest percentage of female victims, and homicidal deaths involving young males. As RTAs cause the maximum number of unnatural deaths, strict enforcement of traffic rules with special attention towards educating the public regarding safe driving, removing stray animals on the highways, improvement of roads, streetlights and displaying of traffic signs needed.

Conflict of Interest: None

Source of Funding: None

Ethical Clearance: Not applicable, as this is a retrospective study based on autopsy reports.

REFERENCES

Study on Informed Consent in Medical Practice

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ABSTRACT

Consent is a voluntary agreement between a doctor and a patient prior to any examination or treatment. Proceeding without consent is tantamount to assault and battery, even though it is beneficial to the patient and done in good faith. In this case the patient can file a complaint against the doctor. Informed consent is a must in medical practice. A study was conducted regarding documentation procedure of informed consent in Hyderabad and Ranga Reddy Dist. the consent part of the case sheets were thoroughly examined. and several inconsistencies were found in the consent forms. All errors were analyzed to explain medico-legal issues.

Keywords: Informed consent, Hospital consent proforma. Medical practice.

INTRODUCTION

Consent means a voluntary agreement, compliance or permission. The principle of consent is a very important aspect of medical ethics and international human rights. It is a fundamental documentation before starting any examination or procedure on a patient. The ethical and legal rationale behind this is to respect the patient autonomy and right to self-determination. Improper consent can lead to various medico-legal issues.

The practice of consent is ancient in India, Sushrutha Samhita an ancient surgeon in his treatise mentions that the permission from the king should be sought when a situation warrants that without surgery the patient may die. Arthashastra texts of 3rd century B.C also mention capital punishment to physicians who have not taken prior permission before performing major surgery which could result in death.

In 1914 the legal precedent for informed consent arose in the US from a court case in New York State. A patient of tumor underwent surgery to which he did not give consent. The New York justice Benjamin Cardoza in his opinion said “Every human being of adult age and sound mind has the right to determine what shall be done with his own body and the surgeon who performs the operation without his consent commits assault for which he is liable in damages.

The discovery of Nazi atrocities during their experimentation on unwilling prisoners during World War II, shocked the world and has subsequently led to the development of a legal framework to cater for issues of medical consent. The Nuremberg Trials of 1947 and world medical association declaration of Helsinki 1964 both are seen as the basis for the development of medical consent. Medical council of India has also formulated guidelines on informed consent in their Professional Conduct, Etiquette, and Ethics Regulations.2002 and made it a compulsory practice in India.

According to “Sec 13 of Indian contract act” Consent is legally defined as two or more parties agreeing on the same thing in the same sense “. Consent must be given by a patient before any medical procedure is carried out. There are various types of consent: Implied consent, expressed consent and Informed consent.

Implied Consent: The action of the patient implies that he has given consent. This is the most common type of consent for simple medical examination; this does not include examination of private parts of the patient.

Expressed consent: Procedure to be performed is explained to the patient in clear, unambiguous terms. It can be verbal or written. Written consent is always preferable because when a litigation arises the document can be produced as a proof in the court.
Informed consent: Consent obtained after giving the complete information to the patient regarding the disease suffering and treatment options. The doctor should explain the proposed treatment method and their benefits and risks, if any alternative treatment methods are available and their risks and benefits. The doctor should also explain the cost of the treatment, and remind the right to withdraw the proposed treatment at any point in time.\(^3\)

Informed consent can be broken down into three basic parts; ‘voluntariness, capacity and knowledge\(^3\).

Voluntariness: the decision to either consent or not to consent to treatment must be made by the person themselves, and must not be influenced by pressure from medical staff, friends or family.

Knowledge: the person must be given all the information in terms of what the treatment involves, including the benefits and risks, whether there are reasonable alternative treatments and what will happen if treatment does not go ahead.

Capacity: the person must be capable of giving consent, which means they understand the information given to them, and they can use it to make an informed decision.

Consent in relation to various conditions:

- Consent of the patient cannot be used as defence by a medical practitioner in criminal negligence cases.
  
  - In Loco parentis: it literally means “in place of a parent.” When the parents cannot be immediately reached for consent, the immediate person in charge can give consent.
  
  - Blanket consent is not valid: A doctor should take the consent for a specific procedure\(^1\).
  
- Consent for Autopsy: No consent is required to conduct a Medico-legal autopsy. In a case of a pathological autopsy, consent is to be taken.

- For contraceptive and sterilization: The consent of both husband and wife has to be taken.

- MTP Act 1971: The consent of the woman is required, in case of a minor or mentally ill person consent from parent/guardian is required. Consent of the husband is not required\(^8\).

- Consent for organ donation: Consent of the individual is necessary. In a case of cadaveric organ donation, if consent was already given by the individual during his life it is sufficient otherwise consent from the family member needs to be taken\(^9\).

- Consent for Artificial reproductive therapy: Both husband and wife consent is necessary.\(^3,6\)

- Examination of the victim of sexual offences: Consent must be obtained after telling her that the findings of the clinical examination will be revealed in the court of law, the victim cannot be examined without her consent, even though it is a medico-legal case, including relevant specimen collection\(^10\).

- Consent in pregnancy and delivery: Consent of the woman is sufficient, in case the woman is not in a position to give consent due to progression of labor then her husband or family members can give consent.

- Professional secrecy: A doctor cannot disclose the disease condition of his patient without his consent. In cases of therapeutic privileges for the interest of the third party, the doctor can reveal without consent.\(^2,3\)

- Scientific research: A doctor cannot conduct any research related activities on his patient without consent.\(^2,3\)

- Medical records and publications: A doctor cannot reveal the patient information either directly or indirectly to the third party

- A prisoner can be treated forcibly without consent in the interest of the society.

Legal acts in relation to consent:

Sec 351 IPC: Examination of a patient by a doctor without consent is treated as assault or battery, Punishment up to 3 months imprisonment or a fine or both.\(^2,3\)

Sec 354 IPC: Examination of a female patient without her consent invites grave offence, it amounts to assault on a woman with intent to outrage her modesty, punishment up to 2 years imprisonment or fine or both.\(^2,3\)
Article 21 of the Indian constitution: Deals with the right to live and personal liberty, which include the right to live with human dignity. It interprets that an adult man of sound mind has a right to determine what will be done with his own body.

Section 90 of IPC: Defines consent in a negative term, as per this section consent given under the following circumstances will not be a valid consent.\(^2,3\)

- By a person under fear.
- By a person with misconception of the facts.
- By an intoxicated person.
- By a person who is of unsound mind.
- By a person who is below the age of 18 years.

Section 88 of IPC: A person above 18 years of age can give consent to suffer any harm, which may result from an act not intended to or not known to cause death, done in good faith and for their benefit.\(^2\)

Section 89 of IPC: A child under 12 years of age and a mentally incapable person cannot give a valid consent to suffer any harm which result from an act done in good faith and for their benefit. The consent of the parent or guardian is a must.\(^2\)

Section 92 of IPC: In an emergency no consent is required. Any act done in good faith for the benefit of the patient without consent is not an offence.\(^2\)

Section 2(1) of the Consumer protection Act: Not taking consent is considered as a deficiency in medical services. Consent is not a defence in criminal negligence.

Section 53(1) of CrPC: A registered medical practitioner can examine an accused by using reasonable force if the examination is requested by the police officer not below the rank of sub-inspector. Force should be applied by the police.\(^3\)

Case Laws:

Darrah vs Kite. New York, 1969. The verdict, in this case, established that each invasive diagnostic test requires a separate consent.\(^1\)

In Canterbury v. Spence Washington, D.C.1972. The court held that the consent must address the following six points.\(^1\)

1. The patient must be aware of the diagnosis.
2. The patient must be aware of any procedure necessary to ascertain the diagnosis.
3. The surgical procedure must be described in the way that the patient understands.
4. The patient must be informed of any inevitable risks from surgery.
5. The patient must be informed of all alternative methods of treatment both surgical and conservative.
6. The expected results and their probability should be discussed in sufficient detail with the patient prior to surgery.

Bech v. Lovell, Louisiana, 1978. The State Court ruled out that a spouse or family member cannot consent for surgery in place of the competent patient except in emergency.\(^1\)

Perna v Pirozz, New Jersey, 1983. Surgery performed by a person other than the surgeon named by the patient at the time of consent constitutes battery. Additionally, the originally authorized surgeon who obtained the consent but failed to perform the surgical procedure is, therefore, liable for breach of duty.\(^1\)

Samira Kohli vs. Prabha Manchanda. Supreme court of India judgment was related to a Gynecological case where Hysterectomy was done as an additional procedure. While the initial consent was obtained for diagnostic laparoscopy, hysterectomy and removal of both ovaries were performed in the same sitting under general anesthesia. The consent for hysterectomy was however obtained from the mother of the patient. The Supreme Court held the doctor liable for malpractice overruling the order passed by the National Consumer Dispute Redressal Commission. The Supreme Court was of opinion that additional surgery, however, beneficial to the patient in saving time, expenses, pain, and suffering are no ground for defense.\(^1,11\)

Aim of the study:

The main Aim of this study is to create awareness in the medical community about informed consent and how it can lead to various medico-legal issues. Doctors were found guilty of improper medical records and
wrong consent practices in more than 50% of medical negligence cases occurring in India. In this study, we attempt to highlight the mistakes commonly committed in hospital inpatient consent records and explain how it can lead to medico-legal issues.

**Materials and Methods:**

A cross-sectional record based study conducted in Hyderabad and Ranga Reddy Dist region of Telangana state. About 24 Consent proformas of Hospital inpatient case sheets were randomly collected from various Government and private hospitals after obtaining the permission from the hospital authorities. The names of the hospitals are not revealed in this study. Consent proformas were thoroughly examined and the following details were taken for analysis.

- Voluntariness: Whether consent was given by his own interest.
- Patient’s disease condition.
- The procedure of treatment planning.
- What are the risks and complications involved in the proposed treatment?
- Any alternative treatment available and their risks and complications.
- The outcome of the procedure.
- Age of the patient in the proforma.
- Whether the patient is having a sound mind to give consent.
- Whether the consent was taken in patients familiar language.
- Option to refuse procedure at any time.
- Signature of the patient or guardian.
- Signatures of two witnesses.
- Name and Signature of the doctor who recorded consent.
- Name of the doctor performing procedure/treatment.
- Time and date of record of consent.
- Whether consent was recorded with the video camera.

**Observations and Discussion:**

The following observations were made in our study.

**Voluntariness:** It is the willingness of a patient of sound mind to the treatment suggested by the consulting doctor. All of the consent proformas showed voluntariness by the patient.

**Patient disease condition:** The consent form must contain information about the patient disease condition. It has to be explained to the patient so that they understand what they are suffering from and its consequences. In this regard, 50% of the consent proformas lacked this information.

**Treatment procedure:** 67% of the collected forms mention the treatment procedure while 33% did not have any mention of it in the form.

**Risks and complications:** This feature can help to build a good defense in the court. 79% of the forms had this information; the rest 21% did not mention it.

**Alternative procedures:** 42% of the forms had mentioned while 58% did not.

**The outcome of the procedure:** Disappointingly, only 21% of the consent forms had recorded this part of the consent while the other 79% neglected it.

**Age of the patient:** If the patient is a minor, the consent should be taken from the parent/guardian. None of the proformas contain this information.

**Sound mind:** This refers to the ability of the patient to make decisions. 88% of the proformas contained relevant information and other 12% were lacking it.

**Consent was taken in patient own language:** The consent must be written and explained in a language known to the patient. 75% of the proformas mentioned it, whereas the other 25% did not.

**Informed refusal:** The doctor is under obligation to inform the patient that he has every right to refuse the suggested treatment procedure. None of the proformas contain this information.

**Signature of the patient:** The signature of the patient must be taken, if the patient is below the age of
18 years then the signature of the parents or the guardian must be taken instead. The signature validates that the patient has read and understood the contents of the consent form and agrees to the course of action without any force or coercion. This information is available in all consent proformas.

**Signature of witness:** It is obligatory for a witness to be present while recording consent. The witness may be a relative of the patient or someone unbiased. 71% of the consent proformas had the signature of the witness while the other 21% had neglected to mention the witness signature.

**Name of the doctor recording consent:** The name of the doctor taking the consent should be mentioned along with his signature. 50% of the consent forms had a signature of the doctor but the rest 50% had no signature of the doctor.

**Name of the doctor doing procedure** has to be mentioned in the consent form, this amounts to complete disclosure. Failure to perform the surgery by the doctor mentioned in the consent form amounts to breach of trust. 25% of the consent proformas had the name of the doctor performing the procedure while the other 75% didn’t contain it.

**Date and time of consent:** Doctor must record the date and time of consent, It helps to prove that it was taken before the surgery. 75% of the consent proformas had this information while 25% did not.

**Record of consent under the video:** In my study none of the consent proformas mentioned this information.

**CONCLUSION**

Consent must be recorded with due care and attention. Doctors must cultivate the habit of careful documentation. Documentation is an art: it can be learnt only by practice. Consent proformas must be designed in a legal manner and all the important columns should contain reasonable space to record relevant information. Training should be given to all doctors at an early level i.e. during their internship and post graduation. Consent must be recorded under the supervision of a senior doctor to minimize errors. To avoid the hassles of a litigant and ill-tempered patient, it is advised to record the consent with a video camera.

**The Source of Funds:** Self.

**Conflict of Interest:** Nil.

**Ethical Clearance:** Not required

**REFERENCE**

1. The History of Informed Consent, by Peter M. Murray, M.D. published in a journal The Iowa Orthopaedic Journal.
6. ICMR guidelines, chapter 3 of Code of practice, Ethical consideration and legal issues. 3.2.5 of informed consent.
Comparative Study of the Lungs in Wet Drowning and Secondary Drowning in Fresh Water

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ABSTRACT

Drowning in fresh water following inhalation of water into air passages results in churning of air, water and proteinaceous secretions of respiratory passage resulting in the formation of abundant fine lathery froth. The froth functions as a valve which permits only entry of air into alveoli, preventing the escape of air from alveoli. This results in an emphysematous, ballooned out, voluminous and pale lungs. The acute lung injury results in diffuse alveolar damage and acute respiratory distress syndrome, and when the person is rescued and resuscitated resulting in hypoxic brain damage and delayed death.

Keywords: Fresh water wet drowning, Secondary drowning.

INTRODUCTION

Drowning is a state of mechanical asphyxia due to submersion/immersion in a fluid medium. Immediately after submersion, a conscious person will hold the breath. The period for which an adult person can hold his breath under water is variable, however an average of two minutes to three minutes is the maximum time. During the apnoeic phase the oxygen within the body is used up by the cells and the excreted carbon dioxide accumulates. Hypercapnia (increased partial pressure of carbon dioxide) being a potent stimuli of the respiratory centre, breathing occurs under water. Immediately as water enters the air passage the larynx undergoes spasm asphyxiating the person. At the onset of unconsciousness underneath the water the laryngeal muscles relaxes allowing the entry of water into the lower air passages resulting in wet drowning, however in less than 10% of drowning the spasm of the larynx continues till the onset of cardiac arrest resulting in dry drowning, where there will be asphyxial signs but no evidence of entry of water into the air passages. A continued lack of oxygen supply to the brain results in cerebral hypoxia. Fresh water aspirated into the lungs results in hemodilution, hemolysis, hyperkalemia and hyponatremia altering the electric activity of the heart often resulting in ventricular fibrillation. Cardiogenic pulmonary edema is the accumulation of fluid with low protein content in the lung interstitium and alveoli as a result of cardiac dysfunction. In drowning pulmonary edema can also result from decreased intra vascular oncotic pressure due to hemodilution (resulting in imbalance of starling forces) and damage to alveolar capillary barrier. Pulmonary capillary blood and alveolar gas are separated by the alveolar capillary membrane which constitutes of, 1) Capillary endothelium 2) interstitial space 3) alveolar epithelium. Pulmonary edema occurs when the influx of fluid from vasculature into interstitium is increased. The present study was aimed to Observe the lung findings in immediate death due to fresh water drowning and delayed death due to fresh water drowning with reference to gross and microscopic changes of lung and to Evaluate delayed effects of asphyxiation in fresh water drowning.

MATERIALS AND METHOD

The present study was conducted at Department of Forensic Medicine, Govt. Medical College, Kozhikode after obtaining ethical clearance from institutional ethical committee. Ten cases of drowning, recovered dead from fresh water, were compared with four cases of delayed death following recovery from fresh water. The cases of delayed death due to drowning were treated at

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Govt. Medical College, Kozhikode. The gross findings of the lungs and histopathology of lungs of both the groups were evaluated and compared. The gross changes of brain were examined and histopathology studies of brain conducted. The dead bodies were subjected for complete medico legal autopsy and other relevant observations documented. The following criteria was followed in selection of the cases.

**Inclusion criteria** – Deaths due to fresh water wet drowning beyond reasonable doubt and witnessed cases of secondary drowning were selected for the study.

**Exclusion criteria** – Decomposed dead bodies were excluded from the study

### RESULTS

#### Table : 1 – Fresh water drowning

<table>
<thead>
<tr>
<th>Category</th>
<th>no (10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lungs pale</td>
<td>10</td>
</tr>
<tr>
<td>Air passages contained fine froth</td>
<td>10</td>
</tr>
<tr>
<td>Voluminous, ballooned lungs</td>
<td>10</td>
</tr>
<tr>
<td>Ribmarking on surface of lung</td>
<td>4</td>
</tr>
<tr>
<td>Marginal emphysema</td>
<td>0</td>
</tr>
<tr>
<td>Shiny small bullae over surface</td>
<td>2</td>
</tr>
<tr>
<td>Lung weight 200 – 400 gms</td>
<td>10</td>
</tr>
<tr>
<td>Cut section spongy, exuded pale froth</td>
<td>10</td>
</tr>
</tbody>
</table>

Histopathology lungs – Acute pulmonary oedema, over distended alveoli with thinning of alveolar septa.

#### Table : 2 - Category in Secondary drowning

<table>
<thead>
<tr>
<th>Category (n=4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lungs congested, airless, oedematous</td>
</tr>
<tr>
<td>Lung weighed, 500-800 gms</td>
</tr>
<tr>
<td>Cut section firm, consolidated with patchy dark blood infiltration</td>
</tr>
<tr>
<td>Focal emphysematous bullae over surface</td>
</tr>
<tr>
<td>Diffuse cerebral oedema</td>
</tr>
<tr>
<td>Histopathology – oedema involving grey matter</td>
</tr>
</tbody>
</table>

Histopathology of lungs: Exudation into alveoli.

Diffuse alveolar damage, Necrosis of epithelium and proliferation of pneumocytes

#### Table 3 : Survival in secondary drowning

<table>
<thead>
<tr>
<th>Period of survival</th>
<th>No. of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>12-18 hours</td>
<td>1</td>
</tr>
<tr>
<td>24-36 hours</td>
<td>2</td>
</tr>
<tr>
<td>74 hours</td>
<td>1</td>
</tr>
</tbody>
</table>

**WET DROWNING**

Froth (photo 1)

Pale Voluminous lungs (photo 2):

SECONDARY DROWNING (Survival 18 hours)

Water logged lungs (photo 3)
SECONDARY DROWNING (Survival 32 hours)

Cases that survived for 12-18 hours showed congestion and oedema of lungs, which appeared airless. Lungs weighed 520gms and 500gms. On sectioning the lungs showed non spongy feel with darkened airless areas within the parenchyma. Brain appeared congested sulci and gyri appeared normal, however cut sections of brain showed a shiny water logged appearance.

Both the cases which survived for 24-36 hours showed heavier lungs which appeared airless and firm on sectioning. The lungs weighed 680gms and 650gms each / 700gms and 660 gms. Patchy areas of consolidation / airless regions could be made out within the parenchyma. In both the cases the brain was appeared congested and oedematous which was confirmed by histopathology, however there was no evidence of a marked increase of intracranial tension as brain herniation was absent. Histopathology of the lungs revealed diffuse alveolar damage. Death due to secondary drowning following survival of 74 hours revealed congested oedematous airless lungs, firm in consistency with patchy areas of consolidations. Lungs weighed 780gms and 690gms. Histopathology of lungs revealed diffuse alveolar damage and patchy areas of consolidation, necrosis of alveolar epithelium, proliferation of pneumocytes.

DISCUSSION

The patho-physiology of death in fresh water drowning and secondary drowning in fresh water appear to be different. Immediate death consequent to aspiration of fresh water results in acute pulmonary edema and emphysematous changes in the lung resulting from obstructions of air passage and asphyxia, however the detection of electrolyte imbalance or cardiac arrhythmia are beyond the scope of an autopsy.

After varying period of survival following aspiration of fresh water, the changes of lung morphology and histological evidence showed the response of lung consequent to damage of alveolar epithelium and vasculature.

The decreased lung compliance and diffuse alveolar damage appear to have resulted in reduced arterial oxygen pressure. Brain being vulnerable to hypoxia appears to have developed hypoxic encephalopathy and cytotoxic oedema. The early phase of acute respiratory distress syndrome was not associated with hypoxic cerebral oedema, but as the necrosis of alveolar epithelial cells and proliferation of pneumocytes occurred the brain showed evidence of hypoxic brain damage. Diffuse interstitial fibrosis could not be seen in any of the cases. Probably as the maximum period of survival was only 74 hours. Hyaline membrane formation could not be made out even though there
was necrosis of pneumocytes. The absence of microatelectasis in histologic studies suggests an absence of surfactant deficiency.

**CONCLUSION**

The understanding of various patho-physiology of secondary drowning helps in deciding the proper ventilator strategies for a better prognosis. Volume and pressure modes of mechanical ventilation may have a difference in patient outcome. The non fatal cases of drowning can present with varying grades of hypoxic brain damage that may result in residual neurological deficit or a total vegetative existence.

**Conflicts of Interest:** Nil

**Source of Funding:** Nil

**Ethical Clearance:** Obtained

**REFERENCES**

A Profile of Abdominal Injuries in a Tertiary Care Hospital

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ABSTRACT

Abdominal organs are injured in various forms of trauma. Present study was designed with an aim to study the pattern and type of abdominal injuries and to identify the risk organs in abdomen susceptible to trauma among the medico-legal autopsies at the referral center in north Karnataka during the period of four year (n = 100). Males constituted 82% of the cases. The cause of trauma was Road Traffic Accident in 68%. Majority (40%) of victims were pedestrians. Liver (26%) was the most common organ injured followed by spleen in 17% cases. Hemorrhagic shock (55%) was the most common cause of death. Autopsy can play an important role in establishing the abdominal organ injuries and be helpful to widen the knowledge of the medical faculty in early diagnosis and management of such injuries. It also helps the law enforcement authorities by providing accurate cause of death.

Keywords: Abdominal injuries; Road traffic accident; Autopsy; Karnataka

INTRODUCTION

Majority of vital organs are in the abdominal cavity and trauma to this part of the body will challenge the viability of the individual.¹ Due to soft and yielding nature of the abdominal wall, application of even a heavy force may not cause any external wound on the abdominal wall but the transmitted force may cause serious internal wound.² By virtue of its size and anatomical location it is the major site of trauma in road traffic accident (RTA).³ Careful clinical examination of the patient is a vital part of identification of a specific abdominal organ injury than the investigations. The injury or death produced in such case is unnatural in nature therefore they are treated as medicolegal cases. The medicolegal case need to be solved properly because it has many components like compensation, insurance claim etc. therefore it become necessary to establish exact cause of death. As the number of vehicles and transportation is increasing in this modern world the incidence of RTA and the intra-abdominal injury from blunt trauma continues to rise to a large extent. There is a paucity of research in this part of India regards to abdominal injuries. Thus the study is designed to know the pattern of abdominal injuries to the victims who were brought to the tertiary care hospital. To know the high risk organs injured in abdominal trauma. This will help the clinician to concentrate on early diagnosis and effective treatment.

MATERIALS & METHOD

Total 100 cases autopsied at district government hospital with abdominal trauma were selected retrospectively. The cases were selected from 1st Jan 2010 to 30th Dec 2014 for the period of four years. All the cases showing abdominal injury were included in the study. All other cases where the nature of injury is not made out, decomposed, dismembered and mutilated bodies are excluded. The details recorded in the postmortem report were critically analyzed according to the age, sex, type of accident, type of victim, organs injured, nature of injury and the cause of death etc. The findings were recorded separately, tabulated and subjected to statistical analysis using SPSS version 17.0. The following results were obtained.
RESULTS

Among a total of 100 autopsies analyzed in the study period, 68 were RTA, 22 were fall and 10 other mechanical traumatic causes. It was observed that most (82%) of the victims were males while females comprised of 18% cases. Majority of the victims (28%) belonged to the age group 21 to 30 years. The age group of 31 to 40 years comprised of 26% and 41 to 50 years group contained 14% cases. Among the victims children below 10 years were 3% while only 6% of the victims belonged to the group of more than 60 years. [Table 1]

The cause of trauma and distribution with respect to age and sex is shown in Table 1. Most of the abdominal injuries (68%) were due to RTA. Injury to the abdominal organs was evident in 22% of fall and 10% the cases which are unclassified.

The type of victims in abdominal injuries is shown in Table 2. Majority (40%) of victims were pedestrians followed by bike rider (24%), pillion rider (11%), and car driver (10%) respectively. Only 5% of abdominal injuries were noted in bicycle riders which are the least one.

Table 2 describe about the vital organs injured in a case of abdominal trauma. Liver was the most commonly (26%) injured organ followed by spleen (17%), right kidney (14%), left kidney (11%) and small intestine (10%). Stomach injuries were noted only in 2% of cases, which is the least common injured organ among the abdominal organs.

Table 2 gives details regarding the cause of death in cases of abdominal trauma. Hemorrhagic (hypovolemic) shock is the leading (55%) cause of death followed by septicemia (24%), renal failure (12%) and peritonitis (9%).

DISCUSSION

Death or severe injuries caused as a result of abdominal injuries are common. Most of the fatalities involving this region are due to RTAs. The distribution of abdominal injuries in present study is similar to that shown by other studies. In the northern part of Karnataka, vehicular accidents are the most common cause of abdominal injury because of faulty roads, poor public transport vehicles, overcrowding on the roads and of course the uncontrolled speed. Many vehicles using improper lighting like poor head lamps, unnecessary use of high beam in the city limits, parking on the road without parking lights is increasing the incidence of RTA.

The most involved age of 21–30 years may lead more active life and are at the peak of their creativity having the tendency to take risks, thereby subjecting themselves to the dangers of accidents and injuries. The findings are similar to other Indian studies. Involvement of the economically productive age groups causes a serious economic loss to the community. Males were predominantly involved in the present study with male: female ratio of 5:1. The fact that males are usually the earning members of the families makes them more mobile and thus, vulnerable to the accidents. Many studies conducted in rural India have shown similar results.

Among the causes of abdominal trauma, RTA contributed to 68% of cases. RTA as the common cause of abdominal injuries was also shown by other studies in rural India. RTA remains the commonest cause of blunt abdominal injury worldwide. There were 22 cases of fall from a height in present study. Very few of them had used any safety measures. This necessitates the awareness to the public regarding the use of safety measures during those dangerous works.

Among victims, most of them (40%) are pedestrians. Similar findings of higher incidence of abdominal trauma among pedestrians has been reported. The next common in the group were bike riders comprising 24% of cases. The increased prevalence of motorcyclist’s involvement could be due to high speed impacts and lack of body restraints. It necessitates the proper awareness and education to the public regarding the hazards of RTA. The improperly maintained roads like narrow roads, ditches, crowding in the highways need to be properly monitored.

In the present study, liver was the most commonly injured organ constituting of 26% cases. Similar results were observed in other studies of India origin. The extreme vulnerability of liver to be injured by trauma can be attributed to its large size, fixed position and its inelasticity. Spleen was the second most common (17%) injured organ besides liver. Stomach was injured in 2% cases. The low incidence can be explained by the well protected position behind the left lobe of liver and lower left rib cage. The thickness and strength of the
stomach wall might be the other factors. Injuries to the small intestines was in 11%. As bowel loops travel from their mesenteric attachments, involvement of mesentery is common. Injury to the colon was noticed in 9% cases. The frequencies reported by other studies are well tuned with the present study. Injuries to the kidneys were present in 25% cases. Right kidney was affected more commonly (14%) which may be due to the side of impact. The common involvement of blunt trauma and RTA to the renal injury has been shown in previous studies. Urinary bladder injuries were found in 10% cases. The incidence of bladder injury were similar with other Indian studies.

The determined most common cause of death among the abdominal trauma was hemorrhagic (hypovolemic) shock in 55% of cases. This is due to injury to the highly vascular structure like liver, spleen and kidney in the abdomen. The elasticity of the region and nature of clothing may contribute to the absence of surface injuries. The determination of the underlying cause of death is more accurate when an autopsy is performed. It is necessary to detect injuries to the internal organs not only in the field of Forensic Medicine but also with respect to emergency medical care. In the context of death after trauma, it is particularly important that an autopsy is performed in order not to underestimate the severity of the injuries and thereby underscore them.

There is a need for the forensic experts to spread awareness about the severity of the fatal abdominal injuries. The forensic experts must analyze the various fatal injuries as to their nature and the mechanism of causation with a view to help the law enforcing authorities in investigation and also to suggest preventive measures.

Table 1. Age and gender distribution of victims of abdominal injury

<table>
<thead>
<tr>
<th>Age</th>
<th>Gender</th>
<th>Type of trauma</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>F</td>
</tr>
<tr>
<td>0-10</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>11-20</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>21-30</td>
<td>22</td>
<td>6</td>
</tr>
<tr>
<td>31-40</td>
<td>21</td>
<td>5</td>
</tr>
<tr>
<td>41-50</td>
<td>11</td>
<td>3</td>
</tr>
<tr>
<td>51-60</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>61-70</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>71-80</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>81-90</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>91-100</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>82</td>
<td>18</td>
</tr>
</tbody>
</table>

Table 2. Various factors in abdominal injuries

<table>
<thead>
<tr>
<th>Factor</th>
<th>Frequency in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of victims</td>
<td></td>
</tr>
<tr>
<td>Pedestrian</td>
<td>40</td>
</tr>
<tr>
<td>Bike rider</td>
<td>24</td>
</tr>
<tr>
<td>Pillion rider</td>
<td>11</td>
</tr>
<tr>
<td>Car driver</td>
<td>10</td>
</tr>
<tr>
<td>Worker/labourer</td>
<td>10</td>
</tr>
<tr>
<td>Bicycle rider</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
<tr>
<td>Organs injured</td>
<td></td>
</tr>
<tr>
<td>Liver</td>
<td>26</td>
</tr>
<tr>
<td>Spleen</td>
<td>17</td>
</tr>
<tr>
<td>Right kidney</td>
<td>14</td>
</tr>
<tr>
<td>Left kidney</td>
<td>11</td>
</tr>
<tr>
<td>Small intestine</td>
<td>11</td>
</tr>
<tr>
<td>Bladder</td>
<td>10</td>
</tr>
<tr>
<td>Colon</td>
<td>9</td>
</tr>
<tr>
<td>Stomach</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
<tr>
<td>Cause of death</td>
<td></td>
</tr>
<tr>
<td>Haemorrhagic shock</td>
<td>55</td>
</tr>
<tr>
<td>Septicaemia</td>
<td>24</td>
</tr>
<tr>
<td>Renal failure</td>
<td>12</td>
</tr>
<tr>
<td>Peritonitis</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>

CONCLUSION

Abdominal injuries are frequent in cases of traumatic death. RTA is the prime cause of the injury to the abdominal region. Liver is the most frequently injured organ, spleen occupying the second place. Hemorrhagic shock was the most common cause of death. Post mortem examination can play a vital role in establishing all the injuries and be helpful to widen the knowledge of the medical faculty in early diagnosis and management of such injuries. The knowledge of accurate cause of death helps the law enforcement.

Conflict of Interest: None

Source of Funding: Self

Ethical Clearance: The study was approved ethically by the Institutional Ethical Committee

REFERENCES

1. Bishop M, Shoemaker W.C, Avakian S. Evaluation of a comprehensive algorithm for blunt and penetrating thoracic and abdominal trauma Am


The Effect of Age and Sex on Vitreous Humour Chemistry and Postmortem Interval (PMI)

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ABSTRACT

Vitreous humor is an inert, transparent, jelly like substance that fills the posterior four fifths of the cavity of eyeball which offers shape to the eye. Vitreous humour were collected from the eyes of 50 dead bodies (28 males and 22 females) at the Federal Medical Center Yenagoa morgue. The vitreous supernatant was analyzed for glucose, total protein, albumin, globulin, sodium, potassium, chloride, bicarbonate, urea and creatinine using WHO certified methods. SPSS 18-21 and Excel Microsoft were employed for data analysis. The level of the studied vitreous biochemical parameters were not significant (P>0.05) based on gender, age and PMI comparisons. Also, there was no correlation between PMI and genders on one hand, and PMI and age on another hand. In conclusion, it is suggestive that gender and age does not have any overt effect on PMI and studied vitreous postmortem chemistry parameters. Hence, age and gender should be a factor in forensic investigations and jurisprudence.

Keywords: Forensic Science, PMI, sex, age, vitreous humour.

INTRODUCTION

Vitreous humor, sometimes referred to as “the vitreous body” or just “vitreous”, is a transparent, jelly-like structure that accounts for four fifths of the eye volume. It serves as a mechanical buffer for the surrounding tissues, and assists in the maintenance of intraocular pressure.

Water constitutes 98-99% of the total volume of the vitreous humour (as opposed to 75% in the cornea). The viscosity of vitreous is two to four times that of pure water.

Postmortem chemistry is the biochemical analysis of body fluids or tissues obtained from dead bodies for the purpose of knowing the mechanism or cause of death. Postmortem determinations of a wide variety of substances are now technically possible in many biological fluids, including blood, vitreous humor, urine, cerebrospinal, pericardial and synovial fluids.

The increasing necessity of vitreous chemistry in forensic science has prompted the need for a study into crucial factors such as gender and age on the vitreous. It is a known fact that sex and age indeed play significant roles in blood and some other fluids biochemical parameters. Due to the significant effect of gender and age on hormonal biochemistry, difference reference ranges are now in place for an effective treatment of hormonal dysfunctions and other related medical challenge.

Vitreous humor biochemical constituents, especially potassium, have been widely used in the postmortem interval (PMI) estimations. The time dependant rise of vitreous potassium levels in the postmortem period has been considered to be helpful in PMI determinations. It is reported that the intracellular concentration of potassium is as high as 2 to 40 times the concentration of potassium within the plasma. This high intracellular concentration is maintained by a balance between the electrical charges inside and outside the cell membrane and the active metabolic forces that pump the electrolytes selectively across the membrane. A return to equilibrium occurs after death at a steady rate because the pumping mechanism is inactive and the cell wall
becomes a semi-permeable membrane that allows the potassium to leak through the membrane to approach equilibrium. The membrane leak occurs at a steady rate because of the mechanical limits of the membrane. The steady rate of potassium leak in the postmortem period provides a form of built in clock that allows a means of projecting back to the time of death and estimate the postmortem interval (PMI).

The use of postmortem vitreous potassium concentration for the PMI estimation has been limited because of the different conclusions reached by different workers and the lack of uniformity in their equations. Certain factors can account for these marked variations in the behavior of postmortem vitreous potassium. These factors have been recently classified as external and internal\(^{16}\). The external factors comprising of sampling, instrumentation and the ambient temperature of the body during the post mortem period. Others are ambient temperature, alcoholism and weight\(^{17}\). Researchers implicated ambient temperature as a factor that could affect PMI. This was similarly supported by Schoning and Strafuss\(^ {18}\). Antemortem metabolic status was another factor as stated by Madea \( et \) al\(^ {19}\). Weight impact on PMI was investigated by Crowell and Duncan\(^ {20}\). Also, Madea \( et \) al\(^ {19}\) suggested possible effects of alcohol at the moment of death on vitreous electrolyte.

The intrinsic and extrinsic effect of age on vitreous chemistry and PMI is very controversial based on the divergent views from the science world\(^ {21-25}\). The overt effects of age on the anatomy and physiology of various organs are not deniable.

The aim of the research is to critically analyze the effect of age and sex on the vitreous humour chemistry and PMI.

**MATERIAL AND METHOD**

**Study Area**

The research work was carried out at the Federal Medical Centre (FMC), Yenagoa, Bayelsa State, Nigeria. According to the 2006 census figures, Bayelsa has a population of about 1.7 million people.

**Study Population**

Vitreous humor were collected from the eyes of 50 deceased bodies at the FMC Yenagoa morgue; twenty two females and twenty eight males. The time of death and cause of death for hospital based deaths were obtained from the medical records as stated by the nurse or clinician on duty. Based on the available records in the deceased medical files the minimum age was 25 years and the maximum was 83 years. The post mortem interval (PMI) which is from time of death to the time of vitreous sample collection was 2.0 to 15 hours.

**Ethical Approval**

The experimental protocol was approved by the Ethics Committee of the Federal Medical Center, Yenagoa, Bayelsa State. Informed consent was also obtained from family representatives of the deceased before the samples were collected.

**Selection Criteria for Cadavars**

Dead bodies embalmed were excluded from the study. Contaminated samples with trace of tissues and blood were also rejected.

**Vitreous Humor Collection**

The vitreous humor samples were collected by the method of Coe\(^ {26}\). Only crystal clear liquid free from tissue contamination and fragments was used in the study.

After collection, samples were dispensed into fluoride oxalate tubes for glucose determination and plain containers for analysis of other studied parameters. Vitreous humour was centrifuged at 2050 g for 10 min and then separated for laboratory analysis.

**Laboratory Methods and Procedures**

Vitreous total protein and albumin were estimated quantitatively using biuret and bromocresol Green Methods respectively. Vitreous globulin concentration was derived by subtracting vitreous albumin from vitreous total protein. Ion selective electrode (ISE) (analyzer ISE 4000) was used for the analysis of the vitreous electrolytes: sodium, potassium, chloride and bicarbonate. Vitreous urea and creatinine were estimated using diacetyl monoxime and Jaffé methods respectively. Vitreous glucose was estimated quantitatively using glucose oxidase method.

**Statistical Analyses**

Data were analyzed with Statistical Package for Social Sciences (SPSS) program (SPSS Inc., Chicago,
RESULTS

Table1: The observed Sex Mean±SD concentrations of various vitreous humor biochemical parameters studied.

<table>
<thead>
<tr>
<th>Measured Parameters</th>
<th>nFemale</th>
<th>Female (Mean±SD)</th>
<th>nMale</th>
<th>Male (Mean±SD)</th>
<th>P-Value</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glucose (mmol/l)</td>
<td>17</td>
<td>5.5±45.0</td>
<td>23</td>
<td>4.7±1.6</td>
<td>P&gt;0.05</td>
<td>ns</td>
</tr>
<tr>
<td>Glucose (mmol/l)</td>
<td>17</td>
<td>5.5±45.0</td>
<td>23</td>
<td>4.7±1.6</td>
<td>P&gt;0.05</td>
<td>ns</td>
</tr>
<tr>
<td>Total Protein (g/l)</td>
<td>22</td>
<td>4.7±3.1</td>
<td>28</td>
<td>3.5±2.5</td>
<td>P&gt;0.05</td>
<td>ns</td>
</tr>
<tr>
<td>Albumin (g/l)</td>
<td>22</td>
<td>1.5±1.3</td>
<td>28</td>
<td>1.1±1.0</td>
<td>P&gt;0.05</td>
<td>ns</td>
</tr>
<tr>
<td>Globulin (g/l)</td>
<td>22</td>
<td>3.2±1.8</td>
<td>28</td>
<td>2.4±1.5</td>
<td>P&gt;0.05</td>
<td>ns</td>
</tr>
<tr>
<td>Sodium (mmol/l)</td>
<td>22</td>
<td>136±14</td>
<td>28</td>
<td>133±14</td>
<td>P&gt;0.05</td>
<td>ns</td>
</tr>
<tr>
<td>Potassium (mmol/l)</td>
<td>22</td>
<td>6.4±1.5</td>
<td>28</td>
<td>6.8±3.2</td>
<td>P&gt;0.05</td>
<td>ns</td>
</tr>
<tr>
<td>Chloride (mmol/l)</td>
<td>22</td>
<td>125±19</td>
<td>28</td>
<td>116±14</td>
<td>P&gt;0.05</td>
<td>ns</td>
</tr>
<tr>
<td>Bicarbonate (mmol/l)</td>
<td>22</td>
<td>11±7</td>
<td>28</td>
<td>15±5.7</td>
<td>P&gt;0.05</td>
<td>ns</td>
</tr>
<tr>
<td>Urea (mmol/l)</td>
<td>15</td>
<td>5.9±3.2</td>
<td>22</td>
<td>4.4±2.5</td>
<td>P&gt;0.05</td>
<td>ns</td>
</tr>
<tr>
<td>Creatinine (mmol/l)</td>
<td>14</td>
<td>109±28</td>
<td>26</td>
<td>98±60</td>
<td>P&gt;0.05</td>
<td>ns</td>
</tr>
</tbody>
</table>

Table 2: A comparison of Mean±SD vitreous Postmortem intervals between Age of the deceased

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Group A (Mean±SD) N=39</th>
<th>Group B (Mean±SD) N=21</th>
<th>t-test</th>
<th>P-Value</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yr)</td>
<td>40 ± 9</td>
<td>68 ± 8</td>
<td>4.5</td>
<td>P&lt;0.05</td>
<td>s</td>
</tr>
<tr>
<td>PMI (h)</td>
<td>7.1 ± 3.9</td>
<td>6.7 ± 4.2</td>
<td>0.7</td>
<td>P&gt;0.05</td>
<td>ns</td>
</tr>
</tbody>
</table>

The observed Pearson’s correlation coefficient PMIs and Age of deceases

<table>
<thead>
<tr>
<th>Parameters</th>
<th>n</th>
<th>r</th>
<th>p-value</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age Vs Group A</td>
<td>39</td>
<td>0.11</td>
<td>P&gt;0.05</td>
<td>ns</td>
</tr>
<tr>
<td>Age Vs Group B</td>
<td>21</td>
<td>0.05</td>
<td>P&gt;0.05</td>
<td>ns</td>
</tr>
</tbody>
</table>

Group A- 25-50 yr
Group B- 51-83 yrs

Table 3: A comparison of Mean±SD vitreous Postmortem intervals between gender of corpse

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Female (Mean±SD) N=22</th>
<th>Male (Mean±SD) N=26</th>
<th>t-test</th>
<th>P-value</th>
<th>comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMI (h)</td>
<td>7.0±4.1</td>
<td>6.7±4.0</td>
<td>0.40</td>
<td>P&gt;0.05</td>
<td>ns</td>
</tr>
</tbody>
</table>
DISCUSSION

The essence of the work is to look at some vital factors that can affect vitreous humour chemistry and PMI. PMI estimation is calculated or extrapolated from biochemical parameters such as potassium or to some extent hypoxanthine. These parameters have preponderance of been altered by inherent factors such as gender and age. Gender and age have been implicated in arrays of biochemical and haematological parameters. Hence, the need for critical look at the overt effect of gender and age on the vitreous humour and PMI.

BETWEEN GENDER DIFFERENCE

In chemical pathology and haematology, gender is crucial in reference range interpolation. A separate reference range is utilized in diagnosis based on the significant difference of the biomarkers involved. This is because differences do exist between males and females ante-mortem blood and other body fluids. Based on the difference, a separate reference range with peculiarity to the gender is utilized in clinical practice. In the vitreous, the biochemical parameters studied exhibited non-significant difference \( (P > 0.05) \) between female and male sexes. Hence a common range can be utilized irrespective of sex difference. The work concurs with that reported by Chandrakanth, et al. Based on the work carried out, it clear that gender have no effect on vitreous chemistry and PMI, hence common reference range is advocated.

AGE and Vitreous Humour Biochemistry

The study investigated the effect of age on the vitreous humour biochemistry. We discovered that there exit no significant difference \( (P > 0.05) \) between studied vitreous chemistry based on subjects below and above life expectancy in Nigeria. The work contrasts that of that used animal model. Gardiner et al. reported as significant difference between age and vitreous biochemistry of studied parameters. Chickens (Gallus Domesticus) was the choice animal for the work, the researchers found that concentrations of inosine, hypoxanthine, uric acid, uracil and uridine changed significantly with increasing age. The reason was based on inherent changes in metabolic rates with age as stated by the researchers. Crowell and Duncan studied vitreous humor of dogs and observed greater variation of potassium in the younger age group than the older dogs as against what we observed using animal model. The investigators explained the variation might be due to the smaller globe of younger dogs, which posed difficulties in vitreous aspiration and may have led to contamination of the sample with aqueous fluid or blood. Some researcher also suggested that age influenced postmortem vitreous potassium concentrations. This may be attributed to the smaller globe diameter of the infants than the adults.

However, the study concurred with that of Anna and Allison that stated that the vitreous humour remain fairly constant throughout life.

PMI and AGE

Difference reference ranges are sometime utilized in pediatrics and geriatrics. The same is applied in drug administration and effective clinical management. Hence such was introduced in postmortem chemistry so as to ensure result stand test of time in the court of law. However, the study showed a weak correlation \( (r = 0.11) \) between age and PMI. This means that age does not have similar pattern or trend with PMI. The study further showed a non-significant relationship \( (p > 0.05) \) between subjects within the age range of 25-50 yr and that of 51-83 yr. PMI is known to be affected by arrays of factors a lot of factors classified as external and internal. Factors such as weight, humidity, temperature and diseases have been implicated to have overt effect on PMI. However, from the study carried out, it is explicit that age does not have effect and PMI, hence such should be discarded in decision making in the postmortem interval estimation.

Source of Funding- Self

Conflict of Interest- Nil

REFERENCES


Fatal Aluminium Phosphide Poisonings in Nagamangala Taluq - A Retrospective Study

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ABSTRACT

Introduction: Toxicology deals with the study of symptoms, signs and mechanisms, treatments, postmortem appearances, detection and estimation of poisoning etc.

Materials and method: In this retrospective study, all the poisoning cases subjected to postmortem during the period 1st January 2011 to 31st December 2015 were analyzed at the department of Forensic medicine and Toxicology, Adichunchanagiri institute of medical sciences (AIMS), Nagamangala taluq.

Results: In the current study, Aluminium phosphide poisoning accounted for 49 cases of the total number of deaths from all other poisoning fatalities.

Discussions: On analysis of the present study, a total number of 186 cases were autopsied during the 5 year study period undertaken, indicating the incidence of increasing trend in suicidal poisoning deaths particularly among the rural farming community.

Conclusion: To improve the prognosis, effective management strategies and protocols should be implemented both at government and private hospitals so that there should not be any delay in managing the patients of poisoning.

Keywords: Toxicology, rural area, aluminium phosphide.

INTRODUCTION

Toxicology is the study of adverse effects of chemicals on living organisms. Toxicology deals with the study of symptoms, signs and mechanisms, treatments, postmortem appearances, detection of poisoning etc. Poisoning is an important cause of mortality and morbidity worldwide. According to WHO, 22000 deaths occur yearly out of the 3 million pesticide poisoning cases reported. About 99% of these deaths occur in developing and under developing countries.1

Aluminium phosphide is a lethal solid fumigant pesticide, insecticide and rodenticide which are considered as an ideal grain and tobacco preservative in India. It is a common outdoor and indoor pesticide in a developing country like India. Aluminium phosphide is a restricted use pesticide (RUP) in India. Today, it is emerging as a common cause of suicidal and sometimes accidental poisoning deaths in Northern India. Due to its cheap availability and effectiveness coupled with prevalence of illiteracy and frustration owing to non-availability of avenues for generation of income, the agricultural community is at more risk. In general, accidental poisonings are more common in young adults and children, whereas suicidal poisoning is more common among young adults.2

MATERIALS AND METHOD

In this retrospective study, all the poisonous cases that were autopsied from the date of 1st January 2011
to 31st December 2015 were analysed at the department of Forensic Medicine and Toxicology, AIMS, Nagamangala taluq.

Inclusion criteria:

Autopsied cases of confirmed aluminium phosphide poisoning and other poisoning cases. (After confirmatory report of blood and visceral samples from Forensic science laboratory).

Exclusion criteria:

Autopsied cases other than poisoning deaths including all unnatural deaths.

RESULTS

In the present study, Aluminium phosphide poisonings accounted for 49 cases among the total number of deaths excluding all other poisoning deaths. Thus it is emerging as the frequent and common cause of poisoning deaths after Organophosphorous compound poisoning deaths.

TABLE 1: Distribution of autopsied poisoning cases:

<table>
<thead>
<tr>
<th>YEAR</th>
<th>Total no. of poisoning cases.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>26</td>
</tr>
<tr>
<td>2012</td>
<td>40</td>
</tr>
<tr>
<td>2013</td>
<td>35</td>
</tr>
<tr>
<td>2014</td>
<td>42</td>
</tr>
<tr>
<td>2015</td>
<td>43</td>
</tr>
<tr>
<td>TOTAL</td>
<td>186</td>
</tr>
</tbody>
</table>

TABLE 2: Incidence of fatal ALP deaths and OP compound deat:

<table>
<thead>
<tr>
<th>YEAR</th>
<th>ALP DEATHS.</th>
<th>OP COMPOUND DEATHS.</th>
<th>OTHER POISONING DEATHS.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>03</td>
<td>17</td>
<td>03</td>
</tr>
<tr>
<td>2012</td>
<td>06</td>
<td>25</td>
<td>03</td>
</tr>
<tr>
<td>2013</td>
<td>09</td>
<td>21</td>
<td>05</td>
</tr>
<tr>
<td>2014</td>
<td>14</td>
<td>27</td>
<td>04</td>
</tr>
<tr>
<td>2015</td>
<td>17</td>
<td>28</td>
<td>04</td>
</tr>
<tr>
<td>TOTAL</td>
<td>49</td>
<td>118</td>
<td>19</td>
</tr>
</tbody>
</table>

DISCUSSION

On analysis of the present study, there were a total number of 186 poisoning cases autopsied during the 5 year study undertaken at AIMS, Nagamangala tq, indicating the increasing trend in suicidal poisoning deaths particularly among the rural farming community. On further analysis of the incidence pattern of aluminium phosphide poisoning, there is an increasing trend year-wise from 2011 to 2015 next only to OP compound deaths indicating the alarming trend of Aluminium phosphide poisoning owing to it's cheap and easy availability, absence of specific antidote, high lethality and increasing incidences of farmer suicides reported in rural areas due to many factors like crops failure, scanty rainfall, debt burden and un resolving poverty states. Males are more found to be involved in Aluminium phosphide deaths comparatively to females more so in the middle age group of 30 to 50 years, yet again highlighting the fact that that the male productive age group are more vulnerable to the suicidal tendencies with poisonings, particularly among the illiterates and in the rural areas highest among the farming community. The cause for this may vary from many problems the agricultural and farming community face leading to overt depression, suicidal thoughts and tendencies, lack of grievance redressal mechanism, all contributing to suicidal poisoning deaths in the absence of proper counseling among the affected farming community.

According to a study done by Sanjeevkumar Chaudhary, a total of 208 cases of death due to fatal poisonings were selected for their prospective study, which were brought to them for postmortem examination during the span of one year. The study took into consideration certain aspects and studied the relationship relation with age, sexual variations, the type of poison consumed, hospitalization arrival and
stay, the caste factors and studying the time elapsed between consumption of poison and death reported, were analyzed in 208 cases of poisoning. Their study concluded that Hindus constituted majority of the victims of lethal poisonings, and males who were married and of middle socio-economic status were the common population subset who died of self ingestion of known or unknown poisonous compounds. The study also noted that the Male to Female ratio in terms of poisoning fatalities was 1.36:1. In that study, pesticides and insecticides contributed to the highest number of fatal poisoning cases, whereas Aluminium phosphide is the most fatal poison according to WHO classification of poison.1

According to a study done by Boukatta Brahim4, analysis was done concerning 47 patients intoxicated by the Aluminium phosphide compound between January 2009 and December 2012. The study revealed that Aluminium phosphide poisonings comprised of 23.4% of the total number of poisonings studied. Among the age group affected, 24.5 years was the mean or the average age group and also females (63.8%) were more affected.5,6 Aluminium phosphide poisoning was seen in 95.7% of cases predominantly with suicidal intentions. 3 grams of Aluminium phosphide compound was the mean ingested quantity among the study group. The study also concluded that the presenting clinical signs and symptoms predominantly were vomiting, abdominal discomfort and pain, shock and sensorium disorders. 38.3% of the studied cases showed marked Electrocardiogram(ECG) abnormalities. Troponin7 levels were also elevated in 27.7% of cases. 36.2% of patients were intubated and ventilated and 40.4% had been placed under vasoactive drugs. The mortality rates were 38.3%. The prognostic factors noted in the study were: delay of arrival to hospital and delay in management, pre-existing metabolic and electrolyte derangements, cardiac markers like troponin and their elevated levels, deranged haemodynamics of the poisoned patients like blood pressure and heart rates, impending cardiorespiratory failure necessitating the need for airway stabilization and mechanical ventilation along with role and need of vasoactive drugs and shock.8,9

CONCLUSION

To conclude, the study mainly reveals the alarming trend of increased Aluminium phosphide deaths more so in rural regions and among the young and middle aged population. To improve the prognosis, effective management strategies and protocols should be implemented both at government and private hospitals so that there should not be any delay in managing the patients of poisoning. The Government should also give more priority and focus towards prevention and restrict and regulate Aluminium phosphide compound sales and distribution, so that Aluminium phosphide compounds are not available to general population easily.

Ethical Clearance: Taken from Institutional ethical committee.

Source of Funding: Self

Conflict of Interest: Nil

REFERENCES

Comprehensive Analysis of Fatal Poisoning Cases: An Autopsy Study

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ABSTRACT

Introduction: Poisoning is a major health problem in developing countries like India. Epidemiology of poisoning can help to take measures for prevention of poisoning.

Objective: To assess the magnitude of unnatural death due to poisoning and to determine the various parameters of poisoning such as mode and type of poisoning, relation to age and sex, vulnerable age group, religion, seasonal variation, place of occurrence and to find out the most common type of poison consumed.

Materials and method: Present study was conducted retrospectively during January 2011 to December 2011, which included 327 cases of death due to poisoning brought for postmortem examination at Department of Forensic Medicine and Toxicology, Victoria hospital, Bangalore medical college and research institute, Bengaluru. Information pertaining to sociodemography, place of occurrence of poisoning and type of poisoning etc was collected and analysis was done.

Results: Out of 3544 post mortem examinations done during study period, 9.22 % (n-327) cases were that of poisoning. We observed that majority of victims were male (66.97%, n-219) and from urban area (71.86%, n-235). Peak incidence was observed in the age group of 21-30 years (33.33%, n-109). Majority of deaths were suicidal (78.89%, n-258). Organophosphorous compound poisoning accounted in 53.53 % (n-175) cases.

Conclusion: The mortality and morbidity due to poisoning can be reduced by conducting educational programs, providing counselling services and poison information services to the needy people. Strict legal enforcement in selling and handling of agrochemicals is the need of the hour to avoid premature loss of human resource from death due to poisoning.

Keywords: Fatal, Poisoning, Autopsy, Analysis

INTRODUCTION

Poison is a substance that causes damage or injury to the body and endangers one’s life due to its exposure by means of ingestion, inhalation, or contact.1 Poisons are subtle and silent weapons, which can be easily used without violence and often without arousing suspicion.2 Poisoning is a medical emergency and a patient is always invariably rushed to the hospital at the earliest possible moment, irrespective of the amount and nature of poison ingested. All the cases of poisoning are admitted through emergency services where the safety of life of the patient is the main issue for the doctor.3 Poisoning is an important cause of morbidity

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and mortality worldwide. According to W.H.O., 3 million acute poisoning cases with 2, 20,000 deaths occur annually. Of these, 90% of poisoning occur in developing countries. Everyday around the world, almost 700 people die from poisoning and for every person that dies, several thousands more affected by poisoning. Poisoning is the fourth common cause of mortality in India. Organophosphorus compounds cause most common suicidal deaths in southern, central India. In north India, aluminium phosphide causes most deaths. The autopsy in a suspected case of poisoning can be one of the most difficult problems faced by a forensic pathologist, not in technical procedure of the examination but in the final evaluation of all the available information. Considerable proportion of those died from suspected poisoning would have died in hospitals and it is of prime importance that the medical records be obtained and studied before the autopsy begins. Pattern of poisoning in a region depends on various factors which include availability and access to the poison, socioeconomic status of an individual, cultural and religious influence. A detailed knowledge about the nature and magnitude of the poisoning cases in a particular area is not only important for early diagnosis and prompt treatment but also is essential for introducing the new and evaluating the old preventive measures.

AIMS AND OBJECTIVES

To assess the magnitude of unnatural death due to poisoning and to determine the various parameters of poisoning such as mode and type of poisoning, relation to age and sex, vulnerable age group, religion, seasonal variation, place of occurrence and to find out the most common type of poison consumed.

MATERIALS AND METHOD

Present study was conducted retrospectively during January 2011 to December 2011, which included 327 cases of death due to poisoning brought for postmortem examination at Department of Forensic Medicine and Toxicology, Victoria hospital, Bangalore medical college and research institute, Bengaluru. Information pertaining to sociodemography, place of occurrence of poisoning, background causes of poisoning and type of poisoning etc was collected from Post mortem report, Police inquest and treatment history, if any using a predesigned proforma. These data was reduced to tables and subsequently subjected to statistical analysis and conclusions were drawn after comparing and discussing with similar type of work carried out by many scholars. Cases of animal bite (Snake bite, insect bite etc) were not included in the study.

OBSERVATIONS AND RESULTS

Total 3544 post mortem examinations were carried out during the study period. In the present study the proportion of death due to poisoning was estimated to be 9.22% (n-327).

Table No 1. Sex wise distribution of cases

<table>
<thead>
<tr>
<th>Sex</th>
<th>No. of cases (n)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>219</td>
<td>66.97%</td>
</tr>
<tr>
<td>Female</td>
<td>108</td>
<td>33.03%</td>
</tr>
<tr>
<td>Total</td>
<td>327</td>
<td>100%</td>
</tr>
</tbody>
</table>

66.97% (n-219) were males and 33.03% (n-108) were females. The male-female ratio is 2.02:1 in our study.

Table No 2. Age wise distribution of cases

<table>
<thead>
<tr>
<th>Age</th>
<th>No. of cases (n)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 10 yrs</td>
<td>07</td>
<td>2.14%</td>
</tr>
<tr>
<td>11- 20 yrs</td>
<td>36</td>
<td>11.01%</td>
</tr>
<tr>
<td>21- 30 yrs</td>
<td>109</td>
<td>33.33%</td>
</tr>
<tr>
<td>31- 40 yrs</td>
<td>77</td>
<td>23.54%</td>
</tr>
<tr>
<td>41- 50 yrs</td>
<td>48</td>
<td>14.68%</td>
</tr>
<tr>
<td>51- 60 yrs</td>
<td>28</td>
<td>8.56%</td>
</tr>
<tr>
<td>61- 70 yrs</td>
<td>18</td>
<td>5.50%</td>
</tr>
<tr>
<td>71- 80 yrs</td>
<td>02</td>
<td>0.62%</td>
</tr>
<tr>
<td>&gt;80 yrs</td>
<td>02</td>
<td>0.62%</td>
</tr>
<tr>
<td>Total</td>
<td>327</td>
<td>100%</td>
</tr>
</tbody>
</table>

The age ranged from < 10 years to > 80 years. Fatal poisoning were seen most commonly in the 21-30 years age group (33.33%, n-109) followed by 31-40 years age group (23.54%, n-77), while rarely observed in the oldest and youngest age group.

Regarding the religion, in our study Hindus (88.39%, n-289) outnumbered than Muslims (7.65%, n-25). 3.06% (n-10) cases were Christians, religion was not known in 0.90% (n-3) of cases.

Urban habitats were found in 71.86% (n-235) of
cases. Rural habitats were found in 28.14% (n-92) of cases.

Maximum number of poisoning cases were observed in the month of March (10.70%, n-35) followed by the month of September (10.09%, n-33). In the month of January 9.78% (n-32) cases were observed, 9.48% (n-31) of cases were observed in the December month. Only 3.69% (n-12) cases were observed in the month of July.

78.89% (n-258) of cases of death due to poisoning were suicidal in nature followed by 12.84% (n-42) cases were accidental in nature. Only 0.62% (n-2) cases were homicidal in nature. Manner of death was not known in 7.65% (n-25) of cases.

Table No 3. Distribution of cases based on Place of occurrence

<table>
<thead>
<tr>
<th>Place of occurrence</th>
<th>No. of cases (n)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residence</td>
<td>247</td>
<td>75.58 %</td>
</tr>
<tr>
<td>Street</td>
<td>43</td>
<td>13.14 %</td>
</tr>
<tr>
<td>Field</td>
<td>13</td>
<td>3.97 %</td>
</tr>
<tr>
<td>Lodge/ Hotel</td>
<td>05</td>
<td>1.52 %</td>
</tr>
<tr>
<td>Factory/ Office</td>
<td>05</td>
<td>1.52 %</td>
</tr>
<tr>
<td>Other indoor</td>
<td>02</td>
<td>0.61 %</td>
</tr>
<tr>
<td>Other outdoor</td>
<td>04</td>
<td>1.22 %</td>
</tr>
<tr>
<td>Not Known</td>
<td>08</td>
<td>2.44 %</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>327</td>
<td><strong>100 %</strong></td>
</tr>
</tbody>
</table>

Regarding the place of occurrence of the event of poisoning, it was reflected from analysis that in 75.58% (n-247) of cases the event of poisoning was happened to take place with in the residential premises.

Table No 4. Distribution of cases according to background causes of poisoning

<table>
<thead>
<tr>
<th>Causes</th>
<th>No. of cases (n)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic disease</td>
<td>86</td>
<td>26.29 %</td>
</tr>
<tr>
<td>Depression</td>
<td>55</td>
<td>16.84 %</td>
</tr>
<tr>
<td>Credit</td>
<td>32</td>
<td>9.79 %</td>
</tr>
<tr>
<td>Quarrel</td>
<td>17</td>
<td>5.19 %</td>
</tr>
<tr>
<td>Death of relative</td>
<td>09</td>
<td>2.75 %</td>
</tr>
<tr>
<td>Failure in exams</td>
<td>08</td>
<td>2.44 %</td>
</tr>
<tr>
<td>Torture by husband</td>
<td>08</td>
<td>2.44 %</td>
</tr>
<tr>
<td>Others</td>
<td>29</td>
<td>8.87 %</td>
</tr>
<tr>
<td>Unknown</td>
<td>83</td>
<td>25.39 %</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>327</td>
<td><strong>100 %</strong></td>
</tr>
</tbody>
</table>

Regarding background causes of poisoning, chronic disease was noted in 26.29% (n-86) of cases followed by depression observed in 16.84% (n-55) of cases.

Table No 5. Distribution of poisoning cases according type of poison consumed confirmed by FSL (Forensic Science Laboratory) Report

<table>
<thead>
<tr>
<th>FSL report- Name of Poison</th>
<th>No. of cases (n)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organophosphorus compound</td>
<td>175</td>
<td>53.53 %</td>
</tr>
<tr>
<td>Aluminium Phosphide</td>
<td>49</td>
<td>14.98 %</td>
</tr>
<tr>
<td>Alcohol</td>
<td>18</td>
<td>5.52 %</td>
</tr>
<tr>
<td>Alcohol + Organophosphorous compound</td>
<td>16</td>
<td>4.89 %</td>
</tr>
<tr>
<td>Corrosive</td>
<td>07</td>
<td>2.14 %</td>
</tr>
<tr>
<td>Carbon monoxide</td>
<td>04</td>
<td>1.22 %</td>
</tr>
<tr>
<td>Print Ink</td>
<td>04</td>
<td>1.22 %</td>
</tr>
<tr>
<td>Kerosene</td>
<td>02</td>
<td>0.61 %</td>
</tr>
<tr>
<td>Succinyl choline</td>
<td>04</td>
<td>1.22 %</td>
</tr>
<tr>
<td>No Poison</td>
<td>48</td>
<td>14.67 %</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>327</td>
<td><strong>100 %</strong></td>
</tr>
</tbody>
</table>

Regarding type of poison, organophosphorous compound poisoning (53.53%, n-175) accounts to maximum number of poisoning cases followed by aluminium phosphide (14.98%, n-49).

**DISCUSSION**

Total 3544 post mortem examinations were carried out during the study period. In the present study the proportion of death due to poisoning was estimated to be 9.22% (n-327) with concurrence to the observation of 8.9% made by Kumar A et al\(^{11}\) and 9.8% made by Fedakar R et al\(^{12}\), while Dhattarwal SK et al\(^{13}\) exhibited higher incidence of death due to poisoning (23.42%). The lower proportion of poisoning in the present study area constituted of a relatively more of urban than rural population with a high literacy rate in the urban population. In the present study, poisoning death cases were higher in males (66.97%, n-219) than female deaths (33.03%, n-108) which was also supported by previous studies like Batra AK et al\(^{14}\), Maharani B et al\(^{15}\), Fedakar R et al\(^{16}\), McDowell R et al (68.9%).\(^{17}\) However Naveen N et al\(^{17}\) observed that majority (55.60%) were females. In our study the male...
to female ratio is 2.02:1. However, female dominance with sex ratio of 1:1.4 was reported in the studies from north India and Leeds.

Most of the victims were in the 21-30 years age group (33.33%, n=109) followed by 31-40 years age group (23.54%, n=77), similar to studies done in other parts of the country and abroad, for being the most active phase of life socially, physically and mentally. With regards to the religion of the victims, Hindus (88.39%, n=289) were the commonly affected ones followed by Muslims (7.65%, n=25) and Christians (3.06%, n=10). In India, majority of the population follows Hinduism and a similar religion based distribution is observed in different regions of India. The findings are similar to studies done elsewhere in India. Maximum numbers of cases were observed in urban area (71.86%, n=235) as compared to rural area (28.14%, n=92) which was consistent with other studies. Maximum numbers of poisoning cases were observed in the month of March (10.70%, n=35) followed by September month (10.09%, n=33). Water scarcity during summer leads to crop failure and financial loses which indirectly increases the incidence of suicide. And also grains are preserved during summer season for which pesticides are procured that increases the availability of poison and indirectly it leads to rise in the incidence during the summer.

Place of poison consumption was mostly at residential premises (75.58%, n=247), similar to that reported in an earlier study by Mohanty et al. This study shows that most of the cases were suicidal deaths (78.89%, n=258). The findings are similar to other studies. This inference of manner of death is based on history given either by police or relatives. We tend to believe history because when person is claiming that death is due to suicide, he has nothing to hide, but when he claims that death may be due to accident, he may be having a motive to hide something. Easy availability of poisons made them easy victim also. Chronic disease (26.29%, n=86) followed by depression (16.84%, n=55) were the most common background causes of poisoning observed in our study.

Most of the authors have studied the incidence of poisoning according to the history given to them by police officers, relatives of the victim and by medical case papers. while in present study we have scientifically and accurately calculated the incidence of poisoning according to the nature of poison after the chemical analysis that most common poison was organophosphorus compound (53.53%, n=175). Like in present study, in most of the other studies, organophosphorous compounds were most commonly used poison. In some other studies, aluminium phosphide was reported as commonest poison followed by organophosphorous compound.

CONCLUSION

Poisoning has become major cause for morbidity and mortality in India. 9.22% of total autopsies were due to poisoning. Males being the common victims in the age group of 21-30 years. Majority were Hindus living in urban area.majority had contact with poison at their residence. Poisoning was suicidal in majority of cases due to chronic disease, depression etc. they had consumed organophosphorous insecticide, rodenticides which was confirmed by Forensic Science Laboratory report. The mortality and morbidity due to poisoning can be reduced by conducting educational programs, providing counselling services and poison information services to the needy people. Strict legal enforcement in selling and handling of agrochemicals is the need of the hour to avoid premature loss of human resource from death due to poisoning.

Acknowledgement: Nil

Source of Support: Nil

Conflict of Interest: None Declared

Ethical Clearance: Not applicable

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Evaluation of Pericardial Enzymes Activity to Detect the Time Since Death in Patan Region of North Gujarat

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ABSTRACT

Determination of time of death is a critical step in most homicide or un-witnessed death investigation. However, the various methods currently used in estimating PMI yield large post-mortem windows and sometimes contradict one another. Pericardial enzyme is the useful biochemical markers to evaluate the postmortem interval. According to previous study, many authors have demonstrated the high significant relationship between the time since death and various body fluids in human.

Present study is carried out to detect the significant biochemical markers which are helpful to detect the postmortem time interval after death from pericardial fluid. Analysis of pericardial fluid from 90 subjects shows that the enzymes activity of creatinine phosphokinase, Gamma glutamyl transferase, Amylase and lactate dehydrogenase has statistically significant (p<0.0001) and it’s positively correlate to postmortem interval up to 36 hours of death.

Keywords: creatinine phosphokinase, amylase, Lactate dehydrogenase, GGT, time of death, postmortem intervals

INTRODUCTION

Post-mortem interval (PMI) or time of death is a critical step in most homicide or un-witnessed death investigations (including hospital deaths) and remains one of the most challenging variables to quantify and establish. PMI determination not only establishes how long a person has been deceased but also assists in distinguishing ante-mortem pathology from post-mortem artifact. The accurate determination of PMI is essential for including and excluding suspects based on their whereabouts at the time of death and helps to provide a timeframe in which remains decomposed beyond recognition might be connected with missing persons.

Of the current results published for PMI determination, the majority can be divided into two main categories: those related to the early post-mortem period and those related to the late post-mortem period.

Many physico-chemical changes begin to take place in the body immediately after death and progress sequentially until the body completely decomposes. Till date, series of physio-chemical changes which occurs in a dead body forms the basis for estimating time since death. Among the physical changes livor mortis, algor mortis and rigor mortis etc. even if affected by numerous factors, works satisfactorily in the estimation of early post-mortem period. After this period or when above mentioned changes are in contradiction, thanatochemistry of body fluids is the only tool perhaps left for the estimation of time of death of the deceased. Most often investigated body fluids for the purpose are the blood, vitreous humour and cerebrospinal fluids. These fluids though modulated by various factors have shown changes in concentration of their electrolytes and enzymes activities proportional to the postmortem interval.

Many workers have demonstrated that the postmortem changes in the activities of various enzymes in different body fluids are significantly affected by the environmental conditions in which a dead body was found lying. These Environmental conditions are different in this part of India in comparison to where these studies were carried out. As hardly any data exists regarding postmortem changes
in the activities of various enzymes in the pericardial fluid and the present worker had already demonstrated an encouraging results in respect of changes in the levels of pericardial enzymes in relation to time since death.

Present study is attempt to get the proper significant markers which helpful to detect the time since death through the activity of pericardial enzyme.

METHOD & MATERIALS

With the valid consent, pericardial fluid was obtain from 90 subjects between the age of 15 to 65 years (67 males,23 females) who were admitted and died because of various causes (57 trauma, 31 burn, 12 poisoning) at Gujarat Medical Education and Research Society, Dharpur, Patan and on whom time since death given by the department of forensic medicine. Under an aseptic condition, thoracic cavity was opened by removing the sternum. The pericardium was carefully opened with a pair of clean scissors taking the precaution of avoiding any contamination of pericardial fluid. The sample was aspirated by using a clean sterile 10cc glass vial. The samples were estimate for Lactate dehydrogenase, creatinine phosphokinase and gamma-glutamyl transferase through UV-kinetic method (IFCC assay method) by using auto analyzer and amylase was done by Amyloclastic method.

In the present study we include the subjects cause, mode and time of death. Subject with metabolic disorder, electrolyte imbalance, on diuretics or any other particular matter in pericardial fluid or pericardial pathology were exclude from the study.

The data thus collected was analyzed statistically and efforts were made to correlate the changes in the activities of various enzymes not only with time since death but also correlate with postmortem interval, age, mode of death, seasonal variation and gender.

RESULTS & OBSERVATION

Table 1: Relationship between the Time since death & Enzyme Activity

<table>
<thead>
<tr>
<th>Enzyme Activity</th>
<th>Time since death(hrs)</th>
<th>12-24.0</th>
<th>24-36.0</th>
<th>36-48.0</th>
<th>48-60.0</th>
<th>P-value</th>
<th>Correlation coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>GGT</td>
<td>&lt;12.0</td>
<td>197.47±55.12</td>
<td>236.06±56.54</td>
<td>240.28±72.6</td>
<td>159.54±25.70</td>
<td>158.56±30.63</td>
<td>.000**</td>
</tr>
<tr>
<td>CPK</td>
<td>&lt;12.0</td>
<td>2485.20±701.99</td>
<td>3049.35±714.12</td>
<td>3473.67±588.57</td>
<td>3222.70±351.30</td>
<td>2686.88±613.95</td>
<td>.000**</td>
</tr>
<tr>
<td>LDH</td>
<td>&lt;12.0</td>
<td>2508.43±845.17</td>
<td>3807.32±719.43</td>
<td>4030.98±507.59</td>
<td>3691.18±491.47</td>
<td>3242.67±301.25</td>
<td>.000**</td>
</tr>
<tr>
<td>Amylase</td>
<td>&lt;12.0</td>
<td>2546.16±568.46</td>
<td>3369.19±779.60</td>
<td>3812.80±637.33</td>
<td>3466.23±828.04</td>
<td>1976.04±809.63</td>
<td>.000**</td>
</tr>
</tbody>
</table>

Table no. 1:From above plotted graph it’s interpreted that rate of all the above enzyme was more in first 12 hours and then level off to a more gradual rate of increased up to 36hours of death and then decreased. This change in activities were found to be statistically highly significant (p<0.01).
Table 2: Co-relations between Causes of death with enzymes activity

<table>
<thead>
<tr>
<th>Cause of death</th>
<th>Enzymes activities</th>
<th>'P' Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GGT</td>
<td>CPK</td>
</tr>
<tr>
<td>Trauma (n=57)</td>
<td>217.87±62.65</td>
<td>3051±767.58</td>
</tr>
<tr>
<td>Burn (n=31)</td>
<td>200.61±50.17</td>
<td>3170.6±616.24</td>
</tr>
<tr>
<td>Poison (n=12)</td>
<td>287.87±65.00</td>
<td>3155.71±614.0</td>
</tr>
</tbody>
</table>

Table 2: depicts that above mention all the enzymes activities were more in those who died due to poisoning followed by due to burns and trauma.

Table 3: Relationship between activity of enzymes and age group

<table>
<thead>
<tr>
<th>Activity of enzyme</th>
<th>&lt;18 (N=18)</th>
<th>18-60 (N=57)</th>
<th>&gt;65 (N=15)</th>
<th>'P' Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>GGT</td>
<td>252.34±54.13</td>
<td>220.04±66.00</td>
<td>211.75±60.25</td>
<td>.19</td>
</tr>
<tr>
<td>LDH</td>
<td>3760.6±849.22</td>
<td>3638.12±819.78</td>
<td>3698.27±785.03</td>
<td>.85</td>
</tr>
<tr>
<td>CPK</td>
<td>3074.89±535.56</td>
<td>3092.77±752.13</td>
<td>3066.63±585.91</td>
<td>.99</td>
</tr>
<tr>
<td>Amylase</td>
<td>3798.57±1085.13</td>
<td>3276.92±836.90</td>
<td>3297.20±800.92</td>
<td>.12</td>
</tr>
</tbody>
</table>

Table 3: According to result of table 3 enzymatic activity of gamma glutamyl transferase was more in the subjects <18 years followed by in the age group 18-60 and >60 years. Whereas that of LDH and amylase were more in the subjects <18 years followed by in the >60 and 18-60 years. CPK has not gross change in different age group.

**DISCUSSION**

Advantage of pericardial fluid over vitreous humour and cerebrospinal fluid is the availability of the easily obtainable in reasonable large volume and over blood is that it is less prone to microbial contamination and bacterial degradation, hence allowing a large number of tests to be conducted on each specimen with few restrictions because of the volume of fluid available. Observation of present study that significant changes occurs in the pericardial enzymes activities proportional to time of death was as reported by others. Luna shows that creatinine kinase is enzymes pattern provides significant information of cardiac status of the deceased. Akoi reported a correlation between the postmortem interval and glutamate oxaloacetic transaminase and glutamate pyruvate transaminase. Balasooriya et al demonstrated a significant increase in the pericardial enzymes viz alanine aminotransferase, gamma glutamyltransferase, hydroxybutyric dehydrogenase, alkaline phosphatase, glutamate oxaloacetic transaminase, creatinine phosphokinase concentration with an increasing time of death. The greatest rise were seen in the levels of creatinine phosphokinase while the smallest rate of rise was seen in gamma glutamyl transferase. Gurumukhi et al had observed a significant rise in the pericardial Alanine transaminase proportional to time since death. Variations in rate of activities of investigated enzymes than as reported by Others. Arroya et al had also found no significant difference in biochemical composition in pericardial fluid of natural or violent deaths although apprehended, no literature was available to the authors to discuss the role of environmental temperature on postmortem pericardial enzyme activities. It could be due to that mean temperature in both climates observed was different from the reported ambient temperature favoring the process of decomposition. Therefore decomposition of body was possibly at different rate, resulting in variations of these enzyme activities in hot and cold climatic conditions.
Similarly, gender was reported to have no major role to play in the process of putrefaction and could be the reason that a change in pericardial enzyme activities was found statistically insignificant between the genders in the present study.

CONCLUSION

According to our present study we conclude that rate of activities of all the above enzymes is more in first 12 hours and then level off to a more gradual rate of increase up to 36 hours of death and then decreased. This change in activities is found to be statistically highly significant (0.0001).

Funding: Self

Conflict of Interest: None.

Ethical committee permission: Taken from respected institute.

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Profile of Assault Cases at a Tertiary Care Hospital in North Karnataka

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ABSTRACT

Assault forms an inevitable part of medicolegal cases of a hospital casualty department. The attending doctor who provides medical care to victims of assault cases should be aware of proper handling of such cases. The present retrospective study of assault cases was carried out at a tertiary care centre in North Karnataka. The study revealed that most of the patients were males, individuals aged 21-30 yrs were more commonly injured, injury by blunt weapon was the commonest, injuries to the head and neck region (including face) were the most, contusion was the commonest injury, 18.00-23.59 hrs was the commonest period of assault, most of the patient were treated on inpatient basis and majority of the injuries were nonfatal.

Keywords: Assault; Blunt weapon; Contusion.

INTRODUCTION

Medicolegal cases are part of the doctor’s practice. A medico-legal case is any case where the attending registered medical practitioners, after eliciting history and examining the person, thinks that some investigation by law enforcement agencies is essential to establish and fix responsibility for the case in accordance with the law of the land. Assault is one among the various types of medicolegal cases which we encounter apart from road traffic accident, poisoning, assault, burns, animal bite, hanging etc. An assault according to Indian law is defined as whoever makes any gesture, or any preparation intending or knowing it to be likely that such gesture or preparation will cause any person present to apprehend that he who makes that gesture or preparation is about to use criminal force to that person, is said to commit an assault. By the definition it is clear that just an attempt to injure someone will fit into an assault according to law. An assault put into action is called battery, where the person is injured. Those who seek medical care would have sustained some kind of body injury. Proper documentation of the injury by the doctor is essential as the doctor has to issue a wound certificate at a later date and may be summoned to testify in the court. The present retrospective study of assault cases is carried out at a tertiary care centre in Karnataka to know the profile of assault cases including pattern of injuries in such victims.

MATERIALS AND METHOD

A retrospective study was carried out at SDM Medical College, Dharwad by obtaining information of assault cases from the medicolegal register. The study included patients who visited the hospital during January 2015 to December 2015. Details regarding the age and sex of the individual, type of weapon used, anatomical location of the injury, type of injury, time of assault, admission pattern, prognosis of the individual were recorded from medicolegal register and case paper of the patient in prestructured Performa. The details obtained were tabulated and analysed.

RESULTS

In the study period a total of 73 assault cases attended the hospital for medical care. Among 73 patients males formed 82.19 % of cases and females...
formed 17.81% of cases (Table 1). Majority of the patients were in the age group of 21-30 years, followed by 31-40 years (Table 2). No patients were below 10 years. In most cases (65.75%) blunt weapon was used for assault followed by human body parts in 18.11% of cases (Table 3). The most common anatomical site of injury was head and neck (including face) in 50.82 % cases followed by upper limbs in 25.41% cases (Table 4). Least common site of injury was lower limbs in 5.74%. Contusion (50.82%) was the most common type of injury followed by abrasion and laceration (Table 4). In majority (56.16%) cases assault took place between 18.00 hrs to 23.59 hrs, followed by 06.00 hrs to 11.59 hrs (Table 5). Most individuals were inpatient (71.23%) and rest took treatment on outpatient basis (Table 6). Only one patient succumbed to injury in the hospital due to assault (Table 7).

Table 1: Gender wise distribution of cases

<table>
<thead>
<tr>
<th>SEX</th>
<th>MALES</th>
<th>FEMALES</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO OF CASE</td>
<td>60 (82.19%)</td>
<td>13 (17.81%)</td>
</tr>
</tbody>
</table>

Table 2: Distribution of cases according to age

<table>
<thead>
<tr>
<th>AGE RANGE</th>
<th>NO OF CASE</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>11-20</td>
<td>5</td>
<td>06.85</td>
</tr>
<tr>
<td>21-30</td>
<td>26</td>
<td>35.62</td>
</tr>
<tr>
<td>31-40</td>
<td>18</td>
<td>24.66</td>
</tr>
<tr>
<td>41-50</td>
<td>10</td>
<td>13.70</td>
</tr>
<tr>
<td>51-60</td>
<td>9</td>
<td>12.33</td>
</tr>
<tr>
<td>&gt;61</td>
<td>5</td>
<td>06.85</td>
</tr>
<tr>
<td>TOTAL</td>
<td>73</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Table 3: Distribution of cases based on prime weapon used

<table>
<thead>
<tr>
<th>Type of weapon</th>
<th>No of cases</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blunt weapon</td>
<td>48</td>
<td>65.75</td>
</tr>
<tr>
<td>Sharp weapon</td>
<td>02</td>
<td>02.74</td>
</tr>
<tr>
<td>Body parts</td>
<td>23</td>
<td>18.11</td>
</tr>
<tr>
<td>Total</td>
<td>73</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4: Distribution of cases based on anatomical site and type of injury*

<table>
<thead>
<tr>
<th>Anatomical site</th>
<th>Abrasion</th>
<th>Contusion</th>
<th>Laceration</th>
<th>Stab wound</th>
<th>Incised wound</th>
<th>Fracture</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head and neck (Including face)</td>
<td>11</td>
<td>30</td>
<td>18</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>62 (50.82)</td>
</tr>
<tr>
<td>Thorax</td>
<td>3</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>10 (08.20)</td>
</tr>
<tr>
<td>Abdomen</td>
<td>3</td>
<td>8</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>12 (09.84)</td>
</tr>
<tr>
<td>Upper limbs</td>
<td>6</td>
<td>15</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>6</td>
<td>31 (25.41)</td>
</tr>
<tr>
<td>Lower limbs</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>07 (05.74)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>26 (21.32%)</strong></td>
<td><strong>62 (50.82%)</strong></td>
<td><strong>21 (17.21%)</strong></td>
<td><strong>1 (0.82%)</strong></td>
<td><strong>1 (0.82%)</strong></td>
<td><strong>11 (9.02%)</strong></td>
<td><strong>122 (100)</strong></td>
</tr>
</tbody>
</table>

*Some victims sustained multiple injuries so total of 122 injuries documented in 73 cases

Table 5: Distribution of cases based on time of incident

<table>
<thead>
<tr>
<th>Time of incidence (Hrs)</th>
<th>No of cases</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>06.00-11.59</td>
<td>19</td>
<td>26.03</td>
</tr>
<tr>
<td>12.00-17.59</td>
<td>10</td>
<td>13.70</td>
</tr>
<tr>
<td>18.00-23.59</td>
<td>41</td>
<td>56.16</td>
</tr>
<tr>
<td>00.00-5.59</td>
<td>3</td>
<td>04.11</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>73</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>
### Table 6: Distribution based on admission pattern

<table>
<thead>
<tr>
<th>OUTPATIENT</th>
<th>%</th>
<th>INPATIENT</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO OF CASES</td>
<td>21</td>
<td>28.77</td>
<td>52</td>
</tr>
</tbody>
</table>

### Table 7: Distribution of cases based on prognosis

<table>
<thead>
<tr>
<th>Prognosis</th>
<th>No. of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discharged/Referred</td>
<td>72</td>
</tr>
<tr>
<td>Death</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>73</td>
</tr>
</tbody>
</table>

**DISCUSSION**

In the present study males outnumbered the females similar findings were inferred by another study. Males being physically stronger than females, indulge in violent activity more often than females. Majority of the patients belonged to age group of 21-30 years followed by 31-40 years the same is appreciated in other studies. Study in a western country also inferred the same. This age group population possesses aggressive behaviour and indulges more frequently in risk involved activity. The study found use of blunt weapons like lathi, rod, cricket bat, belt, brick, and stone for assault more often, followed by the body parts like hands and feet for punching or kicking. Sharp weapons were rarely used for assault. Same findings were noted in other studies. But a study although infers more often use of blunt weapon, but it differs from our study by noting sharp weapons and firearms as the next commonly used mode of assault. This indicates the regional variation in the kind of weapons used for assault. Use of weapon depends on the intention of the subject, availability of the weapon, to overpower other person, to safe guard themselves. Injuries to the head and neck region (including face) were more common followed by the upper limbs. These findings are similar to another study. It is common instinct to strike at head and neck region (including face) as it is easily accessible when the weapon of offence is body part or a blunt weapon. Most common injury was contusion that too in the head and neck region (including face) same findings is inferred by another study. Fractures were more common in upper limbs but another study found it to be more commoner in head region. 13 patients were female victims among them 7 were victims of domestic violence. Only one person (1.34%) succumbed to injury in the present study as he was stabbed. Another study found fatality of 4.58% this can be attributed to rise in the figures of sharp weapon and firearms usage which was not present in our study. In the present study majority of the assault weapon and firearms usage which was not present in our study. In the present study majority of the assault cases took place during 18.00-23.59 hrs and the same has been noted in another study. Probably this is the time when people are relatively free after work and usually under the influence of alcohol so they indulge in arguments which lead to assault. Majority (71.23%) of the assault patients took treatment on inpatient basis while in another study majority took treatment on outpatient basis.

**CONCLUSION**

This study gives an idea of pattern of injuries in assault cases, type of weapon used and other details which may vary from region to region. Studies regarding these cases are few at present so such region wise study of profile of assault cases can be taken up including other factors like educational status, marital status, inebriated state of injured etc which is lacking in this study.

**Acknowledgment:** Nil

**Declaration of interest statement:** The Author declare that there is no conflict of interest.

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**Ethical Clearance:** Obtained from ethical committee.

**REFERENCES**


Lip Biometric – A Systematic Review

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ABSTRACT

Cheiloscopy, study of lip prints dates back to 1900. R.Fischer was the first to describe it in 1902. Le Moyne Synder was first to propose the use of lip prints for identification purpose. Lip prints can be used in forensic science to identify criminal suspects and person identification. Earlier studies concentrated in analyzing the types of lip print based on the morphological appearance. Digitalization of lip prints for accurate analysis was the next step. Recently researches are attempting to evaluate the efficiency of lip prints as a biometric tool. The aim of the review is to analyze whether lip/lip print can be used as a biometric tool. Search strategy used in this review are electronic database, fors, forensic science abstract by Elsevier, PubMed, Science Direct and hand search articles. Articles published from January 2010 till March 2015 were included in the review. 15 articles included for the final analysis. All authors have used digitalized lip prints. No hardware used to recognize the lip print. Various algorithm were used to analyze the lip/lip prints. As a result number of new algorithms were discovered and studied to explain the uniqueness of lip and lip prints. At present there is no definite scanners discovered to prove the application of lip print as a biometric tool. Further research in hardware machines to collect lip prints and software to analyze can be the future in lip biometric.

Keywords: lip print, lip prints, biometrics, biometric authentication, biometric identification, lip biometrics (mesh terms)

BACKGROUND

Biometric is the measurement and statistical analysis of people’s physical and behavioral characteristics, the technology is mainly used for identification and access control or for identifying individuals who are under surveillance. The basic principle of biometric authentication is that everyone is unique and an individual can be identified by his or her intrinsic physical or behavioral trait.

The distinctive features of the body parts are used for identifying or security purpose. Finger prints are most commonly used character for biometric analysis because of its uniqueness. Lip/lip print also has unique pattern and it can also been used as biometric tool.

Biometric development for any anatomical structure includes enrollment, templates and matching to ensure complete application for personal identification and security purpose. This systematic review was thus conducted to evaluate how far the studies are able to achieve the various stages of biometric application.

MATERIALS AND METHOD

Literature search

A systematic literature search of electronic database, fors, forensic science abstract by Elsevier, Pub Med, science direct, and hand search for articles published
from January 2010 till December 2015, with language restricted to English, was done using the terms lip, lips, lip print, biometrics, biometric identification, biometric facial recognition, lip biometric. All the abstracts were reviewed separately and if an article was considered relevant, full article was obtained and evaluated.

Inclusion criteria

Studies that have concentrated on lip/ lip print as a biometric tool are included.

Exclusive criteria

Articles from 2010 to 2015 are included.

Biometric articles other than lip biometric.

Articles that give general information about biometrics.

Lip print studied apart from biometric application are excluded.

RESULT

PRISMA FLOW CHART

Table 1.1 Studies from 2010 to 2012

<table>
<thead>
<tr>
<th>S. No</th>
<th>Year</th>
<th>Author</th>
<th>Lip Biometric (Shape, Lip Print, Motion)</th>
<th>Results and Outcomes</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Jan 2010</td>
<td>Michal choras</td>
<td>Shape and colour</td>
<td>Lip shape and colour can be used as biometric.</td>
<td>Integrgrated lip descriptors used to detect lip shape and colours and works well in lip recognition.</td>
</tr>
</tbody>
</table>
**Table 1.1 Studies from 2010 to 2012**

<table>
<thead>
<tr>
<th>No.</th>
<th>Year</th>
<th>Authors</th>
<th>Topic</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2011</td>
<td>Piotr Porwik, Tomasz Orczyk</td>
<td>Lip print</td>
<td>DTW analysis using horizontal, vertical and oblique grooves. DTW and voting based lip print recognition shows better results. Algorithms show good results in dentification. Used as important tool in identification.</td>
</tr>
<tr>
<td>3</td>
<td>June 2012</td>
<td>Yun-Fulin, Chao-Yu-Lin, Jing-Ming Guo</td>
<td>Contour of the lips</td>
<td>Proposed algorithm shows good results. Recognition operates in real-time fusion. Need to be explored.</td>
</tr>
<tr>
<td>4</td>
<td>Oct 2012</td>
<td>Saparshi Bhattacharjee, S Arunkumar, Samir Kumar</td>
<td>Lip print</td>
<td>Accurate match showed higher efficiency than fast match. Algorithm can be found in implementation of hybrid biometric system.</td>
</tr>
</tbody>
</table>

**Table 1.2 : Studies from 2013 to 2014**

<table>
<thead>
<tr>
<th>No.</th>
<th>Year</th>
<th>Authors</th>
<th>Topic</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>April 2013</td>
<td>Reshmi M. P, V. J Arul karthik</td>
<td>Lip shape and colour</td>
<td>Support vector machine (SMV) shows better recognition. Lip can be easily extracted from the face. Lip biometric system is applicable when other facial organs are covered.</td>
</tr>
<tr>
<td>2</td>
<td>Sep 2013</td>
<td>Kolukula B Shankar, K Kanthi Kumar, K V Murali Mohan</td>
<td>Lip movement</td>
<td>Biometric security system for locking and unlocking the car. A quasiautomated system to extract and analyze robust lip motion feature to improve the unimodal system.</td>
</tr>
<tr>
<td>3</td>
<td>2013</td>
<td>Krzysztof WROBEL, Rafal DOROL</td>
<td>Lip print</td>
<td>Generalized hough transform (GHT) GAVE 86% result in identifying the lip fragments. Digital analysis of lip print images are difficult due to low quality. GHT was suitable for identification of lip fragments.</td>
</tr>
<tr>
<td>4</td>
<td>2013</td>
<td>P. Chandra sekharan</td>
<td>Lip shape</td>
<td>Upper and lower vermillion border and oral fissures. Different shapes are classified for person identification.</td>
</tr>
<tr>
<td>5</td>
<td>2014</td>
<td>Amer Abdulmejeeeed, Abdulrahman</td>
<td>Lip colour</td>
<td>Shows difference between skin colour and lip colour. RBG chromaticity differentiates lip colour from skin color.</td>
</tr>
<tr>
<td>6</td>
<td>June 2014</td>
<td>Sunil Sanguve, Nilakshi Mula</td>
<td>Lip contour, surface of lower and upper lips, ridges present in lower lip.</td>
<td>Bayesian classifier, GMM used. Lip has unique parameters in the form of grooves, furrows, distance between the lines of lower lip are unique.</td>
</tr>
</tbody>
</table>
### DISCUSSION

The search for the review initially started to find for if there is any automated machine for lip biometric as like finger print recognition for lip print identification and recognition. Various studies have been done with lips whether lip can be used as a biometric tool. Studies show that lip shape, color, size, texture, outline, segment, grooves furrows and movement of the lips has unique features and can best be used as a biometric tool. The author Michal Choras, has mentioned in his article as there is no such automated machine for lip biometric.\(^{(1)}\) The search extended to further development of certain templates/algorithms and software for lip biometric.

The steps involved in lip biometric is, the software first recognizes the face from the image obtained from digital camera. Followed by lip extraction through certain algorithm and then analyzed by matching with the stored database.

Author Alfredo Grunwald De la Cuesta et al conducted, studies for biometric identification using motion history images of a speaker’s lip movement. In his study he used speaker’s verification video sequences of lip movements by motion history image (MHI).\(^{(2)}\)

Shalini et al, have reported about the differences in lip prints in sex determination and differences between two communities. He gives idea about the use of lip images and measurement along with lip pattern as a biometric system in sex determination among two communities.\(^{(3)}\) Sunil Sanguve et al, reported that in his studies that the distance between the lines in the lip is different for each individual and is also different in different areas in the same lip and thus explains about the uniqueness of the lip print.\(^{(4)}\)

Sangeetha Devi et al, reported about various algorithms used for extraction of lips for its identification and security purpose.\(^{(5)}\) lips can even be used for identification purpose even in low resolution images. The recognized lips would help to improve the accuracy of speech recognition algorithm and person identification.\(^{(6)}\) Extraction and classification of characteristic feature of the mouth from photographs was also effective in identification. The K-star classifier proved to show the effectiveness of the images of lip photographs.\(^{(7)}\)

Sparse coding based technique was used for visual speaker identification, the texture and the shape of the lip were used. Space dictionary was built analyzed for both static lip and speaker’s lip. It has high identification accuracy.\(^{(8)}\) The DTW-based lip imprints showed the lip feature has unique horizontal, vertical and diagonal projections in lip patterns and hence lip print might become an important tool for identification.\(^{(9)}\) lips are flexible they have the tendencies to deform. The grooves and indentation present in the lips has the tendency to change but the outline, oral fissure and the

<table>
<thead>
<tr>
<th>Table 1.3 studies done in 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong></td>
</tr>
<tr>
<td><strong>2</strong></td>
</tr>
<tr>
<td><strong>3</strong></td>
</tr>
<tr>
<td><strong>4</strong></td>
</tr>
<tr>
<td><strong>5</strong></td>
</tr>
</tbody>
</table>

1. Michal Choras, "There is no such automated machine for lip biometric."  
2. Alfredo Grunwald De la Cuesta et al, "Studies for biometric identification using motion history images of a speaker’s lip movement."  
3. Shalini et al, "Reports about the differences in lip prints in sex determination and differences between two communities."  
4. Sunil Sanguve et al, "Reported that in his studies the distance between the lines in the lip is different for each individual and is also different in different areas in the same lip and thus explains about the uniqueness of the lip print."  
5. Sangeetha Devi et al, "Reported about various algorithms used for extraction of lips for its identification and security purpose."  
6. Sunil Sanguve et al, "Reported about various algorithms used for extraction of lips for its identification and security purpose."  
7. Shalini et al, "Reported about the differences in lip prints in sex determination and differences between two communities."  
8. Sunil Sanguve et al, "Reported about various algorithms used for extraction of lips for its identification and security purpose."  
9. Sangeetha Devi et al, "Reported about various algorithms used for extraction of lips for its identification and security purpose."
vermillion border has the unique pattern and does not change. Hence can be used in personal identification. In all studies in this review, they have used various template for identification, extraction of lip, to identify the shape, color and texture of the lips. For color, Ycbr – for separation luminance differentiate from blue to red chrominance, MONO (channel of mono chromatic image density. Viola and jones algorithm, canny edge detection, SUSAN (smallest uni value segment assimilating nucleus) for edge detection for lips. Histogram equalization, PCA template matching, fast match, accurate match, support vector machine, optic flow, for lip recognition.

**CONCLUSION**

The available literature reveals that lips, lip outline, lip shape, color, texture and lip print can be used for biometric purpose. Lip biometric can be used for identification and security purposes. The unique feature of lip print like finger print can give a much more specification in identification purpose. The various other features have been used for security purpose. The review reports that the lips and lip print can be used as a biometric tool and further analysis with various new template can give accuracy of the lip biometric. There is no hardware device available to collect lip prints. Evaluation of such hardware that can scan lip prints and analyze using soft wares can be developed to use the uniqueness of the lip prints The most advantage of the current lip biometric is, there is no direct contact with the machine but an automate machine exclusively for lip biometric can be the future in lip biometrics. Furthermore researches and templates should be analyzed to use lip biometric as a most ideal biometric tool.

**Ethical Clearance:** An review article

**Source of Funding:** Nil

**Conflict of Interest:** Nil

**REFERENCE**


Rapid Screening of Some Plant Poisons by TLC using a Novel Solvent System- A Forensic Approach

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ABSTRACT

The forensic scientists are regularly confronted with the challenge of detection of the specific plant toxins in the exhibits viz. visceral tissues, plant materials, crime scene related exhibits, pharmaceutical preparations, industrial formulations and traditional medicines to confirm their presence which might be the result of homicide, suicide, negligence, criminal intent for loss of life etc. Plant poisons such as Abrus Precatorius, Strychnos Nux-Vomica & Plumbago Zeylanica have been used in instances of death of human beings, cattle, aquatic life etc. Thus, the need has been felt for ensuring fast and reliable detection of these plant poisons. Hence, we have developed a simple, rapid, adaptive, economical and selective thin layer chromatographic method using a novel solvent system for the qualitative detection of the toxic constituents of these plant poisons. We detected the active constituent of these plants in spiked visceral tissues by using an efficient extraction method. The proposed novel solvent system comprising toluene, chloroform and methanol can be used in routine analysis for successful rapid screening of these plant toxins by the forensic laboratories. Detection of all the three toxins by using a common solvent system has not been reported to the best of our knowledge.

Keywords: Plant poisons, Thin Layer Chromatography, solvent system, visceral tissues, forensic.

INTRODUCTION

India is a cradle of a dozen biodiversity centers, comprising of over 45000 plant species. It has been reported in the ancient texts that around 1500 plants have medicinal uses and around 800 plants have been immensely used in traditional medicinal formulations¹,². Plants produce thousands of specialized Secondary metabolites in their roots, leaves, fruits or seeds, many of which have been reported to have medicinal uses and some of these metabolites are toxic alkaloids prepared by the plants to protect them from herbivorous animals and insects³. These plants are dangerous to human beings³,⁴, animals/cattle⁵,⁶,⁷ and aquatic species⁸ in cases of accidental, homicidal and suicidal poisoning in general and children in particular as the plants bear attractive fruits, flowers/ seeds etc. In Abrus Precatorius seeds, Strychnos Nux-Vomica fruits and Plumbago Zeylanica flowers have been found to be very attractive⁹.

Literature survey reveals that there have been cases of causality and deaths due to accidental ingestion or homicidal poisoning due to the toxins abrin⁴,¹³,¹⁴, strychnine⁵,⁸ and plumbagin⁶,⁷,⁸. Poisoning due to plumbagin is mainly seen in animals, cattle⁶,⁷ and aquatic organisms⁸. For instance, it is reported in literature that certain tribal people of Kawal wildlife sanctuary named as Gond tribe used Plumbago as the piscicidal plant to stupefy fishes so as to catch them⁸. Similar poisoning has been reported in the canines that developed convulsive disorders from the exposure to a variety of the toxicants including strychnine³¹. Such cases post challenges to the forensic toxicologist in the rapid detection of these toxins in the visceral tissues, body fluids submitted to forensic science laboratory.

DOI Number: 10.5958/0973-9130.2017.00097.4
Several analytical methods like HPLC, HPTLC, LC-MS, UV visible spectrophotometer, GC-MS, IR, 1H-NMR have been published for the determination of Abrin, Strychnine and Plumbagin, but there is no simple, accurate, precise, economical and rapid method based on TLC for their simultaneous detection available as per our knowledge. Since many of the reported methods are extremely expensive, tedious, and have poor resolution, they cannot be used in the routine examination of these toxins. The objective of this work was to simultaneously detect these active constituents from the plant material of Abrus Precatorius, Strychnos Nux-Vomica and Plumbago Zeylanica by cheap, rapid, easy and efficient TLC method using a novel solvent system in order to overcome the drawbacks of the earlier reported complicated methods. We propose this novel solvent system for detecting plant poisons in visceral tissues i.e. blood, liver.

MATERIAL AND METHOD

2.1 Collection of plant material

Procured the seeds of Abrus Precatorius (AP) and Strychnos Nux-Vomica (SN) and roots of Plumbago Zeylanica (PZ) from local vendors and then tested in Regional Forensic Science Laboratory, Chanakyapuri, New Delhi during training. 20gms seeds of AP and SN while 40gms roots of PZ were dried in the shade and reduced to coarse powder using mortar-pestle and stored in air tight container for further use.

2.2 Equipments and chemicals:

Equipments: Citizen CX 220 Weighing balance, spraying cabinet, Camag UV cabinet, Camag twin trough chambers (size 20x10 cm), TLC Aluminum pre-coated plate with Silica gel 60 F254 (size 20X20cm; 0.2 mm thick).

Chemicals: Analytical Grade, E. Merck: Toluene, Formic acid, Acetic acid, Petroleum ether, Diethyl ether, alcoholic NaOH, Dragendorff spray reagent, Iodoplatinate spray reagent, ammonia, Chloroform, Methanol, Benzene, FCPA reagent, Isopropanol, and n- Hexane.

2.3 Experimental

Preparation of Extracts

Soxhlet extraction, reported as the most efficient extraction technique was used for the extraction of abrin, strychnine and plumbagin from the visceral tissues. It was carried out for not more than 20 minutes because if extraction time is longer, unwanted constituents may also get extracted and may even lead to degradation of compounds and may hinder the analysis of main toxins.

10gms of dried powdered plant material of each AP and SN while 30gms of powdered material of PZ was obtained and equal portions of the powder was divided and taken into the RB flasks separately. The extraction was done following three different protocols for the enrichment of compounds as follows:

2.3.1 Cold Maceration (Chloroform Extract)

Powdered form of the SN and PZ plant material taken in the separate flasks was soaked in 20-30ml of chloroform for 24 hours so that the active components get leached out. While the powdered form of AP seeds were extracted with chloroform and methanol in the ratio 9:1 for 24 hours. The extracts obtained were filtered through Whatmann filter paper no.1 and concentrated by evaporating the solvent to dryness. The chloroform extracts were then stored in refrigerator and further subjected to TLC.

2.3.2 Hot extraction (Petroleum ether Extract)

Powdered form of AP, PZ and SN taken in the separate flasks were extracted with petroleum ether (30ml) in the soxhlet apparatus at a temperature not exceeding the boiling point of the solvent for 20 minutes. The extracts obtained were filtered while hot and concentrated by evaporating to dryness. The petroleum ether extracts were then stored in refrigerator and further subjected to TLC.

2.3.3 Hot Extraction (n-Hexane Extract)

Powdered form of the AP and PZ were extracted separately with n-hexane (30ml) in the soxhlet apparatus similar to hot petroleum ether extract.

On being subjected to TLC, these extracted residues were used as working standards (WS) when the Rf of the active components obtained were matched with those published in literature (Table 3). These working standards were then used for further analysis.
2.3.4 Spiking of Blood and visceral tissues:

Drug free PM blood and viscera were procured from Regional Forensic science Laboratory, Chanakyapuri, New Delhi and were spiked with AP, SN and PZ respectively. The spiked visceral tissue and blood samples were then extracted.

**Blood Extraction:** Added 50mg of sodium tungstate to the sample and 3ml of conc. sulphuric acid and warmed. Obtained filtrate was subjected to liquid-liquid alkaline, acidic and neutral extraction with 30ml ether and chloroform. But exceptionally, plumbagin being a dye could not be extracted through chloroform-ether extraction. So, extraction of plumbagin from blood was carried out using 30 ml n- hexane. Organic layer was collected and passed through the anhydrous sodium sulphate. The filtrate was air-dried and concentrated and then used for phytochemical and TLC analysis.

**Viscera Extraction:** Drug free 10gm viscera was taken and spiked with working standard of PZ and macerated, then treated with 5gm anhydrous ammonium sulphate and 5ml acetic acid. The mixture was subjected to water bath for 3 hrs. at 110°C. Filtrate was subjected to liquid-liquid extraction using 30ml n- hexane. Organic layer was collected and passed through the anhydrous sodium sulphate. The Filtrate was air-dried and concentrated for TLC analysis

2.3.5 Preliminary Qualitative Color Tests:

Color reactions are produced by compounds with a particular chemical structure. By performing various color tests for an extract, we can get the idea of the possible presence of the alkaloids. A portion of the dried residue of all the three extracts was subjected to color test separately (Table 1).

<table>
<thead>
<tr>
<th>S.NO.</th>
<th>TESTS</th>
<th>Poison</th>
<th>Inference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Taken 2 ml of 0.5% acetic acid residue was taken and performed tests: <strong>Test with Mandelin’s reagent</strong> [37]: Added 100ml of conc. sulphuric acid to 1gm of ammonium vanadate and then added to the 1ml of acetic acid solution.</td>
<td>Strychnos Nux-Vomica</td>
<td>Violet blue color appears which finally changes to yellow on long standing.</td>
</tr>
<tr>
<td></td>
<td><strong>Play of color test</strong> [49]: Taken two drops of the acetic acid solution into a white proclain basin and dried. To the dried residue, added a pinch of manganese dioxide followed by a drop of conc. sulphuric acid.</td>
<td></td>
<td>Blue color is observed which changes to violet color, further to red and then purple, then orange and finally to yellow</td>
</tr>
<tr>
<td>2.</td>
<td>Dissolved dried residue in 5ml of dil. HCl, heated on steam bath and filtered and further divided into two portions and performed following tests. <strong>Test with Mayer’s reagent</strong> [38]: Dissolved 1.355g of HgCl2 in 50ml water by warming and added to another solution prepared by mixing 5g of potassium iodide in 20ml water. Mixed the solutions and made up-to 100ml with water. Added 1 ml of the Mayer’s reagent to 1ml of the residue</td>
<td>Plumbago Zeylanica</td>
<td>Faint yellow color observed</td>
</tr>
<tr>
<td>3.</td>
<td><strong>Test with Wagner’s reagent</strong> [38]: To 1ml of the residue, added 2ml of Wagner’s reagent prepared by adding 2g of iodine in 6 g of potassium iodide mixed in 100ml of water</td>
<td></td>
<td>Formation of reddish brown precipitate indicates the presence of plumbagin</td>
</tr>
<tr>
<td>4.</td>
<td><strong>Test with Marquis reagent</strong> [38]: Added 2 drops of Marquis reagent to the dried residue of the extracts.</td>
<td>Abrus Precatorius</td>
<td>A pink color is observed</td>
</tr>
<tr>
<td>5.</td>
<td><strong>Test with Van–Urk Reagent</strong> [4]: Added 1 drop of Van Urk Reagent to the dried residue of the extracts.</td>
<td></td>
<td>A green color changing to blue is seen</td>
</tr>
</tbody>
</table>
2.4 Chromatographic method

2.4.1 Thin Layer Chromatography

The dried extracts of AP, PZ and SN (approx. 1g) were diluted to 10ml in their respective solvents and subjected to TLC separately. Chromatograms were then developed in chambers saturated with different solvent systems chosen on the basis of polarity of various anticipated constituents which are in agreement with the published literature (Table 3). The air dried plates were then viewed under daylight and U.V lamp at 254nm and 366nm wavelength. The eluted compounds were confirmed by spraying. The Rf of the active components was obtained and matched with those published in literature. Those extracts whose Rf of the active components were matched with literature, AP, PZ and SN were then used as working standards for further analysis.

To fulfill the purpose of the simultaneous detection of the active constituents, the above extracts of the AP, PZ and SN were subjected to TLC and tried in following common solvent systems viz., Toulene: Chloroform:Methanol (8:1.5:0.5), Toulene:Methanol (8:2), Chloroform:Methanol:Formic Acid (8:1.5:0.5). The Rf of the eluted compounds in proposed common solvent system was noted down after their presence was confirmed on spraying. Similarly, the spiked visceral tissue extracts were subjected to TLC in proposed common solvent system and the Rf of the eluted compounds obtained was matched with the Rf of the active components in the working standards. The detailed findings of the TLC are mentioned in the Table 3.

RESULTS AND DISCUSSION

Development of new solvent system and detection of the active constituents:

For the development of a common mobile phase for simultaneous detection of the plant toxins from the spiked viscera tissues, different trials were made using many solvents in different proportions. Rf of the eluted compounds in their respective solvent systems was matched and compared with those published in literature and thus after confirming the purity of the isolated compound, its extract was used as the working standard23. The working standards of AP, PZ and SN were then subjected to TLC for the simultaneous detection of the toxins. When mobile phase consisting of Toulene: Chloroform:Methanol was used in the ratio of 8:1.5:0.5, v/v specific spots were observed at the R values of 0.29, 0.25 and 0.95 for abrine, strychnine and plumbagin, respectively for AP, SN and PZ pure extracts respectively. This new mobile phase helped in achieving very compact spots at the respective R values (Fig.) with good resolution of more than one. Simultaneous detection of these toxins in visceral tissues was also done by using this novel solvent system. Abrine from the acidic blood extract resolved as a light brown band at Rf 0.26 while strychnine from the basic blood extract showed a very intense orange spot at Rf 0.27 after visualizing with FCPA spray reagent. Plumbagin was also successfully detected from hexane extract of spiked blood extract in the form of dark red color bands which appeared at Rf 0.97 and 0.96 respectively. These intense dark red color bands confirming presence of plumbagin were observed after spraying with Wagner’s reagent. These calculated Rf values of the eluted compounds in the spiked visceral tissue extract are given in table 3 along with the color bands. Preliminary phytochemical analysis of the plant extracts of AP, PZ and SN was also done to reveal the presence of the active principles (Table 1). Although these are based upon non-specific color reactions but they give a positive direction towards detection of the toxins. Chemical tests in visceral tissue extracts were not very encouraging due to matrix interferences.

In case of plant/herbal poisoning, herbs are generally detected via variety of complex and expensive analytical instrumentations such as HPLC12, HPTLC11, LC-MS14, GC-MS16 and techniques with missionary zeal as the forensic analyst is confronted with unique challenge due to the use of traditional medicines which have medicinal value but can cause death or injury when used incorrectly. Large number of homicidal, suicidal and accidental poisoning cases of plant poisons such as Abrus Precatorius, Strychnos Nux-Vomica & Plumbago Zeylanica in both humans3,4 and animals5,6,7,8 have been reported. Taking this into account, TLC has emerged as a simple, rapid, reliable and efficient method for the simultaneous detection of two or more components. As per the literature survey, no chromatographic method has been reported yet for the simultaneous detection of the toxins- abrin, strychnine and plumbagin; hence it was essential to develop the same, because it is cheap, accessible and overlooked generally in the Indian scenario. Altogether, in this present study, a simple,
rapid, accurate, economical and selective thin layer chromatographic method using a novel solvent system Toluene:Methanol:Chloroform has been developed for the simultaneous qualitative detection and routine screening of abrine, strychnine and plumbagin in various exhibits such as plant material, tissues, herbal medicines, etc.

### Table 2: TLC details of working standards of plant poisons such as AP, PZ, SN

<table>
<thead>
<tr>
<th>EXTRACTS</th>
<th>TLC SOLVENT SYSTEMS</th>
<th>RATIOS</th>
<th>RF VALUES</th>
<th>COLOR OF THE SPOT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>REPORTED</td>
<td>OBTAINED</td>
</tr>
<tr>
<td>AP CHLOROFORM: METHANOL EXTRACT</td>
<td>SS1 ISOPROPANOL: CHLOROFORM: METHANOL: WATER</td>
<td>50:20:25:5</td>
<td>0.29</td>
<td>0.30 BROWN (iodine fuming) BROWN (iodine fuming)</td>
</tr>
<tr>
<td>SN CHLOROFORM EXTRACT</td>
<td>SS4 CHLOROFORM: METHANOL</td>
<td>8:2</td>
<td>0.60</td>
<td>0.58 ORANGE (Dragendorff) ORANGE (Dragendorff)</td>
</tr>
<tr>
<td>PZ CHLOROFORM EXTRACT</td>
<td>SS2 HEXANE:BENZENE</td>
<td>1:9</td>
<td>0.64</td>
<td>0.62 PURPLE (Ammonia) PURPLE (Ammonia)</td>
</tr>
<tr>
<td>SPIKED VISCERAL TISSUE EXTRACT</td>
<td>SS6 TOLUENE: CHLOROFORM: METHANOL</td>
<td>8:1.5:0.5</td>
<td>-</td>
<td>Detailed Results mentioned in table 3</td>
</tr>
</tbody>
</table>

### Table 3: TLC details of spiked visceral tissue extract in SS6 for plant poisons

<table>
<thead>
<tr>
<th>S.NO</th>
<th>DETECTION/ VISUALISATION</th>
<th>AP Working Standard</th>
<th>ACIDIC BLOOD EXTRACT</th>
<th>RF</th>
<th>COLOR</th>
<th>SN Working Standard</th>
<th>BASIC BLOOD EXTRACT</th>
<th>RF</th>
<th>COLOR</th>
<th>PZ Working Standard</th>
<th>HEXANE BLOOD EXTRACT</th>
<th>RF</th>
<th>COLOR</th>
<th>HEXANE VISCERAL EXTRACT</th>
<th>RF</th>
<th>COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>UNDER UV 254 nm</td>
<td></td>
<td></td>
<td>0.95</td>
<td>Dark Grey</td>
<td>0.81</td>
<td>Grey Grey</td>
<td>0.87</td>
<td>Grey Grey</td>
<td>0.91</td>
<td>Dark Grey</td>
<td>0.97</td>
<td>Dark Grey</td>
<td>0.97</td>
<td>Dark Grey</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>UNDER UV 365 nm</td>
<td>0.82</td>
<td>Blue</td>
<td>0.92</td>
<td>Purple Blue</td>
<td>0.81</td>
<td>Blue</td>
<td>0.87</td>
<td>Blue</td>
<td>0.91</td>
<td>Purple Purple</td>
<td>0.97</td>
<td>Blue</td>
<td>0.96</td>
<td>Blue</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>AFTER VISUALIZATION</td>
<td>0.29</td>
<td>Light Brown</td>
<td>0.26</td>
<td>Light Brown</td>
<td>0.25</td>
<td>Orange Yellow</td>
<td>0.27</td>
<td>Orange</td>
<td>0.95</td>
<td>Dark Red</td>
<td>0.97</td>
<td>Dark Red</td>
<td>0.96</td>
<td>Dark Red</td>
<td></td>
</tr>
</tbody>
</table>
CONCLUSION

The findings of our study proved that the proposed novel solvent system comprising Toulene:Chloroform: Methanol (8:1.5:0.5) is best for the simultaneous detection of the toxins and can be employed successfully in the rapid routine screening of these plant toxins from plant material, blood, viscera & traditional/ pharmaceutical formulations by forensic laboratories, as the method is rapid, economical, reliable & easy to perform with all the chemicals and apparatus readily available in a laboratory. Although, it is obvious that at least for forensic purposes, confirmatory test of these toxins must be performed by GC-MS, but for speedy routine analysis, preliminary examination of these plant toxins in the proposed novel solvent system can be done by Forensic Laboratories. Literature survey reveals that detection of these toxins in common solvent system has not been reported.

Conflict of Interest Statement: The authors whose names are listed above certify that they have NO affiliations with or involvement in any organization or entity with any financial or non-financial interest in the subject matter or materials discussed in this manuscript.

Source of Funding: Nil

Ethical Clearance: This clause is not applicable as no human body is used in experimentation.

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Estimating the Post-mortem Interval in Decomposing Bodies
Using Entomology as a Tool

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ABSTRACT

Forensic Entomology is nothing but the study of insects and other arthropods that inhabit decomposing remains which can be used as a tool to aid legal investigations. One of which, is estimating the post-mortem interval by studying the life cycle of the carrion flies involved in the decay of corpses in correlation with the state of decomposition of the body. The aim of this study was to estimate the post-mortem interval by studying the life cycle of carrion flies from eggs to adults under different cyclic temperature regimes and the data obtained to be used as reference to estimate the post mortem interval in decomposing bodies in future. Sample of different stages of the carrion flies (eggs, larvae, pupae and adult flies) was collected from different parts of the body, reared in meat media and their life cycle was recorded. A total of 17 cases were covered in this study.

Keywords: Forensic Entomology, Post-mortem interval, Decomposing bodies, Maggots.

INTRODUCTION

Insects are major players in nature’s recycling effort, and in nature a corpse is simply organic matter to be recycled. Left to its own devices, nature quickly populates a corpse with a diverse community of organisms, all dedicated to reducing the body to its basic components [1].

The major contribution usually made by forensic entomologists, and one of the main concerns to the police service and justice system, in death investigations is an estimate of the time between death and corpse discovery, generally referred to as the post-mortem interval (PMI) [2].

It is important to know when the crime was committed which gives the police a starting point for their inquiries [3], it might enable to exclude some suspects and also to check on the suspect’s statement [4].

Estimation of time since death within a narrow range is possible only in the early period. Once putrefaction sets in, this range becomes wider. However, entomological study can help in narrowing the range considerably [5]. Insects develop through a predictable life-cycle at a predictable rate, based primarily on temperature and species. Therefore, if the temperature, species, and stage of insect are known, an entomologist can determine how long the insects have been on the body and, therefore, the minimum time that has elapsed since death [6].

Only a few species actively participate in cadaver breakdown directly accelerating the rate of decay [1]. They mainly comprise the bluebottle, greenbottle flies [7] commonly known as blowflies as their wing beats make a loud buzzing sound at the time of oviposition [8]. Bluebottle flies are characterized by a bottle-blue hue on the abdomen and are active during winter.

Oviposition first occurs at the orifices or wounds of the corpse [9]. The eggs then hatch and the larvae begin to feed on the corpse. Once fully grown, the post-feeding larvae usually migrate away from the body to pupariate. Once the first colonizing species have been identified, PMI can be estimated by comparing the

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degree of development of the eggs, larvae, or pupae with laboratory data on their development times under a temperature regime similar to that of the period leading up to the discovery of the corpse [10].

The reason why this study was taken up is because not many studies to standardize the time since death using entomology has been done in India, especially in South India. Since many decomposing bodies are subjected for medico–legal autopsies at our centre and in some of the cases it would be quintessential to narrow down the PMI which in turn would provide vital information to the investigating officer.

The objective of this study was to estimate the PMI by the studying the life cycle of carrion flies from eggs to adults under different cyclic temperature regimes [11] and the data obtained will be used to estimate the PMI based on the most mature stage in the life cycle of the fly found on the body (eggs, length of the larvae, pupa).

MATERIALS & METHOD

This study was carried out in the department of Forensic Medicine M. S. Ramaiah Medical College, Bangalore. The material for this study comprised of 17 cases with entomological evidence brought for autopsy during a period of 2 years.

The methodology that was incorporated in this study for collection, preservation, transport & laboratory methods for rearing & later identification of the species was done in accordance with standard procedure in consultation with an entomologist.

Sample of insects of different stages (eggs, larvae, pupae & adult flies) were collected from different parts of the body usually from the natural apertures – mouth, nose, ears [12] & sites of traumatic wounding if present (Fig. 1).

Two sets of samples, one for preservation & one for rearing was collected. The stage of decomposition the body was in was noted according to the 5 phases of decomposition viz fresh, bloated, active decomposition, advanced decomposition and dry remains [13].

Preservation of specimen: Eggs & pupae – were placed directly into separate vials containing the preservative (Isopropyl alcohol). Larvae – the larvae were first killed in very hot water [14] and placed in vials along with the preservative (Isopropyl alcohol).

Transportation & rearing of live specimen:

The eggs & larvae collected were transferred into plastic jars with perforated lids & covered with fine plastic mesh. The bottom of the container was covered with saw dust to provide a dry place for pupation (pupation could be delayed in sub optional conditions) & meat media was placed in the containers (media was added as & when required) (Fig. 2). Few eggs, if present, were placed in container labelled no.1 and the larvae of different stages depending on their lengths i.e. larvae measuring 3mm in length (most immature) were placed in container no. 2, larvae measuring 6mm in length were placed in container no. 3, larvae measuring 9mm in length were placed in container no. 4, larvae measuring 12mm in length were placed in container no. 5, larvae measuring prepupal stage in length were placed in container no. 6, this was done in order to correlate the rate of development of the fly with the different stages which were found on the body. Every 12th hour the rate of development of the larvae was recorded. Specimen from each container was killed in hot water & the length was recorded. The ambient temperature was recorded using a max/min thermometer.

Once the adult fly (Imago) emerged from the pupae a strip of cotton dipped in chloroform was dropped into the container to kill the fly. The flies were then identified using identification keys [8, 15, 16] to the common forensically important carrion flies.

RESULTS AND DISCUSSION

Of the 17 cases with entomological evidence, which were subjected for autopsy, 3 cases were left out due to drowning of the larvae during transportation, the entomological samples in the remaining 14 cases (Fig. 3) were all reared to complete the life cycle and the flies were identified.

An example of the study of the life cycle was compiled from one of the 14 cases were the average ambient temperature is around 25°C shown in fig.4.

The life cycle of the green bottle fly (genus lucilia) took about 276 hours (11 ½ days) when the average cyclic temperature was between 29°C to 16°C (winter months, Fig 5) and 240 hours (10 days) to complete one complete life cycle when the average cyclic temperature was between 33°C to 20°C (summer months, Fig 6).

The most common carrion flies found infesting the
bodies with the greatest frequency were the green bottle flies (Genus: Lucilia) (Fig. 7) & in one case the blue bottle fly (Genus: Calliphora).

CASE STUDIES

Below are a few cases that have been discussed on how insect evidence can be effectively used in determining time of death in correlation with changes in decomposition.

A body of an unknown female was found concealed in a drain covered with a stone slab, a little away from the main road. A chop wound was present on the side of her neck. Evidence of the activity of scavengers was seen over the face. Larvae of various sizes were seen all over the body and as a mass at the site of injury. The pre-pupal stage (Fig. 8) of the larvae, characterized by a greyish black discoloration over its dorsal aspect, was seen moving away from the body. This stage was compared with known growth rate data, recorded from rearing of Lucilia at similar ambient temperature and the PMI was estimated to be about 5 days. This evidence helped the police identify the body as that of a person who was reported missing by her husband 5 days ago. This was our most significant case in which entomological evidence proved to be more useful in narrowing down the PMI.

A body of a male was found hanging inside his house in a bloated phase of decomposition. Eggs and larvae, the longest larvae measuring 4 mm in length, were found all over the body. The eggs were found in clusters in the scalp hair. As the body was found in an enclosed room, there could have been a delay of about 24 to 48 hrs before the arrival of the carrion flies thus explaining why the most mature larvae was about 4 mm instead of 12 mm in length which should have been seen considering the state of decomposition the body was in. In this case, according to the entomological evidence the minimum PMI was about 48 hrs, but in correlation with the state of decomposition the body was in, the PMI may have been about 4 to 5 days.

A body of an unknown male was found in a vacant plot next to a building. What was unusual in this case was that although the body was found in open air and being in bloated phase of decomposition the only entomological evidence found on the body were clusters of eggs which for some reason did not hatch. On dissection of the body, the stomach contained about 200 ml of a bright green colored fluid, the smell was peculiar and the stomach mucosa was hemorrhagic indicating that the deceased may have consumed some poison which could not be determined by the forensic science laboratory. This may have been the reason why the eclosion of eggs did not occur. The eggs, when transferred to the media, began to develop normally. The estimation of PMI in this case was given based on the state of decomposition and not the entomological evidence.

In most cases, entomological evidence was effective in determining the PMI. In 2 cases the bodies were completely burnt, it was difficult to estimate the state of decomposition the bodies were in, and hence the entomological evidence was the only means of estimating the PMI.

In two cases the prepupal stages of the carrion flies were present. This stage, due to its characteristic features, was easy to identify as it was the most mature larval stage found on the body and helped in giving a rough estimate of the PMI immediately.

In 3 cases the entomological findings did not correlate with the state of decomposition the body was in, one was a case of poisoning and the other two were the bodies were found indoor which may have caused a delay in the arrival of the carrion flies.
Fig 7: Greenbottle fly (Genus: Lucilia)

Fig 8: Pre-pupal stage of the larva on the body.

CONCLUSION

Estimation of PMI was achieved by studying the life-cycle of carrion flies (i.e. the time taken for the eclosion of eggs to the emergence of the imago [young adult fly] from the pupae) infesting corpses under different cyclic temperature regimes and the data recorded. This data was used effectively in subsequent cases for estimating the PMI by comparing the most mature stage of the carrion fly found on the body and compared with known growth rate data recorded from rearing of the carrion fly at similar ambient temperature thus providing a rough estimate (within 24 hours) of the PMI.

The estimation of PMI which used to be based on the stage of decomposition was a wide range of about 4 days (e.g. 4 to 8 days or 5 to 10 days) was narrowed down considerably, based on the entomological evidence, to about 12 – 24 hours (4 to 5 days or 6 to 7 days).

The genus to which the most common carrion flies found infesting the bodies with the greatest frequency were the green bottle flies (Genus: Lucilia) & in one case the blue bottle fly (Genus: Calliphora).

It was found that the life cycle of the green bottle fly (genus: lucilia) took about 240 hours (10 days) to complete one complete life cycle when the average cyclic temperature was between 33°C to 20°C (summer months) and about 276 hours (11 ½ days) when the
average cyclic temperature was between 29°C to 16°C (winter months).

Of the 14 cases in this study, entomological evidence was effective in determining the PMI in 11 cases and did not correlate in 3 cases. Entomological evidence was the only means of estimating the post PMI in burnt bodies.

In such studies, guidance of an entomologist is strongly recommended as the information provided by them can be fundamental in interpreting insect evidence.

It is necessary to carry out similar studies in other parts of the state and country which will help in giving a wider picture of the different necrophagous fauna and their behaviour in relation to temperature and other environmental factors which are unique to that region. As, the data collected in one geographical area cannot be used for determining time of death in another geographical area. Separate databases should be used when considering corpses in varying geographical location.

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Conflict of Interest: Nil
Ethical Clearance: Obtained.

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Scenario of Accidental Burns in Rural Part of Central India

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Department of Forensic Medicine and Toxicology. MGIMS, Sevagram, Wardha

ABSTRACT

Background: In India, Burns are second most common cause of accidental injuries. Only limited studies have evaluated the scenario of accidental burn in rural part of central India.

Aim: To evaluate prospectively accidental burns in a hospital situated in a rural part of central India.

Study design: The consecutive 300 cases of accidental burns admitted in our hospital were analyzed prospectively to review the scenario of accidental burn over a period of 3 years.

Results: The study revealed female (68.81%) predominance with female to male ratio of 2.2:1. Most of the victims of burn were between the ages of 21 to 30 years. Married (69%) outnumbered unmarried. Accidental burns were predominantly in young adult females.

The accidents due to domestic burns was common among both domestic & non domestic burns. Most of accident due to burns sustained inside kitchen or usually occurred at the time of working in the kitchen. Accidents due to flame burns are more common in adults, while scalds are more common in children. Unprotected source of fire, cooking at floor level, loose feeting synthetic garments & accidental exposure to radiation source were mainly responsible for accidental burns.

Conclusion: considering the increase in incidence of accidental burns in rural areas, government and other social organizations need to put an efforts for running the prevention and education programs against burn injuries.

Keywords: Burn, Central India, Medicolegal domestic.

INTRODUCTION

Burn injury is one of the common medical emergencies admitted to any hospital and is an important public health problem throughout the world. In India, the burn injuries are only exceeded by motor vehicular accidents as a cause of trauma related deaths. They also destroy the physique & psyche of the injured individually.

The objective of this study was to record & evaluate accidental burn injuries as they vary widely in urban & rural population & also in different region & countries.so, therefore there is need of time to have successful preventive program for their preventions.

MATERIALS AND METHOD

The consecutive 300 cases of accidental burns, either admitted or brought for postmortem examination, over the period of 3 years were studied. Each case was followed from the time of admission to casualty or ward till its discharge or death. The cases which died before reaching the hospital and were directly sent for autopsy were also studied. The burn cases treated in outpatient department were excluded from this study.

A proforma was prepared to record important points. It included a detailed history (age, sex, address, occupation, marital and socioeconomic status, time,
Observations and Results:

A total of 300 cases of burn injury were studied over 3Yrs.

A. General information

The detailed history was obtained from the patients close relatives or friends available and the person who was present at the time of incidence or the one accompanying the victim. Information was also collected from the relatives, maternal as well as in laws, neighbors and police investigation reports. In doubtful cases, the dying declaration given by the patient in presence of the magistrate was compared with the statement given by the patient at the time of admission.

1. Sex and age

Considering the sex the males were 87 and females were 213 with a sex ratio of 2.2:1. The age group most commonly affected was 21-30 years followed by 31 -40 years. There was a female predominance in all the age groups.

<table>
<thead>
<tr>
<th>Age Group (in years)</th>
<th>Total</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10</td>
<td>40</td>
<td>15</td>
<td>25</td>
</tr>
<tr>
<td>11-20</td>
<td>25</td>
<td>05</td>
<td>20</td>
</tr>
<tr>
<td>21-30</td>
<td>100</td>
<td>20</td>
<td>80</td>
</tr>
<tr>
<td>31-40</td>
<td>85</td>
<td>30</td>
<td>55</td>
</tr>
<tr>
<td>41-50</td>
<td>30</td>
<td>11</td>
<td>19</td>
</tr>
<tr>
<td>51-60</td>
<td>10</td>
<td>03</td>
<td>07</td>
</tr>
<tr>
<td>More than 60</td>
<td>10</td>
<td>03</td>
<td>07</td>
</tr>
<tr>
<td>Total cases</td>
<td>300</td>
<td>87</td>
<td>213</td>
</tr>
</tbody>
</table>

2. Marital status and time since marriage

Considering the marital status, it was observed that 210(70%) were married, 73(25.5%) were unmarried including the children of unmarriageable age and 07 (4.5%) were widower or widow.

3. Educational status

Most of the burn victims were literate compared to illiterate. Maximum number of victims was educated only up to primary school level.

4. Rural/urban incidence

The incidence of burn was more in rural area, both in males and females. This can be because of the main catchment area of our hospital being the rural area.

<table>
<thead>
<tr>
<th>Rural/urban</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural</td>
<td>48(68%)</td>
<td>192(84.0%)</td>
<td>240(80.0%)</td>
</tr>
<tr>
<td>Urban</td>
<td>23(32%)</td>
<td>37(16.0%)</td>
<td>60(20.0%)</td>
</tr>
<tr>
<td>Total</td>
<td>71(100%)</td>
<td>229(100%)</td>
<td>300(100%)</td>
</tr>
</tbody>
</table>

5. Occupation

Housewives constituted the largest group comprising 150 cases (50%) of the total accidental burns.

This was followed by unskilled workers including farmers and labors (15.7%), students (09.32%), employed i.e. skilled and professionals (07%) and others including the unemployed and children constituted 14% of total accidental burn victims.

6. Economic condition

Most of accidents due burns occurs in peoples of low standard living & poor economic status.

7. Time of sustaining burn injury

Maximum burn injuries occurred during the usual time of cooking or the working time in the kitchen.

<table>
<thead>
<tr>
<th>Time of burn</th>
<th>Total cases</th>
<th>percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 Noon-4 am</td>
<td>44</td>
<td>44(14.7%)</td>
</tr>
<tr>
<td>4 pm - 8 pm</td>
<td>86</td>
<td>86(28.8%)</td>
</tr>
<tr>
<td>8 pm - Midnight</td>
<td>42</td>
<td>42(14.00%)</td>
</tr>
<tr>
<td>Midnight - 4 am</td>
<td>09</td>
<td>09(03.00%)</td>
</tr>
<tr>
<td>4 am - 8 am</td>
<td>21</td>
<td>21(07.00%)</td>
</tr>
<tr>
<td>8 am - 12 Noon</td>
<td>98</td>
<td>97(32.5%)</td>
</tr>
<tr>
<td>Total</td>
<td>300</td>
<td>300(100%)</td>
</tr>
</tbody>
</table>
8. Place of burn

Most of the accidental burn cases were domestic (263 cases) and only 37 cases were non-domestic. The burn injury sustained inside the kitchen and in females working in the kitchen was highest constituting 162 cases (54.0%)

Table 4: Distribution of accidental burn cases according to place of burn.

<table>
<thead>
<tr>
<th>Place</th>
<th>Sex</th>
<th>Flames</th>
<th>Scalds</th>
<th>Electric</th>
<th>Radiation</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Kitchen</td>
<td>M</td>
<td>25</td>
<td>19</td>
<td>00</td>
<td>-</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>147</td>
<td>14</td>
<td>00</td>
<td>-</td>
<td>161</td>
</tr>
<tr>
<td>2. Home excluding kitchen</td>
<td>M</td>
<td>15</td>
<td>11</td>
<td>02</td>
<td>-</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>25</td>
<td>03</td>
<td>02</td>
<td>-</td>
<td>30</td>
</tr>
<tr>
<td>Non-domestic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Field/open place</td>
<td>M</td>
<td>05</td>
<td>00</td>
<td>05</td>
<td>02</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>00</td>
<td>02</td>
<td>00</td>
<td>04</td>
<td>06</td>
</tr>
<tr>
<td>2. Place of work</td>
<td>M</td>
<td>03</td>
<td>00</td>
<td>05</td>
<td>04</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>00</td>
<td>00</td>
<td>07</td>
<td>07</td>
<td>07</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>220</td>
<td>49</td>
<td>14</td>
<td>17</td>
<td>300</td>
</tr>
</tbody>
</table>

Table 5-Distribution of accidental burn cases according to type of burn.

<table>
<thead>
<tr>
<th>Type of burn</th>
<th>Sex</th>
<th>Male/Female</th>
<th>Age group (years)</th>
<th>Total cases</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0-10</td>
<td>11-20</td>
<td>21-30</td>
<td>31-40</td>
</tr>
<tr>
<td>Flames</td>
<td>Male</td>
<td>02</td>
<td>04</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>08</td>
<td>16</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>Subtotal</td>
<td>10</td>
<td>20</td>
<td>90</td>
</tr>
<tr>
<td>Scalds</td>
<td>Male</td>
<td>20</td>
<td>01</td>
<td>03</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>15</td>
<td>02</td>
<td>02</td>
</tr>
<tr>
<td></td>
<td>Subtotal</td>
<td>35</td>
<td>03</td>
<td>05</td>
</tr>
<tr>
<td>Electric</td>
<td>Male</td>
<td>00</td>
<td>00</td>
<td>02</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>00</td>
<td>02</td>
<td>00</td>
</tr>
<tr>
<td></td>
<td>Subtotal</td>
<td>00</td>
<td>02</td>
<td>02</td>
</tr>
<tr>
<td>Radiation</td>
<td>Male</td>
<td>00</td>
<td>00</td>
<td>01</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>00</td>
<td>00</td>
<td>03</td>
</tr>
<tr>
<td></td>
<td>Subtotal</td>
<td>00</td>
<td>00</td>
<td>04</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>45</td>
<td>25</td>
<td>101</td>
</tr>
</tbody>
</table>

Accidental burn injury by flame was common in adults & females while scalds were most common in children.

9. Type of burn injury

Accidental burn injury by flame was common in adults and females while scalds were most common in children and males.

10. Pattern of clothing- most of accident due to burns i.e. 70% occurred due to wearing synthetic & mixed clothing.

11- Source of flame burns- most of accidents due to flames (almost fifty percentage) occurred from sources like use of inflammable liquids, kerosene stove or kerosene lam

Table 6: Type of burn cases (Percentage)

<table>
<thead>
<tr>
<th>Manner</th>
<th>Flames</th>
<th>Scalds</th>
<th>Electrical</th>
<th>Radiation</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accidental</td>
<td>220(73.0%)</td>
<td>49(16%)</td>
<td>14(5%)</td>
<td>17(6.0%)</td>
<td>300 (100.0%)</td>
</tr>
</tbody>
</table>
DISCUSSION

Majority of studies in India have reported the maximum incidence of accidental burn between the age of 15 to 40 years, with an overall female preponderance 6,7,8,9,10,11,12,13,14,15,16,17.

In our study the same was reflected with a female predominance (sex ratio 2.2:1). The commonest age group affected was 21 to 30 years (80 cases) followed by the age group between 31 to 40 years (55 cases). Female dominance in victims of burn was almost in all age group.

This can be attributed to involvement of females in kitchen work even at a younger age, early marriage system, more of a social burden leading to depression and bride burning. The studies carried in western countries showed male predominance and extremes of ages.

(Children and old peoples) were involved in burns 2, 3, 18, 19,20,21,22.

The incidence of burn was maximum in young married females 6,23. The maximum cases (69%) we studied were married. Educational status plays an important role in decreasing the burn incidence, both by increasing the awareness in handling of inflammable substances, safety measures, improving the economic status and personality. Most of the studies have shown that the incidence of burn was more in illiterate 6,7,8,9.

Increasing awareness about the education and governments programs to increase literacy levels may be the reason behind this change in observation as compared to the studies carried out in earlier years. In this study, most of the victims who sustained burn injuries due to accidents were from the rural area Sinha, reported similar higher incidence in rural areas & it suggests there is long way to provide suitable housing conditions for the rural populations.

Occupation of a person makes him or her susceptible for burn. Majority of victims in our study were housewives engaged in cooking followed by unskilled workers. Similar findings were also reported by sen & sharma. The predisposing factors for high incidence of burn in housewives were frequent exposure to cooking, inadequate knowledge of handling high pressure stoves, too much demand of work leading to hurried job and accidents .children were burnt accidentally due to carelessness. Ambade et al 7 and Sharma et al 10 also observed the high incidence of burn in housewives.

Among the victims of electrical burn we studied, three sustained burn while repairing high tension electric cables. Literature reveals that the occupation related burns were common in electricians, welders etc. 16.

Most of the accidental burns occurred usually at the time of cooking or working in Kitchen i.e. domestic burn 6,7,8,10,12. Flame burns are common in adults.

While scalds are common in children 6, 7, 10, 12.

We observed that the scalds were common in males as compared to females and most of these cases were children below ten years of age. Similar is mentioned in the literature 3,10,13,19.

Contrary to this Parks et al 25 had reported maximum scalds in adults with equal sex distribution. In the present study most of the electric burn victims were males (85.3%). Dandapat et al 16 in his study reported that all the electric burn cases were males while Ghuliani et al 7 had reported 90.9% electric burn cases occurring in males. In present study most of radiation burn victim’s sustained burns due to accidental exposure to radiation sources ,radiation skin toxicity is from the irradiation of breast or chest wall as reported in other reported studies 27 & most of victims sustained radiation burn injuries due to prolonged accidental exposure & mostly more in females (70.00%), as compared to males (30%)

It was also observed the majority of injuries occurred in between 8 pm & 12 midnight which is usual time of cooking & lighting equipment.

The factors like unprotected source of fire, cooking at floor level, loose footing synthetic garments & accidental exposure to radiation source were Mainly responsible for accidental burns 7,8,10,27.

Preventive strategies

To reduce incidence of accidental burns, few preventive measures are suggested. The most common source of accidental burn injuries in this setting are use
of kerosene & kerosene pressure stoves. These two should be banned & alternate safe technology like LPG or electric stoves or solar cookers or even some new technology should be made easily available to rural households. Education of general public specially the vulnerable group, burning and lightening agents should not be left unguarded, small children should be kept away from fire sources or kitchen, safety means in factories safety precautions while exposure to radiation Should be strictly observed. Above all, it needs a change in the social tradition and custom.

CONCLUSION

Accidental burns in developing countries like us is still increasing, despite of all the fact that, existing laws are revised and many non-government organizations (NGOs) are working in this matter, burn fatalities continue to occur.

The present scenario of accidents due to burn injury cases in rural area helps to emphasis the fact that, unlike in the western countries, the burn fatalities in India go beyond the meaning implied in term ‘accident’. Thus burn cases need a thorough investigation to enable the legal system, public health agencies & medicolegal expert to take necessary action in preventing this social evil.

REFERENCES


Sexual Wing Shape Dimorphism in *Piophila casei* (Linnaeus, 1758 Diptera: Piophilidae)

**Jose Nuñez Rodríguez**, **Jonathan Liria**


**ABSTRACT**

The Piophilidae are synanthropic flies that grow and develop on cheese, fish, cured meat, among others substrates. Some species represents an important forensic indicator associated to carcasses, because the adults are common during the bloat stage, and the larvae are associated to the advanced to dry stages. Recently, the geometric morphometrics has been used to quantify the sexual shape dimorphism in medical important insects. We proposed to evaluate the shape sexual dimorphism in *Piophila casei* through the wing geometric morphometrics. Were collected 34 *P. casei* specimens and sorted by sex (17 females and 17 males), later the wing was dissected and slide mounted for digitalizing eight landmarks. The x,y coordinates were aligned by Generalized Procrustes Analysis to extract the matrix configurations and centroid size. The sexual shape dimorphism differences were evaluated by means a Discriminant Analysis (DA), and the size with non-parametric ANOVA. We didn’t found differences in centroid size between females and males; however, the shape was significantly different between sex. In the cross-validation DA, 82% specimens were correctly classified into females and 88% males. Our study represents the first investigation that quantifies the sexual shape and size dimorphism in *Piophila casei*, and this could be a basis for further studies that combines geometric morphometrics tools and forensic entomology.

**Keywords:** Phiophilinae, Procrustes analysis, Geometric morphometrics, Forensic entomology.

**INTRODUCTION**

The Piophilidae commonly know as “cheese skippers”, most species are scavengers and synanthropic flies that grow and develop on cheese, fish, cured meat, human excreta, household garbage, among others substrates [1,2]. In the stored food industry are an economically important pests [3,4], also some species has been reported to cause human myiasis [5,6,7].

From a forensic point of view, some Piophilidae species represents an important indicator associated with carcasses, because the adults are common during the bloat stage, and the larvae are associated to the advanced and dry/remain stages [4,8,9]. *Piophila casei* (Linnaeus, 1758) adults are attracted by the carrion in early stages [10]; however, some investigations suggested that the presence of adult does not necessarily is associated to oviposition on the carcass; and it has been assumed that immature stages do not develop in a corpse until 3-6 months after death when fatty acids and caseic products are present [3]. Nevertheless, *P. casei* has had little forensic importance and is unnoticed in most cases because of its small size (2-5 mm) and as referred to secondary colonizer. The immature stages of some Piophilidae species are still unknown, and the correct identification is a crucial factor for the Postmortem interval estimation [11,12]. Due to this, some studies are focused on determined the life cycle and life statistical parameters in different temperature [2,13]; also the sexual dimorphism is an interesting source of phenotypic variation, and several Piophilidae species showed sex differences among head, foreleg, and wings...
Geometric morphometrics is a technique that quantifies phenotypic differences among groups, and recently demonstrated its importance for blowfly adult and immature taxonomic identification. In our investigation, we proposed to evaluate the shape sexual dimorphism in *P. casei* through the wing geometric morphometrics.

**MATERIAL AND METHOD**

Specimens source and data acquisition: *Piophila casei* specimens were obtained from collections in an urban area of Valencia (10°13’78” north Latitude and 68°00’32” west Longitude) between February and May 2016. The 34 specimens were sorted by sex (17 females and 17 males), and the right wing was dissected, slide mounted and photographed. Were selected eight anatomical points (Figure 1) type I and morphological definitions of McAlpine: Intersection between subcostal vein and costal (LM1), intersection between radial (R1) and wing margin (LM2), intersection between radial (R1+2) and wing margin (LM3), intersection between radial (R1+2) and wing margin (LM4), intersection between medial (M1) and wing margin (LM5), intersection between medial and transversal discal medial-cubital (LM6), intersection between radial (R1+2) and transversal radio-median (LM7), and medial with transversal radio-median (LM8).

Morphometric analysis: From 34 configurations matrix, the coordinates were aligned by Generalized Procrustes Analysis using MorphoJ software to extract the matrix configurations (Partial Warps = PW) and centroid size (CS). Later, the PW matrix was used to perform a Discriminant Analysis (DA) for testing the group (sex) membership significance with Hotelling’s test. Also was estimated the group configuration differences with TwoGroup software, by means a Goodall test. The F test compares the difference in mean shape between two samples relative to the shape variation found within the samples. For statistical significance, we perform an F test based on a Bootstrap analysis on 1000 random data permutations. Finally, CS differences were analyzed with PAST software by means the non-parametric Kruskal-Wallis test with Bonferroni correction.

**RESULTS**

Centroid size: Were not found significant differences ($\chi^2 = 0.003$, df 1, $P = 0.958$) among the wing centroid size between sex; the females specimens shows similar size (mean 2.60 mm, 0.52 standard deviation) than males (2.66 ± 0.44).

**Wing conformation:** Figure 2 shows the DA results for 34 *P. casei* specimens: histogram with values of the discriminant scores for sex (Figure 2A) and the thin-plate spline deformation grid with the differences between females and males (Figure 2B). The main sex distinction occurs in two landmarks: intersection between medial and transversal discal medial-cubital (LM6) moved to the posterior wing margin, and intersection between medial with transversal radio-median (LM8) displacement to wing base. The DA Hotelling and Goodall tests show significant differences between female and male conformations: $T^2 = 110.74$; $P < 0.001$ and $F = 3.21$; df = 12,384; $P < 0.0001$, respectively. Finally, in the cross-validation DA, 82% specimens were correctly classified into females and 88% males.

**DISCUSSION**

In general, insects females are larger than males, due to adaptive advantages such as greater fecundity and better parental care. Sexual dimorphism is of interest in entomological studies since frequently the differences between sexes are not obvious or the individuals are very small; *Piophilidae* females are easy to recognize by the weakly telescopic piercing ovipositor.

Many studies has been reported the wing utility for dimorphism description in medical entomology important species. In Triatominae, the transition to different ecotopes (sylvatic, peridomestic and domestic habitats) are associated to size variations: the body is larger for specimens found in natural conditions, versus those reared in the laboratory or collected in domiciliary habitats. In general, Triatominae sylvatic females are larger than males, but in colonies (or domestic habitats) some species showed strongly reduced sexual dimorphism, becoming the same size. Virginio *et al.* explored the wing sexual shape and size variation in ten Culicidae species, found significant sexual dimorphism in all the species studied, indicating that phenotypic expression of wing shape in mosquitoes is indeed sex-specific.

Bonduriansk and Rowe conducted arena experiments in male-male combats of *Prochyliza*...
xanthostoma Walker, 1849 (Piophilidae), and encountered that the first interaction with a new opponent selected for large body size but reduced head elongation, whereas multiple interactions with the same opponent favored large body size only. In contrast, male-female interactions, females preferred males with relatively elongated heads. Thus, both male-male and male-female interactions favored large male body size, while male head shape appeared to be subject to conflicting sexual selection. Later, Bonduriansk [29] studied the dimorphism patterns in *P. xanthostoma*, and stated that these differences may have evolved in response to sexual selection on male body shape, suggesting a shared pattern of covariation among traits (head, thorax and wing) may have conducd the evolution of sexually body elongation. Recently, Oudin *et al.* [15] reported the dimorphism in *Protopiophila litigata* Bonduriansky (1995) reared under different larval diets. The sex variation did not increase with diet quality within any trait (head, thorax, tibia and wing), among traits the extent of dimorphism was positively associated with the strength of condition dependence in males but not females.

Our study represents the first investigation that quantifies the sexual shape and size dimorphism in *Piophila casei*, and this could be a basis for further studies that combines geometric morphometrics tools and forensic entomology.

Figure 1. Wing of *Piophila casei* showing the landmarks (1-8) disposition. The polygon enclosed by the points conform the configurations analyzed.

Figure 2. Discriminant analysis for 34 *Piophila casei* specimens: A) histogram with the values of the discriminant scores for groups: 1 = females and 2 = males, and B) the thin-plate spline deformation grid with the differences between females and males.
Ethical Clearance. Was not required.

Source of Founding. This project was supported by JNR initiative.

Conflict of Interest. We declare that no conflict of interest.

REFERENCES


Study of Socio Demographic Profile in Homicidal Deaths

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ABSTRACT

Present study was carried out over a period of 2 years. From October 2010 to September 2012. A total of 220 cases of homicidal deaths were studied in the Department of Forensic Medicine, Bangalore Medical College and Research institute, Bangalore.

Among 220 cases of homicidal deaths most of the victims belongs to the age group of 20-29 years (36.8%), majority being males, married and of middle socioeconomic status (53.6%) and native of bangalore (74.5%)

Keywords: Homicide, Social Factors, Medico-legal issues.

INTRODUCTION

Homicide means the death of the one human being as the result of conduct of another. It may be lawful, as killing in self defence in certain circumstances or causing death by sheer misadventure. For the purpose of homicide the death may be caused either by an act or by an omission but in either case they must be proved to be the consequence of the alleged killer’s conduct¹.

Killing of an individual is the highest level of aggression found in all the cultures. Since ages the very reason or motive for these killings has remained the same viz - lust for money, women and land. To commit murder, two elements (“Mens – rea” which means preplanning or afore thought and “Actus reus” which means the actual execution) should work together to constitute the crime.

Homicidal pattern vary from country to country and from one region to another, and are influenced by many factors like family relationships like marital disputes, cultural, psychological, social influences, religious attitudes, criminal activities, drug culture, political factors, unemployment and low socio economics status².

MATERIALS AND METHOD

The present study was conducted in the department of Forensic Medicine Bangalore Medical College and Research Institute (Victoria and Bowring and Lady Curzon hospitals) Bangalore, from Oct 2010 to Sep 2012, a period of 2 years.

All the cases brought to the department for medico legal autopsy registered under section 302 IPC with alleged history of homicide and also the cases registered under 174 (3) CrPc which were later registered as homicide were studied.

Detailed information regarding the circumstances of crime was sought from the police, victim’s relatives and friends, visits to the scene of occurrence or deduced by the photographs of the scene of occurrence.
OBSERVATION

TABLE-1: Distribution of victims based on age and sex.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Age group in years</th>
<th>Male</th>
<th>%</th>
<th>Female</th>
<th>%</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0-9</td>
<td>05</td>
<td>3.1</td>
<td>05</td>
<td>7.9</td>
<td>10</td>
<td>4.5</td>
</tr>
<tr>
<td>2</td>
<td>10-19</td>
<td>10</td>
<td>6.3</td>
<td>03</td>
<td>4.7</td>
<td>13</td>
<td>5.9</td>
</tr>
<tr>
<td>3</td>
<td>20-29</td>
<td>65</td>
<td>41.4</td>
<td>16</td>
<td>25.3</td>
<td>81</td>
<td>36.8</td>
</tr>
<tr>
<td>4</td>
<td>30-39</td>
<td>35</td>
<td>22.2</td>
<td>14</td>
<td>22.2</td>
<td>49</td>
<td>22.2</td>
</tr>
<tr>
<td>5</td>
<td>40-49</td>
<td>29</td>
<td>18.4</td>
<td>17</td>
<td>26.7</td>
<td>46</td>
<td>20.9</td>
</tr>
<tr>
<td>6</td>
<td>50-59</td>
<td>11</td>
<td>7</td>
<td>03</td>
<td>4.7</td>
<td>14</td>
<td>6.3</td>
</tr>
<tr>
<td>7</td>
<td>&gt;60</td>
<td>02</td>
<td>1.27</td>
<td>05</td>
<td>7.9</td>
<td>7</td>
<td>3.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>157</td>
<td>100</td>
<td>63</td>
<td>100</td>
<td>220</td>
<td>100</td>
</tr>
</tbody>
</table>

By observing the above table though all the age groups are affected, the vulnerable age group is 20-29 years in both sexes constituting 36.8% of the total victims. Least number of victims belonged to the age group of >60 years (3.1%). The age group 0-9 years constituting 4.5%. The age group 30-39 years constituting 22.2 % female victims

TABLE-2: Distribution of victims according to Native.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Nativity</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bangalore</td>
<td>164</td>
<td>74.5</td>
</tr>
<tr>
<td>2</td>
<td>Immigrant</td>
<td>45</td>
<td>20.4</td>
</tr>
<tr>
<td>3</td>
<td>Not known</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>Total</td>
<td>220</td>
<td>100</td>
</tr>
</tbody>
</table>

It is imperative from the above table that the maximum number of victims (74.5%) were residents of Bangalore city as compared to the immigrants (20.4%) as the study was confined to a particular region, the factors being same viz marital disputes, dowry, etc and among the immigrants who came in search of employment were because of lack of local family support and were victims of monetary gain, arguments and infidelity. This could also be attributable to real estate rivalry, gang wars, immigrant depriving the facilities/employment opportunities to the local people.

TABLE-3: Distribution of victims according to marital status.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Status</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Married</td>
<td>119</td>
<td>54</td>
</tr>
<tr>
<td>2</td>
<td>Un married</td>
<td>80</td>
<td>36.3</td>
</tr>
<tr>
<td>3</td>
<td>Widow</td>
<td>2</td>
<td>0.9</td>
</tr>
<tr>
<td>4</td>
<td>Divorce</td>
<td>6</td>
<td>2.7</td>
</tr>
<tr>
<td>5</td>
<td>Not known</td>
<td>13</td>
<td>5.9</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>220</td>
<td>100</td>
</tr>
</tbody>
</table>

From study it can be observed that married couples 54% constituted the most, 36% unmarried, divorce constitutes 6%.
TABLE-4: Distribution of victims based on socioeconomic status.

<table>
<thead>
<tr>
<th>S E Class</th>
<th>Number</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper</td>
<td>11</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>Middle</td>
<td>38</td>
<td>118</td>
<td>53.6</td>
</tr>
<tr>
<td></td>
<td>80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower</td>
<td>80</td>
<td>80</td>
<td>36.3</td>
</tr>
<tr>
<td></td>
<td>00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not known</td>
<td>11</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>220</td>
<td></td>
</tr>
</tbody>
</table>

In the above observation the maximum numbers of victim (53.6%) were from the middle socio-economic status followed by lower socio economic status (36.3%).

DISCUSSION

A total of 220 cases of homicidal deaths were studied, though all the age groups are affected, the majority of the victims were men (41.4%). The most common age group of victims were 20-29 year old (36.5%). This study correlates with the study conducted by Lee-Gorman et al stating the trends and patterns of homicide in the Republic of Ireland over five year period (2004-2008). In total 293 cases were studied the majority of the victims were men and most common age group was 20-29 years old. Similar observations were made in studies by shivakumar et al (M:F-3:1), Bhupender S et al (M:F-3:1), Dheeraj B et al, Aich M et al, all the victims were in the age group 21-30 years. Majority of the victims were male.

The factors contributing for highest incidents in the 20-29 age groups were due to marital disputes, infidelity, and related to dowry in females and gang rivalry, revenge, unemployment, arguments and financial conflicts were the reasons in males. Similer observations made in the study by Hugar B S et al, stating Pattern of Homicidal deaths.

It is observed that among 220 cases 119 are married (54%). this study correlates with the study conducted by kumar v et al stating a study of homicidal deaths in medico-legal autopsies at ummc, Kuala Lumpur. Data were collected on 217 homicidal victims A majority of victims were married (47%).

In the study the more number of victims belongs to middle socio-economic class (53.6), followed by low socio-economic class (36.3%). A similar observation was made by Kumar v et al where (71.9%) of the victims came from semi skilled and unskilled group.

CONCLUSION

- Strict law enforcement and strongly implementing the punishments for the crimes.
- Due to fast growth of metropolitan cities like Bangalore crime rates increasing. Legislature, executive and judiciary has great role in enforcement of strict proper rules in furtherance of preventing crimes.
- In most crimes younger age groups involved, problems being unemployment, financial problems, family and marital disputes, involving in antisocial activities. Recognizing problems among these individuals by the government and appropriate organizations in furtherance of reducing crimes.

- **Ethical Clearence** taken from Bangalore Medical College and Research Institute ethical committee.
- **Source of Funding** - Self
- **Conflict of Interest** - Nil

REFERENCES


Knowledge and Attitude of Medical Students and Interns Towards Medicolegal Autopsy

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ABSTRACT

Background: Autopsy is a research tool having a multi-factorial role in medical education and medical practice. Aims and Objectives: The present study is planned to assess the knowledge and attitude of medical students and interns towards medicolegal autopsy. Material and Method: A cross-sectional and questionnaire-based study was conducted among 145 MBBS students and 155 interns who had witnessed medicolegal autopsy. Results: We observed that most of the participants possessed a reasonable knowledge and carried a positive attitude towards medicolegal autopsy. Source of knowledge for autopsy procedure was predominantly medical curriculum, 244 (81.3%) participants refused to specialize in Forensic Medicine and Toxicology. Conclusion: We concluded that participant of present study emphasized the importance of medicolegal autopsy in medical education and medical autopsy should not be scrapped from medical curriculum.

Keywords: Medicolegal autopsy, questionnaire-based study, medical students, interns, knowledge, attitude.

INTRODUCTION

Autopsy as a research tool has been used for centuries, which is having a multifactorial role in modern undergraduate medical education and medical practice. Autopsy means postmortem examination of a body. The word autopsy is derived from the Greek word “autopsia”, which means “to see with one’s own eyes”. It can be divided into clinical or academic and medico-legal autopsy. A clinical autopsy helps in the identification of a person’s illness or cause of death whereas the medicolegal autopsy plays a vital role in the administration of justice. Virchow and Osler previously used the autopsy in the nineteenth century to understand the pathology of fatal diseases such as endocarditis and pulmonary embolisms by correlating pre and post mortem findings¹.

The value of autopsy has been proven in its elucidation of the cause of death, clinical quality control, medical auditing and in medical education. Autopsies raise opportunities to discuss ethical and legal aspects of death and death certification. Despite of this fact, the use of autopsy in medical education has been declining, just as autopsy rate has been falling worldwide²-³, which is furthermore worsened by authorities deterring medical students from attending autopsy sections in some areas. It is a matter of concern. Various reasons for the decline in autopsy-based teaching include insufficient hospital autopsies, competing departmental duties and limited curriculum time⁴-⁵. However in India, as per the curriculum of the Medical Council of India, a medical student should witness a minimum number of medico-legal autopsies in the second year of graduation so that they can observe and interpret various findings in organs and tissues and an intern is supposed to acquire the skill of doing a medico-legal autopsy. Thus, every medical graduate is presumed to be capable of doing a medico-legal autopsy after graduation⁶.

Knowledge of autopsy will broaden the students’ mind and enhance a more accurate diagnosis during the subsequent years of their clinical practice as doctors. It is important to get the views of medical students in relation to its relevance in medical education and to justify the continuous inclusion of autopsy in medical curriculum. Till date various studies⁷-¹⁰ have been conducted to know the attitude of different types of persons like public, family members of the deceased, and medical professionals in this respect, but studies relating to the
knowledge and attitude of medical students on autopsy are very few specially among developing countries like ours. With this in mind, this study is planned to assess the knowledge and attitude of medical students and interns towards medicolegal autopsy.

MATERIAL AND METHOD

The present cross-sectional, questionnaire-based study was conducted at NKP Salve Institute of Medical Sciences and Research Centre, Nagpur, from June 2015 to June 2016 after obtaining approval from Institutional Ethics Committee. The study population consisted of 300 participants (145 MBBS students and 155 interns) who either had studied or currently were studying Forensic Medicine and Toxicology subject and had witnessed medicolegal autopsy. They were selected by simple random sampling. The students who had not witnessed medico-legal autopsy and who were not available or refused to participate were excluded from the study.

The questionnaire was pretested on a group of 10 MBBS students and 10 interns, who were excluded from final analysis and was modified accordingly. A structured and validated questionnaire was used for the study to collect information regarding knowledge and attitude towards medicolegal autopsy. Prior to administering the questionnaire, the participants were addressed regarding the purpose and process of data collection. They were informed that data collected would be anonymous and their participation would be voluntary. Questionnaires were distributed among the participants after taking their informed consent. The data was entered in the excel sheet and analyzed by using Epi-Info 7 statistical software for percentage, mean, standard deviation, t test and Chi-square test. Pearson Chi-square test was used to find out statistical significance of differences in proportions. A p-value of <0.05 was considered to be significant.

RESULTS

The response was gathered from 145 MBBS students and 155 interns, age ranged between 19 years to 25 years (mean = 21.77 years, SD = 1.67) as the commonest age of admission into medical college in India is between 17-20 years. The study sample consisted of 143 males (47.7%) and 157 (52.3%) females (Table 1). All participants had witnessed minimum 10 medicolegal autopsies which is a mandatory requirement as per the syllabus prescribed by Medical Council of India.

Table 1: Demographic data

<table>
<thead>
<tr>
<th>Year of study</th>
<th>Males</th>
<th>Females</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBBS student</td>
<td>63(43.4%)</td>
<td>82(56.6%)</td>
<td>145(100%)</td>
</tr>
<tr>
<td>Interns</td>
<td>80(51.6%)</td>
<td>75(48.4%)</td>
<td>155(100%)</td>
</tr>
<tr>
<td>Total</td>
<td>143(47.7%)</td>
<td>157(52.3%)</td>
<td>300(100%)</td>
</tr>
</tbody>
</table>

In most of the students 138 (95.2%) and interns 131 (84.5%), source of knowledge regarding autopsy was medical curriculum (Figure 1).

![Figure 1: Source of knowledge](image1)

We observed that maximum students 110 (75.8%) and interns 133(85.8%) were uncomfortable on first exposure to autopsy procedure (Figure 2).

![Figure 2: Reaction on first exposure to autopsy](image2)

In the current study, knowledge and attitude of medical students and interns towards medicolegal autopsy was tested and results are tabulated (Table 2 and Table 3).
Table 2: Knowledge regarding medicolegal autopsy

<table>
<thead>
<tr>
<th>Knowledge regarding medicolegal autopsy</th>
<th>MBBS students n= 145</th>
<th>Interns n= 155</th>
<th>Chi-square</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indications for autopsy</td>
<td>142(97.9%)</td>
<td>149(96.1%)</td>
<td>13.408</td>
<td>0.00025</td>
</tr>
<tr>
<td>Objectives of autopsy</td>
<td>126(86.8%)</td>
<td>147(94.8%)</td>
<td>25.916</td>
<td>0.01587</td>
</tr>
<tr>
<td>Prerequisites for autopsy</td>
<td>106(73.1%)</td>
<td>138(89.1%)</td>
<td>17.944</td>
<td>0.00002</td>
</tr>
<tr>
<td>Autopsy involves external and internal examination</td>
<td>143(98.6%)</td>
<td>148(95.5%)</td>
<td>46.291</td>
<td>0.11104</td>
</tr>
<tr>
<td>Types of skin incisions</td>
<td>140(96.5%)</td>
<td>153(98.7%)</td>
<td>33.338</td>
<td>0.21576</td>
</tr>
<tr>
<td>Autopsy involves taking out of viscera if indicated</td>
<td>134(92.4%)</td>
<td>141(90.9%)</td>
<td>0.931</td>
<td>0.33451</td>
</tr>
<tr>
<td>Preservatives used for histopathology and chemical analysis</td>
<td>135(93.1%)</td>
<td>143(92.3%)</td>
<td>0.419</td>
<td>0.51694</td>
</tr>
<tr>
<td>Virtual autopsy</td>
<td>97(66.8%)</td>
<td>103(66.5%)</td>
<td>0.0053</td>
<td>0.96756</td>
</tr>
</tbody>
</table>

Table 3: Attitude regarding medicolegal autopsy

<table>
<thead>
<tr>
<th>Attitude regarding medicolegal autopsy</th>
<th>MBBS students n= 145</th>
<th>Interns n= 155</th>
<th>Chi-square</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of autopsies watched was enough</td>
<td>112(77.2%)</td>
<td>137(88.4%)</td>
<td>10.671</td>
<td>0.00108</td>
</tr>
<tr>
<td>More autopsies should be witnessed</td>
<td>105(72.4%)</td>
<td>104(67.1%)</td>
<td>0.370</td>
<td>0.54288</td>
</tr>
<tr>
<td>Students should actively participate in autopsy</td>
<td>107(73.8%)</td>
<td>138(89.1%)</td>
<td>16.269</td>
<td>0.00005</td>
</tr>
<tr>
<td>Anonymity of deceased should be maintained</td>
<td>139(95.8%)</td>
<td>146(94.2%)</td>
<td>3.796</td>
<td>0.05136</td>
</tr>
<tr>
<td>Dead bodies should be given due respect</td>
<td>141(97.2%)</td>
<td>149(96.1%)</td>
<td>3.939</td>
<td>0.04715</td>
</tr>
<tr>
<td>Autopsy causes disfigurement of body</td>
<td>132(91.1%)</td>
<td>103(66.5%)</td>
<td>35.588</td>
<td>0.00001</td>
</tr>
<tr>
<td>Actual autopsy should be replaced by virtual autopsy</td>
<td>127(87.6%)</td>
<td>148(95.5%)</td>
<td>30.953</td>
<td>0.01299</td>
</tr>
<tr>
<td>Don’t wish to have autopsy on self / relatives</td>
<td>97(66.8%)</td>
<td>111(71.6%)</td>
<td>0.271</td>
<td>0.60216</td>
</tr>
<tr>
<td>Utility of autopsy in medical education</td>
<td>139(95.8%)</td>
<td>152(98.1%)</td>
<td>19.868</td>
<td>0.00008</td>
</tr>
<tr>
<td>Utility of autopsy in administration of justice</td>
<td>137(94.5%)</td>
<td>148(95.5%)</td>
<td>1.335</td>
<td>0.24790</td>
</tr>
<tr>
<td>Autopsy should not be removed from medical curriculum</td>
<td>113(77.9%)</td>
<td>141(90.9%)</td>
<td>19.951</td>
<td>0.00009</td>
</tr>
</tbody>
</table>
In spite of the awareness regarding importance of autopsy, most of the participants 244 (81.3%) refused for specialization in Forensic Medicine and Toxicology for the various reasons (Figure 3).

![Figure 3: Reasons for not specializing in Forensic Medicine](image)

**DISCUSSION**

Autopsy is the procedure which establishes the cause and manner of death accurately for clinical as well as medicolegal purpose and allows the identification of new and re-emerging diseases thus protecting public health. In medical education, autopsies are being used for teaching to medical students worldwide. Autopsy-based teaching is a low cost teaching technique having application in many diverse medical specialties and skills.

In the present study, we observed female preponderance which is in accordance with Khoo JJ\(^{11}\), but differs from others\(^{12-15}\). The source of knowledge about autopsy was predominantly medical curriculum which tallies with studies carried out in Gujarat\(^{16}\) and Delhi\(^{17}\).

The first time experience of observing autopsy is always disturbing for most of the persons. Similarly majority of participants in present study were uncomfortable on their first exposure to autopsy which was also recorded in previous studies\(^{13-20}\) except in few\(^{21-23}\). We observed that maximum participants were aware that medicolegal autopsy is performed in all unnatural, suspicious and sudden deaths which is in agreement with findings of previous authors\(^{13-21, 24-26}\). The medicolegal autopsy is carried out with objectives like to establish the identity of the body if unknown, to ascertain the cause and time of death, to decide whether death was natural or unnatural, in case of new born infants, to determine whether it was a live birth and its viability and so many. In our study, majority of participants were aware about same which is supported by other studies\(^{16, 19, 24, 26}\). To start an autopsy, we need an inquest report and requisition from investigating authority. When interviewed about prerequisites for autopsy, most of them were aware as in other studies carried out in medical students\(^{21-23}\).

Earlier studies\(^{13-16, 21-26}\) noted the awareness of most of the participants in positive that autopsy procedure involves both external as well as internal examination which is supported by our study. In some cases, we need to preserve viscera using preservatives if indicated for chemical analysis, histo-pathological and other type of examination. Most of the participants in current study were known to the situations where the viscera preservation is mandatory as per Indian law, which is supported by other researchers\(^{16-24}\). On the contrary, very few participants were aware about preservatives needed for viscera preservation in a study by Singh VP et al\(^{21}\).

All participants had witnessed minimum 10 autopsies each in their rotatory posting as per the norms suggested by MCI. Most of them stated that number of autopsies they witnessed was enough which is also pointed out by prior studies\(^{14, 19, 23-24}\), except in a study by Ekanem VJ et al\(^{15}\). Most of them indicated that more number of autopsies should be witnessed for better learning purpose. Our findings correspond with other studies\(^{15-24}\), however in a study by Rautji R et al\(^{14}\) only 47.7% recommended for more number of autopsies. Majority of them also confirmed that medical students should participate actively in performing autopsies as well. Similar findings were also documented in former studies\(^{14-19, 24}\).

Only 37% participants of a study by De Villiers F\(^{27}\) were of opinion that anonymity of deceased should be maintained strictly, however in present study 95.8% medical students and 94.1% interns stated that anonymity of deceased should be maintained strictly. Virtual autopsy is an autopsy without giving any incision, but on cellular level we have to do an actual autopsy. In this study, most of participants were willing for actual autopsy to be replaced by virtual autopsy. In a study by Ehsaan Roohi et al\(^{20}\), 45% agreed that actual autopsy should be replaced by virtual autopsy. When inquired about the matter of being autopsied oneself or their relatives if indicated, majority of students and interns refused for the same which is in agreement with
previous workers.

Jadav JC et al, Singh VP et al, and Bharathi Murugesu et al noted that maximum participants stressed the importance of autopsy for administration of justice which was in concordance with present work. We found that maximum participants emphasized the utility of autopsy in the medical education and hence stated that it should not be scrapped from medical curriculum. Similar response was recorded by almost all prior studies except in a study by Ruhaya M et al.

As far as the specialization in Forensic Medicine and Toxicology is concerned, most of the participants refused for the various reasons, the most common reason being interest in other subjects. Similar findings were observed by prior researchers.

CONCLUSION

Autopsy plays a vital role in medical education as well as medical practice. The knowledge of medicolegal autopsy in medical students and interns will broaden their perspectives and definitely will help legal system in delivering quick justice. Even though the magnitude of autopsy is large, its importance has diminished in recent period. So, being future ambassadors, practical training of autopsy should be emphasized for medical students for betterment in learning. In our study, most of the participants possessed a reasonable knowledge about medicolegal autopsy and carried a positive attitude for same. Current study also observed that participants valued the demonstration of medicolegal autopsy as a learning experience and emphasized that medicolegal autopsy should not be scrapped from medical curriculum.

Conflict of Interest: None

Source of Funding: Self.

REFERENCES

17. Verma SK. Teaching students the value of


An Investigation into the Side Effects of Entonox on Primiparas in Painless Labor

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ABSTRACT

Labor pain causes a great fear of vaginal delivery as well as increase of cesarean among women. Therefore, using harmless and efficacious pain relief methods is of great significance. Accordingly, the present study aimed at investigating the side effects of nitrous oxide on mother and fetus. This is a randomized controlled trial study carried out on 178 primipara candidates for natural. During the active labor phase, women were assigned to two groups; intervention group (89 women inhaling Entonox) and control group (89 women inhaling oxygen). The required data including age, gestational age, evidence of abruption, mode of delivery, meconium staining, fetal Apgar score, side effects of drug consumption, the amount of postpartum bleeding, initial hemoglobin concentration and its concentration 6 hours after delivery were recorded. Then the data were analyzed using SPSS software v.16, Chi-square formulas. There was no significant difference between the two groups in terms of the evidence of abruption, accelerated labor, meconium staining by the fetus, mean Apgar scores at 1 and 5 min and the final mode of delivery (P>0.05). Side effects such as dizziness and dry mouth were reported in the group inhaling Entonox. In two modes of vaginal delivery and cesarean section, the mean reduction in hemoglobin concentration 6 hours postpartum in the group inhaling Entonox was less than that in the control group (P<0.05). Compared to the use of oxygen, the use of Entonox gas for painless labor did not cause adverse effects on the mother and fetus; however, only minor side effects including drowsiness and dry mouth were observed. Furthermore, it was observed that Entonox causes less reduction in hemoglobin concentration of mother which may pertain to its positive effects on labor progress and its duration.

Keywords: Labor, Pain, Entonox, Oxygen.

INTRODUCTION

Labor pain is one of the most severe pains women experience within delivery.⁴ It can lead to adverse effects on labor progress and maternal and fetal conditions. Potential physiological effects of pain and their subsequent reactions include increased rate of basal metabolic and oxygen demand, respiratory alkalosis, elevated maternal heart rate and systolic pressure. Moreover, the side effects of labor pain on fetus include late deceleration in fetal heart rate as a consequence of a drop in maternal arterial oxygen pressure, a decrease in utero-placental blood flow due to intense uterine contraction during labor and fetal metabolic acidosis.⁵ The key factors in people’s response and pain perception are maternal age, parity, mother’s condition, bishop score at the first stage of labor, position of the fetus to the birth canal, and demographic and psychological factors.⁶ It must be mentioned that the pain is more intense and lasts longer in primiparas. The intensity of contractions in early labor in nulliparas is

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higher than multiparas. However, as the labor advances, the reverse condition comes true.\(^4, 5\) According to the previous studies, 77% of primiparas described labor pain as extreme and unbearable.\(^6\) An ideal pain reliever should produce good analgesia, be safe for both mother and fetus, controllable, reversible if necessary, easy to use, can be controlled by mother, does not interfere with uterine contraction, and does not affect the mobility of the mother. Entonox is a gas which is a mixture of 50% nitrous oxide and 50% oxygen. Using 50% nitrogen in oxygen dates back to 1961 in England when it was known as Entonox.\(^7\) Attempts to reduce labor pain has a long history in Asia and the Middle East and painless labor started since James Young Simpson first administered it.\(^8, 9\) Entonox is a ready-to-use mixture of 50:50 oxygen and N\(_2\)O contained in a single cylinder. This cylinder has a mask with a valve which opens with the patient's inhalation. Compared with epidural analgesia, some of the advantages of Entonox are being noninvasive, not damaging the spinal cord and making CSF infection, quick discharge from the body, not needing complicated and expensive equipment and specialized staff as well. This gas is not metabolized in kidney or liver and is removed from the body in the form of N\(_2\)O via the lungs. Thus, patients suffering from organ dysfunction can use it too.\(^10\) Nitrous oxide is itself active and doesn’t require any changes in the body in order to become active. It has an onset in roughly the lung–brain circulation time which takes 30 seconds and therefore it should be inhaled 30 seconds before a contraction becomes painful. Its analgesic effect is similar to 15 ml subcutaneous morphine. In a study, patients receiving nitrous oxide/oxygen (50:50) were compared with patients who only received oxygen. It was finally concluded that nitrous oxide noticeably reduced labor pain and had minor side effects.\(^5\) Labor pain has caused great fear of vaginal delivery and an increase in cesarean section among women in our society which is in turn associated with complications of anesthesia and surgery. On the other hand, nitrous oxide is an effective and popular method to reduce labor pain. Although it has been used as a pain reliever over a hundred years, few studies have examined its side effects. The aim current study sought to investigate the side effects of nitrous oxide in painless labor on primiparas.

**MATERIAL AND METHOD**

This is a randomized controlled trial (RCT) study conducted on 178 primipara candidates for natural childbirth which was carried out during 2012-2013 in Fatemieh Hospital, Iran. Inclusion criteria were being primipara, gestational age ranging between 37 and 42 weeks, being in the active labor phase (3-4 cm dilation), absence of medical problems and lack of obstetric complications in mother and fetus. After obtaining the informed consent, the women meeting inclusion criteria were randomly assigned into experimental (89 women inhaling Entonox) and control (89 women inhaling oxygen) groups. After entering the active phase of labor, the patients could inhale 2-6 times in the face mask connected to Entonox cylinder, 30 seconds before pain started and they could breathe room air in the pain intervals. The control group used oxygen cylinders after entering active labor phase. Then, age, gestational age, evidence of abruption and after the delivery information such as mode of delivery, meconium staining and Apgar scores at 1 and 5 min were recorded in the questionnaires. Side effects such as nausea and vomiting, dizziness, dry mouth, numbness of tongue and the amount of postpartum bleeding based on the number of saturated pads during 6 hours after delivery were recorded in the questionnaires. The data as well as the initial and 6-hour postpartum hemoglobin level were recorded in the questionnaires too. The data obtained were analyzed running SPSS software v.16, and t-student and Chi-square formulas.\(^11, 12\)

**RESULTS**

This study was carried out on 178 primipara women referred to Fatemieh Hospital for delivery during 2012-2013. The participants were randomly assigned into two equal groups of 89 women (experimental and control). During the active labor phase, the experimental group was provided with Entonox, whereas the control group was provided with oxygen. The mean age of women in the experimental and control group was 22.7 ± 3.4 and 21.236 ± 3 and the mean gestational age were 39.3 ± 1.06 and 39.5 ± 1.14, respectively and the difference was not statistically significant (P>0.05). Evidence of abruption during labor (increased uterine tone and severe vaginal bleeding) was observed in 4.5% of women in the experimental group and 3.4% in the control group, the mean Apgar score at 1 and 5 min were 8.87±0.36 and 9.82±0.41 in the experimental group and 8.79±0.48 and 9.82±0.41 in the control group. The difference was not statistically significant in this case too (P>0.05). The frequency of accelerated labor (experimental
group 23.4% and control group 21.9%), meconium staining by the fetus (experimental group 5.6% and control group 11.2%) were recorded which did not have a significant difference after being analyzed by Chi-square test (P>0.05). However, concerning the dizziness (experimental group 29.2% and control group 0%), dry mouth (experimental group 47.2% and control group 0%), numbness of tongue (experimental group 4.5% and control group 0%), nausea (experimental group 9% and control group 0%) and drowsiness (experimental group 21.3% and control group 0%) there was a significant statistical difference between the two groups (Table 1). Dry mouth was the most common side effect reported by the mothers. Due to various reasons such as fetal heart rate drop, meconium staining and failure to progress, cesarean section was performed on 13.5% in the experimental group and on 18% in the control group. In terms of cesarean section, the difference between the two groups was not significant (P>0.05). To compare the amount of bleeding during and after labor, the average drop in hemoglobin level of the participants before and after delivery was used. The average drop in hemoglobin level in the women who had vaginal delivery (experimental group 0.79±0.45 and control group 1.2±0.45) and in the women undergoing cesarean section (experimental group 0.84±0.48 and control group 1.5±0.45) were not significantly different (P<0.05)(Table 2). In order to estimate the amount of postpartum bleeding, besides the drop in hemoglobin level, the number of saturated pads during 6 h after delivery was used which were 3.14±1.18 and 0.9±3.08 in the experimental and control group, respectively. It should be noted that the difference was not statistically significant (P>0.05).

DISCUSSION

The present study was carried out on 178 primipara women referring to Fatemieh Hospital for labor. The mean age of the experimental group and control group were 22.7±3.4 and 21.2±3.36 respectively which are consistent with the studies conducted by Talebi and Esfandiar in terms of age range.[5,13] The mean gestational age in both groups was 39 weeks and regarding the evidence of placental abruption, there was no significant difference between the two groups. Therefore, Entonox was not recognized as a cause of placental abruption. 23.4% of women in the experimental group and 21.9% in the control group had an accelerated labor - the duration of the active labor phase was less than 3 h. Entonox was not recognized as a cause of accelerated labor because there was no significant difference between the two groups. In the study conducted by Zare, it was indicated that the duration of active labor phase in the Entonox group was shorter than that in the oxygen group. Parashi et al. also confirmed that inhaling Entonox resulted in a shorter labor.[6] According to the findings obtained in this study, Entonox did not have an effect on meconium staining and the difference between the two groups was not significant. In a study carried out on 1300 primiparas to compare the effects of Entonox and oxygen, Entonox did not have any effects on meconium staining which is consistent with the results of the present study.[14] Concerning the Apgar score at 1 and 5 min, the two groups were not significantly different and Entonox did not adversely affect Apgar score which is consistent with the other studies.[13,15] Entonox gas did not have any effect on the increase in cesarean rate and decrease in labor progress. However, a study showed that those who used oxygen, compared with Entonox, underwent cesarean section which was due to more intense and longer-lasting pain in the active labor phase which contradicts with the results of the present study.[15] A few side effects were reported by mothers using Entonox; however, the effects were not that much serious to cause the patient to discontinue Entonox. These side effects included dry mouth, dizziness, drowsiness, nausea, and numbness of tongue. In their studies, Talebi and Parashi demonstrated that the side effects were more in the intervention group.[5,6] Mohammad Jafari draw the conclusion that drowsiness (29%), dizziness and headache (14%) the most common side effects of Entonox, whereas the least common ones were lethargy (1%) and vomiting (2%). In Norouzinia’s study, 4 mother out 40 who used Entonox complained of lightheadedness and dizziness.[16] Hemoglobin level in women undergoing cesarean section or vaginal delivery was measured 6 h postpartum and the drop in hemoglobin level in both groups was significant. The hemoglobin level in those receiving Entonox dropped less compared to the other group. Therefore, they lost less blood during labor which could be due to the shorter labor they experienced.
Table 1. Comparison of the two groups in terms of dizziness, dry mouth, nausea, numbness of tongue and drowsiness.

<table>
<thead>
<tr>
<th>Side Effects</th>
<th>Number (Percentage)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dizziness</td>
<td>26 (29.2)</td>
<td>0.000</td>
</tr>
<tr>
<td>Nausea</td>
<td>8 (9)</td>
<td>0.004</td>
</tr>
<tr>
<td>Drowsiness</td>
<td>19 (21.3)</td>
<td>0.000</td>
</tr>
<tr>
<td>Dry Mouth</td>
<td>42 (47.2)</td>
<td>0.000</td>
</tr>
<tr>
<td>Numbness of Tongue</td>
<td>4 (4.5)</td>
<td>0.04</td>
</tr>
</tbody>
</table>

Table 2. Comparing the difference in the average drop of hemoglobin level in the two groups for different delivery types

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Standard deviation ± the average drop (g/dl)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vaginal Delivery</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entonox</td>
<td>77</td>
<td>0.793 ± 0.456</td>
<td>0.000</td>
</tr>
<tr>
<td>Oxygen</td>
<td>73</td>
<td>0.693 ± 1.28</td>
<td></td>
</tr>
<tr>
<td>Cesarean Section</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entonox</td>
<td>12</td>
<td>0.483 ± 0.841</td>
<td>0.001</td>
</tr>
<tr>
<td>Oxygen</td>
<td>16</td>
<td>0.454 ± 1.5</td>
<td></td>
</tr>
</tbody>
</table>

CONCLUSION

According to the results obtained from this study, the use of Entonox for painless labor, compared with oxygen, did not cause adverse effects on the mother and fetus; however, only minor side effects including drowsiness, dry mouth, dizziness and nausea and numbness of tongue were observed. Furthermore, it was observed that Entonox causes less reduction in hemoglobin concentration of mother which may be due to its positive effects on labor progress and its duration. Therefore, no serious side effects were reported for this analgesic gas except for some harmless and controllable effects. Moreover, by reducing labor pain and labor duration, Entonox can help women overcome their fear of labor pain.

Ethical Considerations: This research project was approved by the ethics committee of Hamadan, University of Medical sciences and name and Specification of patients were kept confidential.

Source of Funding: Hamadan, University of Medical sciences.

Conflict of Interest: None.

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ABSTRACT

The midwifery ethics is a branch of professional ethics it wants morality for functional safety box midwifery practice and ethical decisions in the midwifery. The aim of this study was to develop a tool to measure the midwives’ awareness of midwifery professional ethics. Questionnaire awareness of professional ethics in midwifery as first initial list of 38 questions was prepared. To check the validity, respectively the face and content validity and reliability, the Pearson correlation coefficient was used and the data using SPSS software version 18 were analyzed. 26 questions have high content validity and 12 questions were rejected. Validity of the questionnaire was calculated an overall index value 0.88 that amount is acceptable. The final results showed that the final questionnaire with the Pearson correlation coefficient 0.97 and p< 0.001 is stable. To assess professional ethics in midwifery to a valid and reliable questionnaire that can accurately measure the extent is needed according to the results, questioning the outcome of this study is a useful tool for evaluation of ethics in midwifery.

Keywords: Validity and Reliability, Ethics professional, Midwifery.

INTRODUCTION

Ethics set of dos and don’ts and the innate human and moral axioms and one of the most important goals of the prophets as citizens and human prosperity depends on adherence to ethics and symmetry of God to the extent that the Prophet has said the purpose of his mission complete ethic.[1, 2 and 3] The work ethic is a special place because man accepts the fundamental need is anything that cannot be achieved without good results[4] and this is particularly important in midwifery from midwifery ethics in a way that can be considered as a separate ethics as they relate to particular moral situation that arises in this field.[5] So that any gaps in compliance with professional ethics in order to provide the most scientific results and the best of care can affect health care.[6] Midwives provide health care services than other groups in your working environment, talent and more contexts for the dreams face of moral issues.[7] In this context, according to the country’s needs, develop codes (rituals) utilizes Midwifery ethics and the opinions of experts as well as professors and students of midwifery and medical ethics expert and in 6 of the 85 code of professional ethics for midwives to raise awareness of the ethical implications adopted.[8] But given the key role and importance of midwifery ethics in the field of planning, education and health policy, setting priorities on these topics, you should use the right tool for planners and policy-makers to be well-
Unfortunately, due to extensive searches on credible sources and various Internet sites and mother, there is any valid questionnaire to measure midwifery professional ethics, so that in all studies in Iran and other countries just to check and monitoring of codes of midwifery ethics was sufficient (like Vasegh Rahim Parvar et al, Faraj Khoda et al, Rafie et al, Community Nursing and Midwifery Board of Australia and ect.).

but so far not a standard questionnaire on this issue, the researcher has set out a standard tool for measuring the ethics of the profession of midwifery design.

MATERIALS AND METHOD

This study is descriptive. In this study, a questionnaire designed to evaluate, respectively from face and content validity and reliability, the Pearson correlation coefficient was used and data using statistical software SPSS version 18 was analyzed. Methods in this study include:

Questionnaire design:

1-1: Determining the content scope of questionnaires: at the beginning of questionnaires range determined. Different methods are used to determine the validity and these methods include validity, content validity, and concurrent validity. Usually the first questionnaire designed to fit in appearance and to determine the range of validity and content validity of questionnaires used. Since the purpose of this study, questionnaire design professional ethics of midwifery content and face validity were used.

1-2 Determining the content of the questionnaire:
At this stage, detailed and extensive studies were conducted to evaluate different aspects of professional ethics in midwifery were identified. In this study, some of the questions of the midwifery profession in Iran’s moral codes issued by the Ministry of Health Midwifery in Shahid-Beheshti University of Medical Sciences in collaboration with the Research Center for Safe Motherhood and with the support of the United Nations Population Fund, the Islamic Republic of Iran was extracted.

1-3 Specific questions for the evaluation of midwifery ethics and prepared the preliminary questionnaire: At this stage, several meetings with professors specializing in midwifery ethics, teaching and practice was also the initial questionnaire included 38 items after initial discussions were designed and thus was formed the initial questionnaire.

1-4 Choose a template to determine the validity:
To determine the validity of the methods suggested Chadwick et al as well as Mr. Lavshy was used (chadowic). Inventory panel was in the hands of junior members of the panel that their role so that members could make accurate judgments based on components necessary tools (models or questionnaires) provided and they were asked their opinion about every item on the scale in terms of the judgments that have been set. Members call was coded as follows: Essential, non-essential and non-essential but beneficial

1-5 Identifying the members of the panel: it was required at this stage that are members of the selection panel at least 5 people and up to 10 people in this regard should comment that this was done with 10 members.

1-6 Distribute questionnaires: the questionnaire in person to 10 members of the panel examined.

1-7 Entry and analysis data: data collected after panel members have been collected and entered into the computer and then data analysis was performed using Excel software. The votes of the members of the panel were paid to the seller is necessary through the content validity ratio (CVR) was a bit.

8-1 Criteria for accepting or rejecting questions: unconditional acceptance CVR question if it is equal to or greater than 0.75, admission question if the value of the CVR is between zero and 0.75. This value CVR shows that more than half of the members of the panel have chosen essential options and reject the question if the CVR is less than zero and less than zero means that CVR less than half of those essential options have chosen.

Determine the content validity index and the introduction of the final questionnaire: content validity index reflects the comprehensive judgment on the validity or applicability of the model, or the test is the ultimate tool. The higher the content validity, the amount of CVI desire to 0.99, and the opposite is also true.

Calculate the content validity index (CVI): from dividing the number of specialists who questions,
a score of 3 or 4 have been obtained on number of specialists.\textsuperscript{[15]}

**Internal consistency and repeatability final questionnaire:**

A) **Internal consistency:** for the reliability or consistency of the measurement tool in a similar condition to what extent will achieve the same results. The reliability of the indicators used to measure reliability of our name. Reliability coefficient ranges from zero to 1. A reliability index of zero represents perfect reliability of stability and reliability of a reagent. Internal consistency was determined using Pearson correlation coefficient. Questionnaires for the internal consistency was given to 20 students of 8 Midwifery once completed, the information entered computer and then using statistical software SPSS version 18 was analyzed.

B) **Repeatability:** One way to determine the reliability of a test retests (test-retest). In this test on two occasions with an interval of one week, one group of examinees run and the resulting score is compared with that correlation coefficient between the scores obtained by twice performing the test, reliability test.

**FINDINGS**

Values CVR, the average numerical judgments and consequences of accepting or rejecting the questions of ethics in the profession of midwifery: After collecting questionnaires from members of the panel and entering information into Excel, CVR values for each of the henceforth can be the tool as a standard tool used to check the status of midwifery professional ethics.

**Table 1. Questions that had the highest validity.**

<table>
<thead>
<tr>
<th>Question</th>
<th>definitely do natural childbirth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient selection as sample</td>
<td>Definitely do natural childbirth</td>
</tr>
<tr>
<td>Using patient as sample without the patient’s permission</td>
<td>Non-registration of some health care services for patients</td>
</tr>
<tr>
<td>Failure to provide service to clients in the event of non-compliance with staff</td>
<td>Skin contact between mother and baby carried by patients’ families</td>
</tr>
<tr>
<td>Remind clients to their rights</td>
<td>The sharing of patient information with colleagues</td>
</tr>
<tr>
<td>Patient safety in ward</td>
<td>Failure to explain all the procedures for the patient</td>
</tr>
<tr>
<td>Attention to relax with patient</td>
<td>More attention to education and lack of explanation on the patient</td>
</tr>
<tr>
<td>Providing services for private midwife</td>
<td>Persian speaking to the patient regardless of the patient’s accent</td>
</tr>
<tr>
<td>Accept criticism recommendations and midwifery personnel with experience higher</td>
<td>Allowing patients health care in some affairs</td>
</tr>
</tbody>
</table>

DISCUSSION AND CONCLUSION

Construction of professional ethics questionnaire in midwifery given to the working conditions and culture of the country, pathfinding and help in professional ethics and promote the knowledge and practice of midwifery in various fields. According to the results of this study, questionnaire validity of the result of the average index 0.88 percent and 0.97 percent correlation coefficient is a useful tool for evaluation of ethics in midwifery and
CONCLUSION

According to the present results, questioning the outcome of this study is a useful tool for evaluation of ethics in midwifery.

Ethical Considerations: This research project was approved by the ethics committee of Hamadan, University of Medical sciences and name and Specification of patients were kept confidential.

Source of Funding: Hamadan, University of Medical sciences.

Conflict of Interest: None.

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Knowledge, Attitude and Functioning Toward Pregnancy Induced Hypertension in Pregnant Women Referred to Health Centers in Zabol, 2014

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ABSTRACT

Pregnancy can increase blood pressure in women who had already normal blood pressure and it is a common cause of hospitalization for pregnant women in the hospital. This study aims at taking a step towards evaluating knowledge, attitude and functioning of pregnant women in Zabol toward their blood pressure and their health optimization. In this cross-sectional study, 260 pregnant women who were referred to health centers during 2014 were studied. A questionnaire containing demographic questions, knowledge questions (15 items), attitude questions (10 items), and functioning questions (8 items) was used for data collection which were answered by the pregnant women, and then were analyzed by software SPSS 18. Among participant mothers in the study 198 (76.2%) had poor awareness, 122 (46.9%) ones had average attitude and 189 (72.7%) ones had good functioning toward pregnancy induced hypertension. Such factors as educational level and job had impact on awareness of pregnant women (P<0.05), while their awareness was not associated with pregnancy frequency, pregnancy age, history of abortion, age group and source of information (P>0.05). Also, age group, job, educational level and source of information of pregnant women was associated with their attitude (P<0.05), while no relationship was observed between attitude and pregnancy frequency, pregnancy age and history of abortion (P>0.05), and such factors as educational level and job had not impact on functioning of pregnant women (P>0.05). Awareness and functioning of pregnant women is improved by increasing their job and employment (P<0.05). But attitude was improved in pregnant women by decreasing educational level and age. Also, being housewife versus being employed and using friend as source of information improved their attitude more than other sources. Educational level of pregnant women, job, source of information, age group were among the main factors affecting awareness, attitude, and functioning of these women regarding pregnancy induced hypertension.

Keywords: Awareness, functioning, pregnancy induced hypertension, PIH, attitude.

INTRODUCTION

Pregnancy can increase blood pressure in women who already had normal blood pressure. Blood pressure in pregnancy is one of the common reasons for hospitalization of pregnant women and in case of exacerbation of hypertension and other symptoms of pre-eclampsia it will also be life threatening for mother and fetus.¹ Pregnancy-induced hypertension (PIH) is most frequently seen at the first pregnancy usually after 20 to 24 weeks of gestation.² PIH has been reported in 10 to 15% of pregnant women. Ten to twenty percent of these women will progress to the stage of pre-eclampsia which is associated with maternal and fetal mortality. The mortality rate for women has been
reported as 5% in developing countries to 14% in underdeveloped countries. [3] Each year about 629,000 women worldwide die of PIH. [2] PIH in most cases is regarded as a temporary and transient situation and it is controlled by resting, but the risk of exacerbation of hypertension and pre-eclampsia exists until the end of pregnancy. [1] The prevalence of preeclampsia in Iran has been reported as 4.6%. [4] According to reports by universities of medical sciences gestational hypertension is the second leading cause of death for women between 79-76% of the country, Iran has been reported as the second cause of death in women at ages 76 – 79. [3] Hypertensive disorders of pregnancy constitute one of the three major causes of death for women. [4] A number of risk factors associated with the incidence and severity of PIH include as follows: age, number of previous pregnancies, race, smoking, spacing pregnancies and multiple pregnancies. History of PIH is considered as a risk factor for developing coronary heart disease in the future. [3] The best treatment for preeclampsia is prevention of it. Timely prevention reduces maternal and neonatal mortality and morbidity. [4] Past studies maintain that pregnancy-induced hypertension is especially important and attention to it has been emphasized. Also, educational programs on pregnant women regarding promoting their education and attitude suggests the fact that there is a significant relationship between education in pregnant women regarding PIH and increasing their awareness and attitude. Also, these studies also point out that there is a definite relationship between knowledge and positive attitude that raised PIH as a preventable disease. [2, 3]

This study aims to increase awareness of women living in the city of Zabol to PIH and their beliefs and attitudes and behavior towards the subject. In fact, this study is the first step toward optimizing the health of pregnant women.

MATERIALS AND METHOD

In this cross-sectional study, 260 pregnant women who referred to health centers in Zabol, 2014 were studied. In order to collect data, a questionnaire containing 4 parts was formulated and given to pregnant women. First part included demographic items such as age, educational level, job, pregnancy age, and pregnancy frequency, history of abortion and source of information. Second part included two-choice items with yes and no choices. If the answer was correct, one score and if it was incorrect zero score was given, which indicates awareness of pregnant women. Third part contained ten items regarding attitude of pregnant women. It was five-choice items and scoring was done based on five-point Likert scale ranging from totally disagrees to totally agree, and scores from 1 to 5 was given. The higher score suggested positive attitude and this part measured attitude of pregnant women toward pregnancy-induced hypertension. Fourth part included items regarding functioning with 8 items related to functioning of pregnant women toward pregnancy-induced hypertension. It was scored as two-choice items with yes and no choices, one score for yes and zero score for no. In order to classify awareness, attitude and functioning level, sum of scores was divided into three parts. Scores below 33 were regarded as poor, scores between 33 and 66 were considered as moderate and scores above 66 were regarded as good. For awareness level, score below 5 was regarded as poor, between 6 – 10 as moderate and above 11 as good. For attitude, score below 15 was regarded as poor, score between 30–15 as moderate, and above 30 as good score. For functioning, score below 3 was regarded as poor; between 4-6 as moderate and above 7 as good score. Validity of the questionnaire was confirmed by epidemiologists, specialists in internal medicine, obstetrics, gynecology specialists and experts in social medicine. Reliability coefficient was obtained using Cronbach alpha as 89%. Data analysis was done using SPSS version 18 software and Fisher’s exact test and Chi-square tests. [6, 7]

FINDINGS

In this study, 260 pregnant women were examined, 63.8% of who were under the age of 30 and 36.2% were above 30 and most of them were housewives with high school diploma (Table 1). Participants were classified as four groups (illiterate, below high school diploma, high school diploma, and higher education). Among them, 19 ones were illiterate, awareness of 4 of them was good, 5 of them was moderate and 10 of them was poor. Functioning of 7 ones was good, 7 ones were moderate, and 5 ones were poor. 11 has moderate attitude, 15 ones had poor attitude and none of them had good attitude. Functioning in 37 participants was good, 3 ones had moderate and one participant had poor functioning. That is, awareness and functioning of pregnant women toward PIH is improved by increasing educational level, and their attitude was increased by decreasing educational level (P<0.05). Job groups of pregnant women included housewife and employed women (Table 2). Results
out of 260 pregnant women, 57 ones had history of abortion. In mothers with history of abortion, awareness of two mothers was good, 16 ones had moderate and 39 ones had poor awareness. 8 ones had poor attitude, 30 ones had moderate attitude and 19 ones had good attitude. Functioning of 40 ones was good, 13 ones had moderate functioning and 4 ones had poor functioning. According to the results of chi-square, there is no significant relationship between history of pregnancy age of pregnant women and their awareness, attitude and functioning toward pregnancy-induced hypertension (P>0.05). In women with once history of pregnancy, one participant had good awareness, 21 ones had moderate awareness, and 66 ones had poor awareness. Results obtained from chi-square suggested that there is no significant relationship between frequency of pregnancy in pregnant women and their awareness, attitude and functioning toward pregnancy-induced hypertension (P>0.05). According to chi-square test, there is no significant relationship between age group and awareness. No significant relationship was observed between awareness toward PIH and pregnancy frequency, pregnancy age, history of abortion, age group and source of information according to Fisher’s exact test (P>0.05). In comparison with awareness and attitude index in James et al, work before educational intervention in awareness and attitude part, both studies found similar findings suggesting poor awareness and attitude in pregnant women in both works. Awareness and attitude poorness was considerably improved. [8] Thus, according to findings of the current work, it seems there is positive relationship between adequate knowledge and attitude, which is a preventable factor and it can be regarded as a key point in promoting current status. The study by Vineeta Singh showed more than 50% of pregnant women have no awareness about PIH. They were at age range of 20 to 30, and were diagnosed at prehypertension stage. Weakness in performing exercise was introduced as the main factor in developing hypertension in these people. [9] In the current work, 53.5% with poor awareness toward PIH were at age range of 20 to 30. Its reason can be due to using experiences of previous pregnancy. Thus, need for informing specifically at this age group is felt more than even considering most pregnancies are done at this age range and mothers are also interested in learning. Findings by Maputle in South Africa suggested poor awareness on recognition of pregnancy-induced hypertension, prevention from consequences as well as impacts of PIH on the newly born children. For example, 60% of women with the first pregnancy had no information on PIH and 20% of multi gravidity women were not familiar with gestational hypertension factors. This shows necessity for health care providers to focus more on educational programs on issues related to blood pressure during pregnancy and prenatal care. [10] In the current work, 75% of women with first pregnancy had poor awareness on pregnancy-induced hypertension which is consistent with findings by Sonto Maputle. But 76.7% of multi gravidity women had also poor awareness which is different from findings by the mentioned work. In fact, in the current study, frequency of pregnancy had no impact on awareness of pregnant women toward PIH. But the basic need for change in informing pregnant women regarding PIH is felt. It is an important point which needs more attention of health system in caring more in this regard and improving current status. Findings by Pragnesh Parmar’s study which was conducted on general publication above 20 years in Kandahar regarding awareness, attitude and functioning toward blood pressure showed that 98% of population had awareness about hypertension

DISCUSSION

Out of 260 pregnant women participating in this study, awareness toward PIH was poor in 76.2%, attitude toward pregnancy-induced hypertension was moderate in 46.9% and functioning toward pregnancy-induced hypertension in 72.7% was evaluated as good. Significant relationship was observed between awareness toward PIH and educational level and job. No significant relationship was observed between awareness toward PIH and pregnancy frequency, pregnancy age, history of abortion, age group and
disease, while they received poor scores on their attitude and functioning. Thus, necessity for repetition and enhancement of attitude and functioning by health education is emphasized. [11] While pregnant women population of current study had poor awareness and attitude, they had acceptable functioning. It can be attributed to suitable health-care coverage of the region considering policies of ministry of health in pregnant women care programs and lower awareness can be due to weakness in timely and updated education to pregnant women. Results showed doctors have good scores on attitude, but their awareness and functioning was poor. Nurses gained good scores on attitude and functioning, but their awareness was poor in this regard. 80 % of them didn’t have adequate self-confidence in PIH management and preferred to examine other adult or child sick people. Although their awareness was 94.4% in this regard and it was evaluated as adequate and positive. [12] While in the population under study in the current work, weak point was in awareness and strength point was in functioning. the difference between findings of two works indicate that medical system has problem in performing its tasks, because good functioning in pregnant women is observe before that in health sector, but evident problem is in transferring updated scientific materials to the population at risk of pregnancy-induced hypertension, i.e. pregnant women.

Table 1. Demographic information of pregnant women referring to health centers in Zabol, 2014.

<table>
<thead>
<tr>
<th>Percent</th>
<th>No.</th>
<th>Source of Information</th>
<th>Education</th>
<th>Job</th>
<th>Age</th>
<th>Pregnancy age</th>
</tr>
</thead>
<tbody>
<tr>
<td>35.0</td>
<td>91</td>
<td>Radio &amp; TV</td>
<td>7.3</td>
<td>19</td>
<td>Illiterate</td>
<td>77.7</td>
</tr>
<tr>
<td>15.0</td>
<td>39</td>
<td>Internet</td>
<td>33.1</td>
<td>86</td>
<td>Below-high school diploma</td>
<td>22.3</td>
</tr>
<tr>
<td>15.0</td>
<td>39</td>
<td>Friends</td>
<td>43.8</td>
<td>114</td>
<td>High school diploma</td>
<td>63.8</td>
</tr>
<tr>
<td>5.8</td>
<td>15</td>
<td>Books &amp; magazines</td>
<td>15.3</td>
<td>41</td>
<td>Higher education</td>
<td>36.2</td>
</tr>
<tr>
<td>29.2</td>
<td>76</td>
<td>Health officials</td>
<td>25.0</td>
<td>65</td>
<td>First trimester</td>
<td>33.8</td>
</tr>
<tr>
<td>21.9</td>
<td>57</td>
<td>Yes</td>
<td>5.4</td>
<td>92</td>
<td>Second trimester</td>
<td>33.8</td>
</tr>
<tr>
<td>78.1</td>
<td>203</td>
<td>No</td>
<td>39.6</td>
<td>103</td>
<td>Third trimester</td>
<td>32.3</td>
</tr>
</tbody>
</table>

Table 2. Attitude, awareness and functioning of pregnant women toward pregnancy-induced hypertension referring to health centers in Zabol, 2014.

<table>
<thead>
<tr>
<th>Awareness</th>
<th>No.</th>
<th>Percent</th>
<th>Attitude</th>
<th>No.</th>
<th>Percent</th>
<th>Functioning</th>
<th>No.</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor</td>
<td>198</td>
<td>76.2</td>
<td>31</td>
<td>11.9</td>
<td>11</td>
<td>4.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>57</td>
<td>21.9</td>
<td>122</td>
<td>46.9</td>
<td>60</td>
<td>23.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>5</td>
<td>1.9</td>
<td>107</td>
<td>41.2</td>
<td>189</td>
<td>72.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sum</td>
<td>260</td>
<td>100.0</td>
<td>260</td>
<td>100.0</td>
<td>260</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CONCLUSION

Considering positive relationship between education level and job with awareness and attitude of pregnant women toward pregnancy-induced hypertension, planning for increasing general educational level and literacy of mothers as well as more attention to employed women because of their less time for learning health points seems necessary. Also, it seems that considering recent policies of ministry of health concerning increasing service delivery quality to pregnant mothers, health system in this region has acted optimally regarding identification and timely referral of pregnant women, so that functioning of pregnant women has been improved. But long term action or planning seems necessary for increasing awareness of mothers. Also, it seems necessary that family doctors at first level and specialized doctors at second level should consider longer time for pregnant women training and education.

Ethical Considerations: This research project was approved by the ethics committee of Zabol, University of Medical sciences and name and Specification of patients were kept confidential.

Source of Funding: Zabol University of Medical Sciences.

Conflict of Interest: None

REFERENCES


Concentration Extent of People with a History of Methamphetamine Consumption Via Measuring Brain Waves in Recovering Addicts who Referred to Taleghani Hospital of Ilam, Iran 2016

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¹Department of Psychiatry, School of Medicine, ²Student of Medicine, ³School of Medicine, Ilam University of Medical Sciences, Ilam, Iran

ABSTRACT

Background: Neurofeedback records hidden physiological reactions in human brain and brain waves that influence functional and behavioral status every moment. Concentration is a method in which the one educates his/her mind for more useful approach. The purpose of present research is to compare the concentration extent of people with a history of methamphetamine consumption with normal people with the help of neurofeedback via measuring brain waves.

Material and Method: Present research is a clinical trial in which 40 persons were divided into two control and experimental groups. Each group consisted of 20 persons. Brain information was recorded in Cz and Fz zones by neurofeedback devices. We used Stroop’s color – word test to assess the studied concentration. We analyzed the statistical data via SPSS software, Version 16.

Results: Obtained results show that people with a history of Methamphetamine abuse have lower concentration relative to healthy people. This proportion observed after using neurofeedback device too. In addition, the ratio of theta waves to Beta waves has meaningful increased in Fz and Cz zones after using neurofeedback in two control and experimental groups.

Conclusion: According to obtained results, we can note that use of neurofeedback can be very effective to increase concentration in people with Methamphetamine abuse and healthy people. It is suggested to conduct more research in this field.

Keywords: Methamphetamine, neurofeedback, Ilam, Iran.

INTRODUCTION

Thousand of automatic and involuntary activities occur in the brain of human. Understanding the brain of human and the manner of its action have long attracted the attention of physicians and researchers around the world. So far many researches have been conducted regarding the manner of action of this organ, but there are many ambiguous aspects about the manner of its performance. The disruption of normal trend of brain waves function and bio- cognitive reactions can be considered as a symptom of existence of physical or mental disease. Brain waves can be likened to radio waves. These waves are activated at different frequencies and activation of some waves limits the action of other waves. Delta wave is the slowest and most extensive wave and it has the highest activity at relaxation time. Theta wave has more activity during sleep. Alpha wave has high frequency and is active in a state of relaxation. Beta wave has the highest activity during concentration and learning. Neurofeedback was invented in 1970 that is a method to measure...
electroencephalography (EEG) signal in the form of monitoring and extracting the information that is related to this signal in the form of audio or video outputs. The main application of this method is to track and assess the activity of brain under abnormalities and diseases. Indeed neurofeedback acts like a mirror for human’s brain. The mirror informs us of appearance and possible deficiencies and defects in it. This knowledge helps us to take action to remove the flaws in our appearance. Neurofeedback exactly acts like an advanced mirror for brain waves and physiological performances of our brain. It helps us to be aware of what is happening in our brain using advanced electronic tools and computer.\(^2\)

The increase of awareness of brain waves causes that we can have more control over the waves.\(^3\) Some researches have shown that healthy people, people with brain damage and patients with epilepsy and psychosis were able to generate changes in their cortical activity after neurofeedback. In fact, we inform of different states of brain waves after training and thus we find the capability of generating them if necessary.\(^4-8\)

Stimulants are substance that increase the mood, activity, alertness and awareness and lead to stimulation of central nervous system.\(^9\)

Methamphetamine was synthesized in 1877. It was initially used for the treatment of obesity, depression and drowsiness.\(^10\) Methamphetamine chemically acts similar to epinephrine and nor epinephrine. It has stimulatory effect on the central nervous system. In addition, it influences dopamine or serotonin system, and leads to mood flushing, exaggeration feelings towards him, paranoia and hyperactivity. Today, Methamphetamine consumption has significantly increased around the world. The majority of consumers of methamphetamine in the United States are 18 to 25 years old males who have high-risk sexual behaviors.\(^11\) It has been reported that chronic use of drugs particularly cocaine, Methamphetamine, cannabis and Smoke is associated with deficiencies in cognitive functions such as decision-making, response inhibition, planning, working memory and attention.\(^12\)

Concentration is a method that fosters the mind in order to have a more useful approach or mental state. Memory disorders and decentralization appear in different situations and in different forms such as impulsivity and distractibility. These disorders may result from anxiety and stress under undesirable conditions or brain problems such as Alzheimer. Memory disorders and decentralization that result from anxiety and stress are detected by neurofeedback effectively and irreversibly. This detection increases the performance and output of memory even in normal people in speech or activities that generate anxiety or require concentration.

The absence of clear medical diagnosis for detoxification of Methamphetamine is another serious problem that represents the necessity of conducting this research about uncovering the importance of role of brain imaging-dependent diagnosis such as neurofeedback in the diagnosis of dependence on the consumption of this substance and keeping patients in the diagnostic process. The purpose of present research is to compare the concentration extent of people with a history of Methamphetamine consumption with normal people with the help of neurofeedback device via measuring brain waves in recovering addicts who referred to Ilams Taleghani hospital in 2016.

**MATERIALS AND METHOD**

Present research is a clinical trial in which 40 people were studied. They were divided into two control and experimental groups. Experimental group consisted of glass-dependent individuals. Control group consisted of healthy individuals and were randomly selected. We collected demographic information by questionnaire. After confirmation of Methamphetamine dependence based on psychiatrist diagnosis and DSM-IV-TR diagnostic criteria, first we studied the concentration extent of individuals in two groups using Stroop test.\(^13\) Then we used neurofeedback devices in two groups in one session for 2 min. The use of neurofeedback devices was based on brain data recording protocol in Fz and Cz zones.\(^14, 15\)

**Neurofeedback training:** In the present research we used flex comp Infinite TM that has 10 channels and is battery-operated. It used electrodes that are attached to the body to give people information about some of their biological function.\(^16\)

**Concentration assessment test:** in this research, we used Stroop’s color-world test to assess concentration and attention.\(^17\) It consists of three steps namely color recognition, concerted efforts and interference or uncoordinated efforts.\(^18\) At first people were asked to express the name of colors that have been written on a specific card as soon as possible. The second step of experiment is reading neutral words that
each one printed with a single color. The last step is the expression of colors that have been printed with another color. Reaction time and the numbers of errors were recorded in three steps.

**Statistical analysis:**

We analyzed data using SPSS software, version 16.

**RESULTS**

Findings show that the studied people were 20-64 years old. The concentration extent was slightly lower in people with glass abuse relative to healthy people. This proportion was also observed after using neurofeedback devices. The ratio of Theta waves to Beta waves in Cz zone was meaningfully different in two groups so that the effect size was 0.44 i.e. 44 percent variance observed in QEEG scores that results from neurofeedback. Clinically the effect size of above 30 percent is meaningful. The ratio of Theta waves to Beta waves in Fz zone is meaningfully different in two groups so that the effect size is 0.49 i.e. 49 percent variance observed in QEEG scores that results from neurofeedback. According to the repeated measures of pretest scores of the ratio of Theta waves to Beta waves in two Fz and Cz zone between two groups, we can note that in these two zones the ratio of these waves in experimental group is meaningfully higher than control group. Indeed the ratio of Theta waves to Beta waves has meaningfully decreased in experimental group relative to control group in Fz and Cz zones after using neurofeedback (tables 1 and 2). Generally, the concentration level of individuals in two experimental and control groups has meaningfully increased after using neurofeedback (table 3).

**DISCUSSION**

Addiction is a complex disease that is characterized by traits such as compulsive behaviors, irresistible temptations, investigative behaviors of drug and continuous use even when is associated with many negative consequence for the individual. The continuation of drug abuse over time and prolonged toxic effects of its abuse on brain function lead to a wide range of bad behavioral, psychological, social and physiological functions that impede the natural behavior and performance of addicts in the family, workplace and society. Today we face a new problem in this area. That is the change of drug use pattern from traditional materials to industrial ones. Despite major efforts to control Methamphetamine use and its derivatives, the use of this drug is still a major public health problem. The main treatment for addiction to Methamphetamine use hasn’t still positive and increasing trends despite the many behavioral therapies. Neurofeedback method was initially known as electroencephalography bio feedback. Neurofeedback process involves training or learning of self- regulation of brain activity. Indeed, neurofeedback can promote memory and concentration level in healthy individuals. In addition, it has diagnostic effects for people with learning difficulties and hyperactivity. Brain controls transfusion through the expansion and contraction of blood vessels, and directs blood flow to specific areas in the brain. Neurofeedback plays an important role in this self- regulation. Also this method is directly used to track and monitor the continuous activity of the areas of brain that are related to behavioral and cognitive factors. In this research, we studied the concentration extent of people with a history of Methamphetamine abuse and normal people with the help of neurofeedback devices via measuring brain waves in two groups. Generally, findings of present research showed that the ratio of Theta waves to Beta waves in people with a history of glass abuse is meaningfully higher than healthy people. In fact, the results of the increase of the ratio of Theta waves to Beta waves in people with glass abuse are consistent with the results of other researches. The researches that have used QEEG method in diagnosis of attention deficit disorder have shown that characteristic of this disorder is the increase of Theta and Delta waves activity and the decrease of the power of Beta waves. Researches have shown that QEEG has the high ratio of Theta to Delta in people with ADHD. In fact, the increase of theta activity remains constant from childhood to adulthood. Arn et al 2008, studied people with glass abuse. They found that beta wave decreased in most people and beta wave increased only in 20 percent of these individuals. Generally, slow cerebral waves such as theta have inverse relationship with cortex performance in doing task. Fast waves such as beta are directly related to cortex performance. In addition, the decentralization of glass abuse or hyperactivity is known to reduce the activity of the frontal areas. Most of the clinical studies that have been conducted in the field of comparison of brain waves with neurofeedback are
related to the improvement of disorders symptoms in the field of growth disorder especially learning disorders, lack of concentration and hyperactivity. Results show the effects of neurofeedback on determining the quality of brain waves in different fields. According to the results of this research and other researches, we can note that neurofeedback is a kind of factor conditioning in which people with a history of Methamphetamine abuse learn to control their brain waves and implement self-regulation strategies in their daily life. Indeed neurofeedback can be effective in the long-term as a self-regulation mechanism in brain. In addition, it can promote mental health.

Table 1. The difference of the ratio of theta to beta between pre-test and post-test in Cz zone.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Test</td>
<td>-1.08</td>
<td>0.92</td>
</tr>
<tr>
<td>Group Control</td>
<td>-0.08</td>
<td>0.72</td>
</tr>
</tbody>
</table>

Table 2. The difference of the ratio of Theta to Beta between pre-test and post-test in Fz zone.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Test</td>
<td>-1.25</td>
<td>1.007</td>
</tr>
<tr>
<td>Group Control</td>
<td>-0.039</td>
<td>0.92</td>
</tr>
</tbody>
</table>

Table 3. The mean score of concentration level in control and experimental groups.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Pre-test</th>
<th>Post-test</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Test</td>
<td>36.76</td>
<td>38.2</td>
<td>1.08</td>
</tr>
<tr>
<td>Group Control</td>
<td>36.98</td>
<td>38.9</td>
<td>0.86</td>
</tr>
</tbody>
</table>

CONCLUSION

Results of present research showed that the pattern of brain waves in people with a history of Methamphetamine abuse differs from that of healthy people. Assessment with neurofeedback shows the changes of brain waves patterns. According to the comprehensiveness of different psychological, mental and physical complications among people with drug abuse and under treatment, it is suggested that further research be done on the effects of such methods.

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Conflict of Interests: Authors have no conflict of interest.

Ethical Considerations: This research project was approved by the ethics committee of Ilam University of Medical sciences and name and Specifications of patient were kept confidential.

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Examining High-Risk Behaviors and Behavioral Disorders in Adolescents with Addicted and Non-Addicted Fathers in Public School of Zabol in the Academic Year 2016-2017

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ABSTRACT

Adolescence is considered an important period for the prevalence of risky behaviors due to adolescents’ self-centeredness and wrong understanding of their own behaviors. This period is followed by widespread physical, psychological, and social changes. The present study aims to examine high-risk behaviors and behavioral disorders in adolescents with addicted and non-addicted fathers at public school of Zabol in the academic year 2016-2017. The present study is a descriptive research that falls within the category of scientific comparative research. Iranian Adolescents Risk-taking Scale, Rutter Behavioral Disorder Questionnaire, and a demographic questionnaire were used for data collection purposes. The statistical data were analyzed using SPSS Version 18. A total of 310 students were placed in two 155-participant groups, namely the case and control groups. The mean value of participants’ age equaled 15.48 years. The highest and lowest rates of risky behaviors pertained to smoking and sexual relations. The results of independent t-test indicated no significant difference between the two groups in terms of drug abuse, violence, and risky driving (P<0.005). The findings of this study suggest the need for the development of prevention programs and treatment interventions in children with addicted fathers. Hence, it is suggested that prevention programs be developed and implemented in order to prevent the incidence of behavioral disorders and high-risk behaviors.

Keywords: High-Risk Behaviors, Addicted, Non-Addicted, Father, Zabol.

INTRODUCTION

Adolescents aged 12-18 years are the major group at risk for behavioral problems. [¹] These behaviors lead to an increase in the risk of premature mortality, disability, and the incidence of chronic diseases while this has witnessed a rapidly increasing trend in developing countries like Iran in the last two decades. [²] Many studies have suggested an increase in risky behaviors in adolescents. [³] In fact, adolescence is a period of transition from childhood to adulthood, and the significant behavioral patterns that can affect an individual’s life during the whole lifetime are shaped in this period. [⁴] The changes in this period of development may act as a precursor to certain problems. Accordingly, adolescence, which is accompanied by widespread physical, social, and psychological changes, is viewed as an important step for the prevalence of risk behaviors because of the adolescents’ self-centeredness and wrong understanding of their own behaviors. [⁵] This risk-taking is considered among the developmental characteristics of people at adolescent age and increases the likelihood of negative, unpleasant, and traumatic physical and social consequences in adolescents. [⁶] In addition, children’s behavioral disorders result from the children’s interaction with the surrounding environment; therefore, the children’s
relationship with the context of family, peers, school, home, and community should be examined. [7] Most of the problems relating to upbringing arise in this period since this is a determining period wherein children are either put in the course of failure or are placed on track of success with the help of their families. [8] Pursuant to the increase of the parent-child gap and conflicts, the adolescents’ relationship with their peer groups increases and, thereby, the likelihood of doing risky behaviors increases in them, as well. [9] According to the American National Cancer Institute’s annual report, more than 6,000 adolescents will experience smoking for the first time each day, and the extent of drug use in adolescents has increased from 27-47 percent. [10] Parents teach their children cultural and family values and social patterns with their behaviors and lifestyles. [11] In general, mental health is the main origin of ideal life and enhancement of personal relationships with others. [12] Fathers’ drug addiction has serious consequences on the children who live in addicted families. [13] Some studies have shown that the adolescents who come with an attractive and desirable image from a smoker are more likely to smoke in the future. [14] Addicted fathers are usually unable to meet their children’s physical needs, create interest, and bring emotional support for their children. Hence, such children suffer from various physical, behavioral, and psychological problems. [15] In fact, identification is one of the characteristics and needs in adolescence, and an adolescent’s responsibility is to create a stable identity and become a mature and useful person. In this regard, family has an essential role in the children’s exposure to correct patterns. [16] Indeed, neurological studies show that brain development is not complete up to the onset of 20 years of age and decision-making power and futuristic thinking are not fully grown. Therefore, adolescents take adult roles while they look physically grownup, but they have not reached the necessary intellectual maturity to deal with problems and obstacles. [17] The aim of this study was to compare risk behaviors and behavioral disorders between adolescents with addicted and non-addicted fathers in public schools of Zabol in the academic year 2016-2017.

METHOD

The present study is a descriptive research that falls within the category of scientific comparative research. In addition to the age range of less than 18 years, fathers’ addiction was another criterion for the inclusion of the case group members into the study. Sampling for both groups was conducted using multi-stage cluster sampling method. For sample selection, Zabol city was divided into two educational areas 1 and 2. Then, two school districts were chosen from each educational district and, eventually, the desired adolescents for the study were selected from the high schools of that district. In the present study, Iranian Adolescents Risk-taking Scale, Rutter Behavioral Disorder Questionnaire, and a demographic questionnaire were used for data collection purposes. [18] IARS was used to assess vulnerability to risk behaviors, such as smoking, drug use, alcohol consumption, sexual behavior, and orientation to the opposite sex. Cronbach’s alpha coefficient of 0.93 has been reported for the total scale. In this study, the Cronbach’s alpha coefficients of 88%, 83%, 79%, 81%, 76%, 85%, and 78% were obtained for the total scale, the subscales of risky driving, smoking, alcohol consumption, friendship with the opposite sex, drug use, and violence and physical confrontation, respectively. The Rutter Behavioral Disorder Questionnaire in this study consists of 30 questions, out of which 24 questions have been directly extracted from Rotter’s questionnaire and 6 questions have been added to it as per the Iranian culture. [19] If one’s score in the questionnaire is higher than 9, that person suffers from a behavioral disorder. The statistical data were analyzed using SPSS Version 18. [20, 21]

RESULTS

From among the total of 400 adolescents who received the questionnaire, 60 questionnaires were returned without the inclusion of demographic characteristics and 30 questionnaires were incomplete; therefore, they were excluded from the analysis. In the end, 310 adolescents were assessed. All the sample units were aged from 14 to 18 years and the mean and standard deviation of their age were obtained equal to 15.48 and 1.34, respectively (Table 1). The results showed that smoking and substance abuse behaviors took up the highest prevalence in both groups, whereas sexual relationship took up the lowest value of risk behaviors (Table 2). The results of independent t-test were indicative of the presence of a significant difference between the two groups in terms of substance abuse, violence, and risky driving (P<0.005) (Table 3).

In addition, it was revealed that the adolescents in the case group reported a higher tendency to show risky behaviors compared to the control group. The difference
between the two groups in other subscales was not significant (P>0.005). Moreover, the mean difference in behavioral disorders between the two groups was equal to 9.61 (P<0.005) (Table 4).

**DISCUSSION**

The results of this study showed that male and female adolescents with addicted fathers had a tendency to high-risk behaviors. In this study, 56 percent of the students in the case group and 12 percent of the adolescents in the control group showed a high risk for smoking behavior, 46 percent of the adolescents in the case group and 7 percent of the adolescents in the control group showed a high risk for substance abuse, 65 percent of the adolescents in the case group and 15 percent of the adolescents in the control group showed a high risk for violence, 33 percent of the adolescents in the case group and 6 percent of the adolescents in the control group showed a high risk for risky driving, 15 percent of the adolescents in the case group and 5 percent of the adolescents in the control group showed a high risk for alcohol consumption, and 12 percent of the adolescents in the case group and 2 percent of the adolescents in the control group showed a high risk for sexual relationship. These findings are consistent with the results reported by Skara et al. [22, 23]. On the other hand, Michael et al stated that alcohol consumption, smoking, sexual relationship, use of cannabis, and physical violence has constituted the highest rates of risk behaviors among American students with addicted parents. [24] However, smoking and drug use took up the highest rate of risk-taking in the case group in this study.

To explain this behavior, one can argue that the results of various studies refer to different psychosocial factors governing the adolescents with addicted fathers as the effective determinants. Also parents explicitly express their opposition against such behaviors and establish stronger disciplinary rules. For this reason, adolescents are less inclined to risk behaviors. However, adolescents with addicted fathers are more inclined to risk behaviors due to lack of preventive programs on part of families, loss of family solidarity and control, and low level of parental supervision over such behaviors. Regarding gender differences, the findings indicate a high prevalence of overall risk-taking among boys compared with girls in both groups, which is consistent with other studies. [25] The lower level of risk-taking and high-risk behaviors in girls than boys can be attributed to the lack of acceptance and welcome of these behaviors by girls, different gender expectations, and higher levels of self-control in girls in different communities. In the same way, behavioral disorders in adolescents with addicted fathers are higher in all dimensions than those in children with non-addicted fathers. Guebaly et al. referred to the following items as the characteristics of addicted family climates: increased familial contradictions and conflicts, physical and emotional violence, reduced solidarity and cohesion of the family, reduced familial organization and discipline, increased level of the family isolation, increase of family stress related to job issues, diseases, and lack of economic management at home, and loss of family connections. [26] Kumpfer et al. found that there are higher rates of behavioral disorders, such as anxiety, depression, drug use, and school problems in children with addicted parents than those in children with non-addicted parents. [27]

| Table 1: Demographic data pertaining to adolescents with addicted fathers (case group) and non-addicted fathers (control group) |
|-----------------|-----------------|-----------------|-----------------|
| Variable        | Case group      | Control group   |
| Gender          |                 |                 |
| Male            | 80              | 80              |
| Female          | 75              | 75              |
| Family structure|                 |                 |
| Integrated      | 150             | 146             |
| Disintegrated   | 5               | 9               |
| Education level |                 |                 |
| First grade of high school | 55              | 55              |
| Second grade of high school | 50              | 50              |
| Third grade of high school | 50              | 50              |
Table 2: The indexes of high-risk behaviors in adolescents with addicted and non-addicted fathers

<table>
<thead>
<tr>
<th>Variable</th>
<th>Risk-taking in the case group</th>
<th>Risk-taking in the control group</th>
<th>Total risk-taking in adolescents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td>Risky driving</td>
<td>69</td>
<td>34</td>
<td>52</td>
</tr>
<tr>
<td>Violence</td>
<td>18</td>
<td>36</td>
<td>101</td>
</tr>
<tr>
<td>Smoking</td>
<td>37</td>
<td>41</td>
<td>87</td>
</tr>
<tr>
<td>Drug use</td>
<td>30</td>
<td>54</td>
<td>71</td>
</tr>
<tr>
<td>Alcohol consumption</td>
<td>113</td>
<td>18</td>
<td>24</td>
</tr>
<tr>
<td>Sexual relationship</td>
<td>115</td>
<td>22</td>
<td>18</td>
</tr>
</tbody>
</table>

Table 3. The mean and standard deviation of risk behaviors in students with addicted and non-addicted fathers

<table>
<thead>
<tr>
<th>Variable</th>
<th>Case group</th>
<th>Control group</th>
<th>Total risk-taking in adolescents</th>
<th>T</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>Risky driving</td>
<td>11/78</td>
<td>4/2</td>
<td>6/34</td>
<td>3/42</td>
<td>-1/124</td>
</tr>
<tr>
<td>Violence</td>
<td>10/24</td>
<td>4/78</td>
<td>6/63</td>
<td>3/83</td>
<td>-1/124</td>
</tr>
<tr>
<td>Smoking</td>
<td>19/12</td>
<td>4/48</td>
<td>8/47</td>
<td>4/78</td>
<td>-1/812</td>
</tr>
<tr>
<td>Drug use</td>
<td>12/48</td>
<td>4/25</td>
<td>7/42</td>
<td>4/12</td>
<td>-1/48</td>
</tr>
<tr>
<td>Alcohol consumption</td>
<td>7/46</td>
<td>3/64</td>
<td>4/12</td>
<td>2/64</td>
<td>-1/930</td>
</tr>
<tr>
<td>Sexual relationship</td>
<td>6/53</td>
<td>3/26</td>
<td>3/49</td>
<td>2/12</td>
<td>-1/764</td>
</tr>
</tbody>
</table>

Table 4. The mean and standard deviation of behavioral disorders in students with addicted and non-addicted fathers

<table>
<thead>
<tr>
<th>Behavioral disorders</th>
<th>Case group</th>
<th>Control group</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Attention Deficit/Hyperactivity</td>
<td>5/26</td>
<td>3/94</td>
<td>1/22</td>
<td>1/54</td>
</tr>
<tr>
<td>Anxiety/Depression</td>
<td>3/36</td>
<td>2/01</td>
<td>1/68</td>
<td>1/35</td>
</tr>
<tr>
<td>Anti-social Behavior/ Conduct Disorder</td>
<td>4/49</td>
<td>3/64</td>
<td>1/06</td>
<td>1/84</td>
</tr>
<tr>
<td>Maladaptive Behaviors</td>
<td>3/18</td>
<td>1/12</td>
<td>1/04</td>
<td>1/02</td>
</tr>
<tr>
<td>Overall Behavioral Disorders</td>
<td>16/29</td>
<td>8/48</td>
<td>5</td>
<td>3/49</td>
</tr>
</tbody>
</table>

CONCLUSION

Based on the findings of this research, the maintenance and promotion of public health require authorities to pay special attention to high-risk behaviors. Also these findings suggest the need for the development of prevention programs and treatment interventions in children with addicted fathers. Hence, it is of higher importance to develop prevention programs in order to prevent the incidence of behavioral disorders and high-risk behaviors.

Ethical Considerations: This research project was approved by the ethics committee of Zabol University
of Medical sciences and name and Specifications of patient were kept.

Source of Funding: Zabol University of Medical sciences.

Conflict of Interest: None.

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Clinical Assessment of Age by Clinical Eruption of 2nd Molar in 12-14 years for Medicolegal Investigation

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ABSTRACT

Background: Human dentition starts to erupt from age 6 months to 2 years with appearance of temporary teeth followed by appearance of permanent set of teeth from 5 to 25 years. The assessment of age in school going children aged 12-14 years by clinical eruption of 2nd molar teeth is very important in medico-legal work and comes up frequently in connection with the questions of criminal responsibility, rape, kidnapping, child labor, etc.

Materials & method: The subject for the present study were selected by random sampling and consists of 50 boys and 50 girls, studying in 7th to 10th standard in various higher secondary schools of Chennai city and were broadly classified in the 2 groups of equal strength and equal male to female ratio. The oral cavity was examined with the help of a torch light, mouth mirror, probe and a tongue depressor. For the conduction of the study, a proforma was devised to collect all relevant information like age, sex, socio-economic status, diet, habits, etc. from the subject. Dental charting was done as per the Federation Dentaire Internationale system (F.D.I). The subjects were also classified after assessing their socio-economic status as per the Modified B.G. Prasad classification for the year 2008.

Results: In age group 12-13 years, more than 40% of the children had more or the other 2nd molar teeth not erupted whereas their countersex had 2nd molar in stage 2 or 3. In age group 13-14 years the contrast in eruption stages between male and female was blurred. The dental eruption is quite earlier in females than males and the 2nd molars of the lower jaw appear earlier than the upper jaw. However there is no significant difference in eruption of 2nd molars of the right and left side in the same jaw.

Keywords: Clinical eruption; second Molar; age estimation; medico legal investigations; socioeconomic status.

INTRODUCTION

The assessment of age in school going children aged 12-14 years by clinical eruption of 2nd molar teeth is an important activity and is commonly carried in medico legal area and hence dentists and medico-legal investigator work together to resolve numerous issues related to identification. One of the important and frequent requirements posed to the medico-legal fraternity by the investigating authorities is to estimate age of a child, which holds great importance from the point of view of Criminal responsibility, kidnapping, consent, child labor etc. [1-4] Assessment of age is often required while administering justice to an individual involved in civil and criminal litigation. The times of eruption of temporary and permanent teeth are fairly constant and assessment of age of an individual by examination of teeth is one of the accepted methods.
of age determination. Eruption of teeth is one of the changes observed easily among the various dynamic changes that occur from formation of teeth to the final shedding of teeth. The process of gingival eruption of teeth is one of those that cannot be dated exactly but can readily be recorded as having occurred or not occurred in any individual. This fact can be made use of in ascertaining the average age of eruption of the tooth.\cite{13}

The age estimation can also be carried out with the help of radiological assessment of various ossification centers. Numerous studies have been carried out to assess the age of a young individual by assessment of eruption of teeth.\cite{6-11} Regional variations due to nutritional, environmental, racial, genetic and numerous other factors exist.\cite{12,13}

**AIMS & OBJECTIVES**

- The assessment of age in school going children aged 12-14 years by clinical eruption of 2nd molar teeth.

- To evaluate the factors that affects the eruption of teeth.

**Materials & Methods**

The subject for the present study consists of 50 boys and 50 girls, studying in 7th to 10th standard in various higher secondary schools of Chennai city. The subjects were selected by random sampling. The purpose and method of study was explained to all and those consenting and meeting the inclusion criteria of being native of this region with valid proof of birth (Birth certificate/School documents), good oral hygiene, no developmental malformations and absence of any acute/chronic diseases were included in the study.

All the selected subjects were broadly classified in the 2 groups of equal strength and equal male to female ratio (Table 1)

- Group I: Age between 12 years to 12 years + 364 days (25 males/25 females)

- Group II: Age between 13 years to 13 years + 364 days (25 males/25 females)

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Male (n = 25)</th>
<th>Female (n = 25)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>%</td>
<td>Number</td>
</tr>
<tr>
<td>12 – 13 years</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>13 – 14 years</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100</td>
</tr>
</tbody>
</table>

For the conduction of the study, a proforma was devised to collect all relevant information like age, sex, socio-economic status, diet, habits, etc. from the subject. The oral cavity was examined with the help of a torch light and a mouth mirror with mouth widely opened with the tongue depressor. After detailed dental examination, dental charting was done according to Federation Dentaire Internationale (FDI) system (Table 2) and the staging of tooth eruption was done as shown in table 3.

**Table 1: Age & Sex wise distribution of study subjects**

**Table 2: Numbering of Tooth by Federation Dentaire Internationale**

<table>
<thead>
<tr>
<th>18</th>
<th>17</th>
<th>16</th>
<th>15</th>
<th>14</th>
<th>13</th>
<th>12</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
<td>28</td>
</tr>
<tr>
<td>48</td>
<td>47</td>
<td>46</td>
<td>45</td>
<td>44</td>
<td>43</td>
<td>42</td>
<td>41</td>
</tr>
<tr>
<td>31</td>
<td>32</td>
<td>33</td>
<td>34</td>
<td>35</td>
<td>36</td>
<td>37</td>
<td>38</td>
</tr>
</tbody>
</table>

**Table 3: Staging of Tooth Eruption**

<table>
<thead>
<tr>
<th>S.No</th>
<th>Stage</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Stage 0</td>
<td>Non-eruption of temporary tooth / fall-out of temporary tooth and non-eruption of permanent tooth</td>
</tr>
<tr>
<td>2</td>
<td>Stage 1</td>
<td>When tip of crown of the teeth penetrated the gum margin. (Positive clinical eruption)</td>
</tr>
<tr>
<td>3</td>
<td>Stage 2</td>
<td>When this crown has grown into the oral cavity beyond the gum margins but not yet reached the occlusal surface</td>
</tr>
<tr>
<td>4</td>
<td>Stage 3</td>
<td>When the occlusal surface comes in contact with its counterpart and the bite is complete</td>
</tr>
</tbody>
</table>

The subjects were also classified after assessing their socio-economic status as per the Modified B.G. Prasad classification for the year 2013. The findings was tabulated and was statistically analyzed.
RESULTS

Age and sex wise distribution of the study subject. 25 males and 25 females in age group of 12- 13 years and 25 males and 25 females in age group of 13- 14 years were selected. After detailed dental examination, dental charting was done according to FDI (Federation Dentaire Internationale) system and stages of eruption of the 4 second molar teeth were evaluated as shown in Table 4.

Table 4: The stages of eruption of the 4 second molar teeth numbered as per the FDI system

<table>
<thead>
<tr>
<th></th>
<th>12 – 13 Years</th>
<th></th>
<th>13 – 14 Years</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male (n = 25)</td>
<td>Female (n = 25)</td>
<td>Male (n = 25)</td>
<td>Female (n = 25)</td>
<td>Male (n = 25)</td>
</tr>
<tr>
<td>Stage</td>
<td>Number</td>
<td>%</td>
<td>Number</td>
<td>%</td>
<td>Number</td>
</tr>
<tr>
<td>RIGHT UPPER JAW (17)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>13</td>
<td>52</td>
<td>3</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
<td>12</td>
<td>3</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>12</td>
<td>13</td>
<td>52</td>
<td>22</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>24</td>
<td>6</td>
<td>24</td>
<td>0</td>
</tr>
<tr>
<td>RIGHT UPPER JAW (27)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>13</td>
<td>52</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td>24</td>
<td>19</td>
<td>76</td>
<td>19</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>24</td>
<td>3</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>LEFT LOWER JAW (37)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>10</td>
<td>40</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
<td>12</td>
<td>6</td>
<td>24</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td>24</td>
<td>6</td>
<td>24</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>24</td>
<td>13</td>
<td>52</td>
<td>16</td>
</tr>
<tr>
<td>RIGHT LOWER JAW (47)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>9</td>
<td>36</td>
<td>6</td>
<td>24</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
<td>12</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td>24</td>
<td>9</td>
<td>36</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
<td>28</td>
<td>10</td>
<td>40</td>
<td>19</td>
</tr>
</tbody>
</table>

• In age group 12- 13 years, more than 40% of the children had more or the other 2nd molar teeth not erupted whereas their countersex had 2nd molar in stage 2 or 3.

• In age group 13- 14 years the contrast in eruption stages between male and female was blurred.

• Thus, it is evident from the table 4 that in females the dental eruption is quite earlier than males and the 2nd molars of the lower jaw appear earlier than the upper jaw. However there is no significant difference in eruption of 2nd molars of the right and left side in the same jaw.

Influence of external factors like diet, oral hygiene and socio-economic status on eruption of 2nd molar is shown in Table 5.
It is evident from the table 5 that the mixed diet, good oral hygiene and the study subjects belonging to class II showed early eruption of 2nd molar.

**DISCUSSION**

The assessment of age in school going children aged 12-14 years by clinical eruption of 2nd molar teeth is very important in medico-legal work and comes up frequently in connection with the questions of criminal responsibility, rape, kidnapping, child labor, etc.\(^{[34]}\)

The subject for the present study were selected by random sampling and consists of 50 boys and 50 girls, studying in 7th to 10th standard in various higher secondary schools of Chennai city and were broadly classified in the 2 groups of equal strength and equal male to female ratio. The oral cavity was examined with the help of a torch light, mouth mirror, probe and tongue depressor. For the conduction of the study, a proforma was devised to collect all relevant information like age, sex, socio-economic status, diet, habits, etc. from the subject. Dental charting was done as per the Federation Dentaire Internationale system (F.D.I). The subjects were also classified after assessing their socio-economic status as per the Modified B.G. Prasad classification for the year 2008.

In the present study the age of eruption of 2nd molar is 12 years 10 months to 13 years 4 months which was corroborative with the findings of the study conducted by Shourie et al and Kaul et al on the eruption of dentition.\(^{[6,7]}\) In the present study, it was observed that there was significant difference in eruption pattern of 2nd molar in both sexes, the females showing early eruption than boys by 4 months. This could be due to the hormonal effect that cause difference in steroid, adrenocortical and gonadotrophin levels between

---

**Table 5: Influence of external factors like diet, oral hygiene and socio-economic status on eruption of 2nd molar**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Diet</th>
<th>Oral Hygiene</th>
<th>Socio-economic status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vegetarian (n=78)</td>
<td>Mixed (n=22)</td>
<td>Good (n=91)</td>
</tr>
<tr>
<td>RIGHT UPPER JAW (17)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>22</td>
<td>28.21</td>
<td>4</td>
</tr>
<tr>
<td>1</td>
<td>6</td>
<td>7.69</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>38</td>
<td>48.72</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
<td>15.38</td>
<td>6</td>
</tr>
<tr>
<td>LEFT UPPER JAW (27)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>19</td>
<td>24.36</td>
<td>6</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
<td>3.85</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>44</td>
<td>56.41</td>
<td>13</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
<td>15.38</td>
<td>3</td>
</tr>
<tr>
<td>LEFT LOWER JAW (37)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>6</td>
<td>7.69</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>10</td>
<td>12.82</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>28</td>
<td>35.90</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>34</td>
<td>43.59</td>
<td>10</td>
</tr>
<tr>
<td>RIGHT LOWER JAW (47)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>12</td>
<td>15.38</td>
<td>6</td>
</tr>
<tr>
<td>1</td>
<td>6</td>
<td>7.69</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>19</td>
<td>24.36</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>41</td>
<td>52.56</td>
<td>10</td>
</tr>
</tbody>
</table>
the sexes. These findings were quite similar with the findings of Mishra et al and Agarwal et al.\textsuperscript{(8,9)} The mandibular 2nd molar erupts earlier than its counterpart in maxilla by 1 month in males and 1-2 months in females in the present study which correlates with the study conducted by Knott et al.\textsuperscript{11} In the present study there is no significant difference between the eruption of 2nd molar of the right and left side in the same jaw which is corroborative with the findings of Carr et al.\textsuperscript{10} The eruption of teeth is promoted by good oral hygiene and mixed diet. The eruption of teeth is also influenced by socio-economic status. The study subjects belonging to class II socio economic status (BG Prasad Classification of Socio economic status 2013) showed early eruption of 2nd molar than the study subjects belonging to class I socio economic status.

**CONCLUSIONS**

- The age eruption of 2nd molar is 12 years 10 months to 13 years 4 months.
- The 2nd molar erupts earlier in girls than boys by 4 months.
- The mandibular 2nd molar erupts earlier than its counterpart in maxilla by 1 month in males and 1-2 months in females.
- There is no significant difference between the eruption of 2nd molar of the right and left side in the same jaw.
- Effect of nutrition, good oral hygiene and socio-economic status does exist. The mixed diet, good oral hygiene and the study subjects belonging to class II socio economic status showed early eruption of 2nd molar.

Appearance of 2nd molar by 14 years in most of the subjects helps in associating it with chronological assessment of age.

**Conflict of Interest** – NIL

**Source of Funding** – SELF

**Ethical Clearance** – From Institution Ethical Committee (BIHER)

**REFERENCES**

Crucial Factors Frequently Overlooked in Deaths due to Hanging: A Prospective Study

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ABSTRACT

For long time forensic investigators have considered Hyoid and laryngeal injuries as important findings in cases of deaths due to strangulation. Further the incidence of injuries to the neck structures in such cases being related to various factors like the age, gender, the type of the hanging based on suspension and the position of the knot are well documented. Our study highlights the impact of other crucial factors which are usually overlooked, but having strong association in the deaths due to strangulations in general and hanging in particular. The study was undertaken in Central Delhi in 100 cases of hanging, where we studied the association between the hyoid and laryngeal fractures with other variables like type of the ligature material used, the number of turns around the neck, the width of the ligature mark, the type of the knot (fixed/running noose), the duration of suspension and the Body Mass Index of the individuals. In our study 42% of cases had hyoid/laryngeal injuries. These injuries were more common in those who had used hard ligature material with more than one turn around their neck and with a broader ligature mark on their neck. Hyoid and laryngeal injuries were also more common in victims who had a running noose and a prolonged duration of suspension.

Keywords: Hanging, ligature material, Number of turns, width of the ligature mark, type of knot, duration of suspension.

INTRODUCTION

Death due to suicidal hanging is a major cause of death worldwide1. Hanging is a common method to commit suicide in India2. Investigating authorities consider the injuries in the hyoid bone and the laryngeal cartilages to be significant findings in such deaths. In our study, factors like the type of the ligature material (soft/hard), number of turns around the neck, the width of the ligature mark, the type of the knot (fixed knot/running noose), the duration of suspension (with evidential Postmortem findings) and the Body Mass Index of the individuals were compared and associated with the hyoid and the laryngeal injuries.

MATERIALS AND METHOD

This prospective study was done in 100 cases of suicidal hanging at Central Delhi, which were brought to Lady Hardinge Medical College for medico-legal autopsy. Only the cases which satisfied our mandated inclusion criteria i.e. A meticulous inquest with a well documented approximate time since suspension which correlates with the postmortem findings, photographs of the crime scene, an intact ligature material, weight of the body in kilograms and length of the body in centimeters (To calculate the body mass index), were taken up for analysis. A standard autopsy procedure with meticulous examination of neck structures was performed. The nature of the ligature mark (soft/hard ligature), the numbers of turns around the neck made by the ligature, the width of the ligature mark and the body mass index of the individuals were considered. The structured Performa was used for data collection.
RESULTS

1. In our study of 100 cases, the fracture of the greater horn of hyoid bone and fracture of the superior horn of thyroid cartilage were the only injuries found.

2. 42 cases had some injury in their neck structures. 39 cases had only thyroid cartilage fracture, 3 cases had only hyoid bone fracture among which 3 cases had both hyoid bone and thyroid cartilage fractures.

3. 50% of the victims who had used a hard ligature material like ropes, wires had injuries in their hyoid bone and laryngeal cartilages.

4. 46% among those who had multiple wraps around their neck showed some bony and cartilaginous injuries.

5. The incidence of Hyoid and cartilaginous injuries were greatest in those who had a hard ligature with more number of turns around the neck.

6. 56% of those victims who had a broader ligature mark had injuries in their hyoid bone and laryngeal cartilage.

7. Hyoid and laryngeal injuries were present in every two victims who had a running noose around their neck.

DISCUSSION

Incidence of injuries in relation to the type of the ligature material used and its number of turns around the neck:

The nature of ligature materials used was broadly classified into hard and soft type. 52 of them had a soft type of ligature material like blankets, chunni (a long scarf) and sari and 48 of 100 victims had a hard ligature material like nylon ropes, coir ropes, electrical wires and plastic tapes. Chunni was the commonest material used in 33 cases followed by the nylon rope in 29 cases. Similar results were shown by Jayprakash and Sreekumari, Sharma et al.

Regarding the number of turns around the neck, 61 of 100 victims in our study group had only a single turn and 39 of them had more than one turn of ligature material around their neck. (Table. 1)

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Type of ligature and no. of turns.</th>
<th>Total no. of cases.</th>
<th>No. of cases with bony or cartilaginous injury.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Hard ligature with single turn.</td>
<td>21</td>
<td>9</td>
</tr>
<tr>
<td>2.</td>
<td>Hard ligature with more than one turn.</td>
<td>27</td>
<td>15</td>
</tr>
<tr>
<td>3.</td>
<td>Soft ligature with a single turn.</td>
<td>40</td>
<td>15</td>
</tr>
<tr>
<td>4.</td>
<td>Soft ligature with more than one turn.</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>100</td>
<td>42</td>
</tr>
</tbody>
</table>

Conspicuously the incidence of fracture was highest in those who had a hard ligature with more than one turn around their neck. Similar results were reported by Sharma et al, that injuries were more frequent in victims who had tough materials as the ligature. But Luke et al. in their study reported that there was no association of the fractures with the composition and number of wraps around the neck. Paparo and Siegel in their study also did not find that the type of ligature had any role on the incidence of the fractures.

Incidence of fractures with respect to the width of the ligature mark:

The ligature mark was measured in all the cases. Based on the width of the ligature mark all the cases were grouped into narrow, medium and broad ligature marks. 18 cases had narrow ligature mark (<2cm), 38 cases had medium ligature mark (2-4cm) and 44 cases had broad ligature mark (>4cm). The incidence of fracture with respect to the width of the ligature mark is as given in the Table 2.
Table No 2: Incidence of fractures with respect to the width of the ligature mark

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Width of the ligature mark</th>
<th>Total no. of cases</th>
<th>No. of cases with bony or cartilaginous injury.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Narrow (&lt;2cm)</td>
<td>18</td>
<td>6</td>
</tr>
<tr>
<td>2.</td>
<td>Medium (2-4cm)</td>
<td>38</td>
<td>11</td>
</tr>
<tr>
<td>3.</td>
<td>Broad (&gt;4cm)</td>
<td>44</td>
<td>25</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>100</td>
<td>42</td>
</tr>
</tbody>
</table>

In our study 56% among those victims who had broader ligature mark had neck injuries. Similar results were shown by G. Feigin in his study and he related the neck injuries directly to the width of the ligature mark. Luke et al. in their study did not derive any association with the width of the ligature mark.

Incidence of fractures with respect to the type of the knot:

87 cases had a fixed knot and 13 had a running noose around their neck. 35 cases out of 87 and 7 out of 13 cases had injuries in their neck bony and cartilaginous structures. Thus the incidence of the neck injuries was higher in victims who had a running noose (Table No. 3). Similar results were shown by Sharma BR et al. in their study.

Table No 3: Incidence of fractures with respect to the type of the knot

<table>
<thead>
<tr>
<th>S.No</th>
<th>Type of knot</th>
<th>No. of cases</th>
<th>No. of cases with bony and cartilaginous injury.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Fixed knot</td>
<td>87</td>
<td>35</td>
</tr>
<tr>
<td>2.</td>
<td>Running noose</td>
<td>13</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100</td>
<td>42</td>
</tr>
</tbody>
</table>

Incidence of fractures with respect to the Duration of suspension:

An approximate duration of suspension was estimated from postmortem changes and the police inquest as mandated in our inclusion criteria. There were 24 victims who were suspended for 0-2 hours, 36 were suspended from 2-6 hours and 39 were suspended for more than 6 hours (Table No. 4).

Table No 4: Incidence of fractures with respect to the Duration of suspension:

<table>
<thead>
<tr>
<th>S.No</th>
<th>Duration of suspension (hours)</th>
<th>No. of cases</th>
<th>No. of cases with bony and cartilaginous injury.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>0-2</td>
<td>24</td>
<td>3</td>
</tr>
<tr>
<td>2.</td>
<td>2-6</td>
<td>37</td>
<td>9</td>
</tr>
<tr>
<td>3.</td>
<td>&gt;6</td>
<td>39</td>
<td>30</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>100</td>
<td>42</td>
</tr>
</tbody>
</table>

The study showed that the incidence of the fracture of the hyoid and the thyroid cartilage increased proportionately with the prolonged duration of suspension. Similar results were claimed in the study by I Morild which showed that higher frequencies of fractures were found in longer suspension time.

Frequency of the fractures with respect to the Body mass index of the victim:

The weight and length of the corpse was measured as the part of the autopsy procedure. BMI was calculated with the standard formula for all the victims (Weight in kg/Height in m²). The BMI of the entire study group fell within the normal narrow range with an average of 23.5 kg/m² among males and 21.6 kg/m² among females. Hence it was difficult to derive a definite cut-off point to relate the body mass index with the frequency of the neck injuries. R Clement et al. in their study related that the incidence of fractures increases with the weight of the individuals.

CONCLUSION

In our prospective study it was apparent that, the injuries to the hyoid bone and the neck cartilage
occurred more in the victims who used a hard ligature material with more number of turns around their neck with a broader ligature mark and a prolonged duration of suspension. Hence it is recommended that these factors which are usually overlooked may also be evaluated along with the other variables like the age, gender, type of hanging, location of the knot to make the forensic investigation complete. We have prepared a pro-forma containing checklist that can be used before conducting autopsy, so that the frequently overlooked factors can be avoided (Table No 5)

1. Name :
2. Age :
3. Gender:
4. Brief history:
5. Place of death:
6. When the person was last seen alive:
7. Time of the last meal:
8. Time of his last urination:
9. Time of recovery:
10. Time since suspension (Based on Post mortem findings):
11. Type of suspension (Complete/Partial):
12. Type of the knot (Fixed/Running noose):
13. Position of the knot (On the nape of the neck/ side of the neck):
14. Type of the ligature material (Hard/Soft):
15. Distance of the drop:
16. Number of turns around the neck (Single/more than one):
17. Width of the ligature mark on the neck (<2cm/ 2-4 cm/>4cm):
18. Length of body (cm):
19. Weight of the body (kg):
20. BMI (Weight in KGs/Height in M²):

Table No:5 Checklist in hanging cases

**Conflict of Interest:** The authors declare that there is no conflict of interest in this study.

**Ethical Clearance:** This study was cleared by the Institutional ethical committee prior to MD Dissertation Thesis at Delhi University.

**Source of Funding:** Self

**REFERENCES**

Medicolegal Case - A Study in a Rural Health Hospital

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ABSTRACT

A study was conducted in a rural hospital to assess profile, types, and the frequency with an incident rate of different types of medico-legal cases (MLC). Medicolegal case concentrates on description of history, injuries in the case record, police intimation and wound certificate. The most important person in a hospital step up is the casualty medical officer examining the patient on whose judgement a case may or may not be registered under medicolegal category. The findings of the study revealed that out of 238 cases registered under medicolegal, assault (n=112) constituted to be the majority followed by RTA (n=80) and in (n=22) cases the medical practitioner did not describe the history of the incident. Male preponderance were in the public assault, whereas female preponderance was in domestic. Therefore, it is more important for doctors not only to treat the patient, but at the same time to know the medicolegal obligations.

Keywords: Medicolegal case, domestic violence, public violence

INTRODUCTION

In a developing country like India, there is a steady rise in crime everyday and with no clear cut definition of a medicolegal case a duty doctor might miss identifying and entering it in the hospital register¹. In some instance cases go unregistered due to a patient’s request². Should the duty doctor respect the patients autonomy or act as a deontologist is a question which needs to be answered. First and Foremost duty of the doctor is to treat and save a patient³. A medical report and treating doctor play a significant role in getting justice to a patient in a medicolegal case, but often it is seen the doctors do not include the case under medicolegal category due to their reluctance to appear in court⁴. All injuries, even though insignificant should be recorded and necessary authorities have to be informed⁵.

MATERIAL AND METHOD

The study was conducted after getting ethical clearance from the Yenepoya University Ethics Committee (YUEC). Permission to collect data on medicolegal case was also taken from the concerned authority in Kasaragod District Co-Operative Hospital, Kumbla.

Type of Study - Retrospective

Duration - One year (1st April 2014 to 31st March 2015)

Place of Study - Kasaragod District Co-Operative Hospital, Kumbla

Sample size - 238 cases (as registered during the study period)

Inclusion Criteria – All medicolegal cases reported during the study duration.

(Medicolegal cases - Road traffic accident, assaults, including sexual assault, domestic assault, and public assaults, fall from height, consumption of poison, self-inflicted injuries, burns, multiple history like assault followed by road traffic accident)

Exclusion Criteria

Cases related to treatment of diseases, Obstetrics and Gynaecology related cases. The data was collected from MLC registers and hospital case files.
It concentrates on description of history, injuries in case record. Data collected from case records was first anonymized while entering in the proforma. It was kept confidential and not to be divulged. The collected data was analyzed for the age, sex, cause & manner of injury, time of injury, month and frequency of occurrence of incidence. Descriptive statistics such as frequency distribution, mean and standard deviation were used to analyze the data.

RESULT

A total of 238 Medicolegal cases were found to be registered in Rural Cooperative Hospital during the study period.

132 cases were of outpatient of which 81.1% were male and 18.9% were females.

106 cases were of Inpatient of which 79.2% were males and 20.8% were females.

Table no. 1- Shows cross tabulation between Type of patient and Type of incident

<table>
<thead>
<tr>
<th>Type of Patient * Type of incident Crosstabulation</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Patient</td>
<td>not mentioned</td>
</tr>
<tr>
<td>OP</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>3.8%</td>
</tr>
<tr>
<td>IP</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>0.0%</td>
</tr>
</tbody>
</table>
Table no. 2 shows the type of incident and the number of Injuries recorded

<table>
<thead>
<tr>
<th>Type of incident</th>
<th>Injury code</th>
<th>No injury</th>
<th>Any 1 injury</th>
<th>Any 2 injury</th>
<th>Any 3 injury</th>
<th>Any 4 injury</th>
<th>Injuries not described by doctor</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not mentioned</td>
<td></td>
<td>1</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20.0%</td>
<td>80.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Public</td>
<td></td>
<td>35</td>
<td>40</td>
<td>10</td>
<td>5</td>
<td>2</td>
<td>3</td>
<td>95</td>
</tr>
<tr>
<td></td>
<td></td>
<td>36.8%</td>
<td>42.1%</td>
<td>10.5%</td>
<td>5.3%</td>
<td>2.1%</td>
<td>3.2%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Domestic</td>
<td></td>
<td>6</td>
<td>8</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td></td>
<td>37.5%</td>
<td>50.0%</td>
<td>6.3%</td>
<td>6.3%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Sexual</td>
<td></td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>RTA</td>
<td></td>
<td>11</td>
<td>48</td>
<td>16</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13.8%</td>
<td>60.0%</td>
<td>20.0%</td>
<td>3.8%</td>
<td>0.0%</td>
<td>2.5%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Poison</td>
<td></td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Burn</td>
<td></td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.0%</td>
<td>100.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Fall</td>
<td></td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.5%</td>
<td>50.0%</td>
<td>12.5%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>25.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>No history</td>
<td></td>
<td>4</td>
<td>9</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td></td>
<td>23.5%</td>
<td>52.9%</td>
<td>5.9%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>17.6%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Self</td>
<td></td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.0%</td>
<td>50.0%</td>
<td>25.0%</td>
<td>25.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Multiple response</td>
<td></td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>22.2%</td>
<td>22.2%</td>
<td>33.3%</td>
<td>22.2%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
Any 1 injury = Abrasion, any 2 injury = Abrasion + Bruise, any 3 injury = Abrasion + Bruise + Laceration, any 4 injury = Abrasion + Bruise + Laceration + fracture.

Table no. 3- Cross tabulation of age distribution and type of incident

<table>
<thead>
<tr>
<th>Age distribution</th>
<th>Type of incident</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>not mentioned</td>
<td></td>
</tr>
<tr>
<td>0-20 Yrs</td>
<td>1</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>1.8%</td>
<td></td>
</tr>
<tr>
<td>20-40 Yrs</td>
<td>2</td>
<td>133</td>
</tr>
<tr>
<td></td>
<td>1.5%</td>
<td></td>
</tr>
<tr>
<td>40-60 Yrs</td>
<td>1</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>2.6%</td>
<td></td>
</tr>
<tr>
<td>60-80 Yrs</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>11.1%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>5</td>
<td>238</td>
</tr>
</tbody>
</table>

N=133 (55.8%) of MLC cases had been reported in the age group of 20-40years, in which public violence shows the highest number, n= 55(41.4%) followed by RTA n = 47 (35.3%). The number of cases reported in the age group of 0-20 years is N=57 (23.9%), in which public violence shows the highest number, n=22 (38.6%) followed by RTA n=14 (24.6%).

**DISCUSSION**

This retrospective study was conducted in a rural hospital in northernmost coastal part of Kerala, for the period of one year from 1st April 2014 to 31st March 2015. A total of about 4040 patients reported to the hospital, out of which only 238 (5.8%) cases were considered as medicolegal, and a study was conducted based on the reports filed in the hospital record. The percentage of medicolegal cases were comparatively average with other studies. It is a proof that many medicolegal cases have not been noticed by the treating doctor or may not be registered on request by the patient’s bystanders. Out of 238 cases reported, 191 (80.3%) were male and 47 (19.7 %) were female and the mean age of the patient was found to be between 20 to 40 years. The age group is consistent with the study done by other authors (table 4). The increased number of RTA and the age group of the victims shows the cause could be rash driving, not using helmets or breaking the traffic rules Though traffic rules have been amended recently, for increasing public safety, making helmet wearing compulsory by both the rider and pillion rider still it has been observed that the public carry the helmets and wear it only if there is patrolling by police.

Among the MLC cases recorded in the present study, there is a high incidence of Public assault (39.9%) followed by RTA (33.6%). In majority of the studies done there is high incidence of RTA 7,8,9,11. Malik et al (2013) reported in Haryana the maximum number of cases was of poisoning whereas in our study only 2 cases were registered under poisoning. Hussaini reported burns to top the list of MLC cases which was not mentioned in the hospital records of the present study13. Authors are of opinion that the increase in public assault case in the present study may be due to religious unrest. The District of Kasaragod is a sensitive area, and a slight provocation can lead to blood shed, communal and political violence.
Table no. 4: Comparison of the present study with studies done by other authors

(3,7,8,9,10,11,12,13,14)

<table>
<thead>
<tr>
<th>Authors</th>
<th>Place/ year</th>
<th>MLC cases</th>
<th>RTA</th>
<th>Assault</th>
<th>Poisoning</th>
<th>Fall from height</th>
<th>Burns</th>
<th>Sexual Assault</th>
</tr>
</thead>
<tbody>
<tr>
<td>Garg &amp; Verma</td>
<td>Punjab/2007</td>
<td>784</td>
<td>59.40%</td>
<td>7.40%</td>
<td>12.10%</td>
<td>9.40%</td>
<td>4.60%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Yadav &amp; Singh</td>
<td>Faridabad/2009</td>
<td>111</td>
<td>27%</td>
<td>29.70%</td>
<td>36.90%</td>
<td>0%</td>
<td>2.70%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Malik et al</td>
<td>Haryana/2011</td>
<td>202</td>
<td>36.60%</td>
<td>9.90%</td>
<td>41.50%</td>
<td>0.40%</td>
<td>6.90%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Dileep</td>
<td>Tumkur/2012</td>
<td>173</td>
<td>41.60%</td>
<td>21.90%</td>
<td>8.09%</td>
<td>5.20%</td>
<td>0.57%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Hussaini et al</td>
<td>Akola/2012</td>
<td>2053</td>
<td>16.90%</td>
<td>19.90%</td>
<td>18.70%</td>
<td>0.00%</td>
<td>21.87%</td>
<td>1.99%</td>
</tr>
<tr>
<td>Sidhart et al</td>
<td>Nepal/2013</td>
<td>1743</td>
<td>50.70%</td>
<td>16.80%</td>
<td>11.80%</td>
<td>5.80%</td>
<td>4.90%</td>
<td>0.05%</td>
</tr>
<tr>
<td>Saxena</td>
<td>UP/2014</td>
<td>264</td>
<td>64.30%</td>
<td>1.89%</td>
<td>17.80%</td>
<td>3.70%</td>
<td>1.50%</td>
<td>0.3%</td>
</tr>
<tr>
<td>Raju &amp; Raj</td>
<td>Tumkur/2014</td>
<td>393</td>
<td>50.50%</td>
<td>7.28%</td>
<td>21.19%</td>
<td>3.53%</td>
<td>7.50%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Yatoo et al</td>
<td>J&amp;K/2014</td>
<td>1136</td>
<td>48.06%</td>
<td>30.60%</td>
<td>9.24%</td>
<td>2.81%</td>
<td>3.08%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Kishor et al</td>
<td>Kasargod/2014</td>
<td>238</td>
<td>33.60%</td>
<td>39.90%</td>
<td>0.84%</td>
<td>3.36%</td>
<td>0.42%</td>
<td>0.42%</td>
</tr>
</tbody>
</table>

The studies done by various authors have shown that the opinion was sought for medicolegal cases from the Department of Medicine, Surgery, Orthopaedics, Ophthalmology & Forensic Medicine\(^9,10,12\) but in the present study out of 238 cases only 41.59% was referred to Forensic experts and 0.42% to OBG Department and the rest 57.98% cases were seen by the casualty officer.

In the present study the maximum number of incidents was observed in the month of May (13.4%) & July (13.4%) followed by August (9.2%) and December (8.8%) which differs from incidents reported by Garg & Verma where the maximum case was reported in the month of September (11.7%) followed by July\(^7\). According to Saxena et al the maximum number of cases was reported in the month of November followed by July\(^8\). In all these studies, including the present study, the month of July is common, the reason may be, it being the monsoon season the chances of RTA is more. The authors totally agree with Garg & Verma that in future the main cause of death will be due to RTA\(^7\).

In some of the case record doctor has not described the history or injuries or both, but mentioned only the treatment part like cleaning and dressing of wounds. Sexual assault cases were not mentioned by many authors in their study\(^7,8,10,11,13,14\) and those who mentioned showed only one entry as was seen in the present study\(^9,13\). The reason may be the stigma attached to a victim of sexual assault, family pressure, fear of society. There is a need to train the casualty officer often an MBBS graduate on identifying the injuries which are often missed due to less expertise in recognizing the injury and taking appropriate history. During the MBBS course a student study the subject of Forensic Medicine in the second year and by the time the course is completed they have totally lost touch with the subject. As mentioned by Malik et al (2013)\(^12\) and Singh et al (2011)\(^13\) the authors also agree that there is a need to train the interns in this aspect of Forensic Medicine related to identifying and reporting medicolegal cases\(^11,12,13\) the authors also feels that the casualty officer should be given briefing by Forensic Experts at the time of joining duty and consulting them when in doubt.

**CONCLUSION**

The number of patients visiting casualty with different injuries may not find an entry under the medicolegal case due to the inability of the treating doctor to recognize the type and cause of injury or the reluctance to appear in court.
There is a need to recognize the importance of training casualty doctor who is the first contact doctor seeing the patient to identify an injury of medicolegal importance and correctly recording the details of injury and history of the patient. The maximum number of medicolegal cases were under public violence followed by road traffic accidents. There is an urgent need to create public awareness regarding the cause of public violence and road traffic accidents and the younger generation in the age group of 20 to 30 years has to be trained to obey traffic rules to avoid casualties due to a steep rise in road traffic accidents. At this rate the Public assault seems to be the main cause of death among the youth followed by the RTA. The sexual assault cases might not have been registered in the hospital records owing to fear of shame in the society. Very few people come forward to register the case and those who do come might request for confidentiality. Every hospital should have a protocol to identify and deal with medicolegal cases which should include correct entry of history of the case, type of injury and if patient is showing discomfort in disclosing the details in front of the bystanders the doctor should provide privacy and maintain confidentiality with regards to the details collected. Even trivial details which might seem of no importance should be entered if in doubt and intimation to police should be given.

Conflict of Interest – None.

Source of Funding - Self.

Ethical Clearance: Obtained from University Ethics Committee, Ref No. YUEC402/2016.

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7. Garg V, Verma SK. Profile of Medicolegal cases at Adesh Institute of Medical Sciences & Research, Bathinda Punjab.s
Get Reproductions Uncover that Worldwide Marine Fishery Gets are Higher Than Revealed and Declining

S Arul DelphinSutha1, N SriKumaran2

1Research Scholar, 2Assistant Professor, Department of Marine Biotechnology, AMET University, Chennai

ABSTRACT

Fish is a developing some portion of the economy. However, its monetary esteem is lessened by marine maladies. Irresistible infections are primary in the sea, and here we organize 67 cases that can diminish business species’ development and survivorship or reduction fish quality. These effects appear to be most risky in the unpleasant and swarmed states of aquaculture, which progressively commands fish creation as wild fishery generation levels. For example, marine maladies of cultivated clams, shrimp, abalone, and different fishes, especially Atlantic salmon, cost billions of dollars every year. In the examination, it is frequently hard to precisely appraise ailment impacts on wild populaces, particularly those of pelagic and sub-tidal species. Cultivated species frequently get irresistible illnesses from wild species and can, thus, trade irresistible specialists to wild species. Nonetheless, the effect of ailment fare on wild fisheries is disputable because there are couples of quantitative information exhibiting that wild species close homesteads experience the ill effects of irresistible maladies than those in different regions. The development of extraordinary irresistible operators to new regions keeps on being the best concern.

Keywords: Salmon, Sea Lice, Fish, Abalone, Prawns, the Externality.

INTRODUCTION

Oceanic fisheries are the central benefactors of healthy fish (finfish and marine spineless creatures; here 'fish')[1-3]. In many creating nations (and likely additionally in many “move” nations), fish is the significant creature protein source that country individuals can get to or afford[4]; and they are likewise a critical wellspring of micronutrients fundamental to individuals with generally inadequate nutrition. In any case, the developing prevalence of fish in nations with created[5] or quickly creating economies makes a request that can’t be met by fish stocks in their particular waters (for instance, the EU, the USA, China and Japan). [6]These business sectors are progressively provided by fish imported from creating nations, or gotten in the waters of creating nations by different inaccessible water fleets3,4,5, with the results that: Outside or potentially trade arranged modern household armadas are progressively angling in the waters of creating countries[7]. Modernly got angle has turned into a globalized ware that is generally[8-10] exchanged between mainland’s instead of expended in the nations where it was caught, and The little scale fisheries that generally provided fish to waterfront provincial groups and the inside of creating nations (quite in Africa)8 are compelled to contend with the fare situated mechanical armadas without much support from their legislatures.

The absence of consideration[11] a Proposed System of Ship Trajectory Control Using Particle Swarm Optimization that little scale fisheries endure in many parts of the world shows itself inconceivably deceptive insights that are submitted every year by numerous part Nations of the Food and Agriculture Organization of the United Nations (FAO), which may preclude or significantly underreport little scale fisheries data. FAO fits the information put together by its individuals, which then turns into the main worldwide informational index of fisheries measurements on the planet, broadly utilized by arrangement creators and scholars.

This informational index[12] the current landscape of the mesenchymal stromal cell secretome: a new
paradigm for cell-free regeneration, nonetheless, may not just disparage distinctive (that is, little scale, business) and subsistence fisheries, additionally, for the most part, overlook the get of recreational fisheries, disposed of by getting and unlawful and generally unreported get, notwithstanding when a few assessments are available. In this manner, aside from a couple of evident instances of over-reporting, the arrivals information refreshed and spread every year [13] Isolation of Marine organisms and their antifungal studies by the FAO for the benefit of part nations may extensively belittle real fisheries get. While this underestimation is known among numerous fisheries researchers working with FAO get information and is openly recognized by FAO, its worldwide greatness has not been unequivocally displayed as of recently.

**METHOD**

At the point when ‘no information is accessible’ on a fishery that is known to exist, it is not fitting to enter “NA” or ‘no information’ into the database. Such passages will later be transformed into a zero, which is an awful gauge of the get of a current fishery. This worry about the tricky ‘polish of the number zero’ is additionally something that influences other logical exercises, for example, atmosphere modeling.

Or maybe, a best gauge ought to be embedded in all such cases, in view of the way that angling is a social action that will undoubtedly toss a “shadow” on the general public in which it is installed, and from which a surmised and moderate (yet superior to anything zero) gauge of getting can be inferred if angling of this sort is known to happen (for instance, from the fish or the fuel expended locally, or the quantity of vessels occupied with fisheries and the normal get rate of vessels of this sort et cetera).

Strikingly, while doing reproductions, it wound up plainly evident that the impression of ‘no information’ being accessible was not right: the ‘social shadow’ yields many articles in the associate explored and reported writing with getting information, or information from which get rates could be derived, notwithstanding for remote islands10. Likewise, nations may now and again send to FAO a stripped down variant of the nation get information their fisheries inquire about establishments have, and may even distribute on their sites.

Disposed of fish and spineless creatures are by and large thought to be dead, except the US fisheries where the portion of fish and spineless creatures answered to survive is by and large accessible on a for every animal varieties basis. Because of a distinct absence of worldwide scope of data, we don’t represent purported submerged disposes of, or net-mortality of angling gears. We additionally don’t address mortality created by apparition angling of surrendered or lost angling gear.

For financially got jellyfishes, it has been demonstrated that more than 2.5 times more are gotten than answered to FAO. This component is utilized to evaluate missing gets of unidentified jellyfish. Be that as it may, this extra find is, pending further review, not assigned to a particular nation or FAO range, and is along these lines included just the world’s aggregate get.

**RESULTS AND DISCUSSION**

We exhibit, interestingly, worldwide remade marine fisheries gets by fisheries parts Supplementary. They are commanded by mechanical fisheries, which contribute 73 mt of arrivals in 2010, down from 87 mt. At the worldwide scale, it is a declining mechanical get 12 that prompts declining worldwide gets since 1996, while the high-quality area, which produces a discover expanding from around eight mt·per years in the mid-1950s to 22 mt, per year in 2010, keeps on indicating progressive development in gets at the worldwide scale.

Additionally detectable is that the between yearly varieties in both remade gets and revealed gets are fundamentally determined by mechanical information, which is moderately all around archived and announced in time arrangement, while the little scale part information are smoother after some time, and all the more unequivocally affected by progression suspicions after some time as a major aspect of the national reproductions.
While a few nations progressively incorporate subsets of distinctive gets in authority get measurements given to FAO, subsistence fisheries get once in a while are10. Around the world, subsistence fisheries got an expected 3.8 mt·per year in the vicinity of 2000 and 2010. The current worldwide gauge of just shy of 1 mt·per year of recreational gets is somewhat uncertain, and recreational angling is declining ingrown, however expanding in creating nations.

CONCLUSION

Our remade get information, which joins the information answered to FAO with evaluations of unreported gets incorporate appraisals of susceptibility related with every national remaking. We incorporate instability evaluates here, in spite of the way those reproductions address an inborn negative inclination in worldwide get information and not the replicability of getting information gathering, which is the thing that “susceptibility” gauges, for the most part, are utilized for. We do perceive that any assessments of unreported gets suggest a specific level of instability, however so do formally announced information. Most nations on the planet utilize inspecting plans, estimations and raising variables to infer their national get information they authoritatively report locally and globally, all without including appraisals of the susceptibility innate in the numbers being accounted for as official national gets.

Ethical Clearance: Taken from , AMET University.

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Hexahedral Mesh Quality Development by Using Mesh Generator

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ABSTRACT
Programmed hexahedral mesh era is an exceptionally meriting answer for better execution of limited component examination of vast complex structures. At present plating, bristle weaving and hair weaving based putting calculation are accessible to perform such assignments. As these hexahedral work era procedures are entirely programmed, it is conceivable to shape a few components, which don’t have high enough qualities for limited part investigation. For this reason, a reliable post-processing method is presented in this paper which can modify the shapes of the already generated hexahedrons. Four different structural models are tested, and the results show that the proposed method can effectively amend the quality of the inverted hexahedrons and eliminate the invalid ones.

Keywords: Doublet, Triplet, Quadruplet, Whisker Weaving Based Plastering Algorithm, Hexahedral Mesh

INTRODUCTION
The limited component strategy is at present an essential apparatus for mechanical building (shipbuilding, vehicle, airship and so forth.) outline and examination. Toward the starting phase of the limited component strategy, most clients were fulfilled to reenact boundlessly rearranged types of their last plan using just tens or several components. Careful preprocessing was required to subdivide areas into available parts. Advertise strengths have now pushed fitting innovation to a point where clients now hope to work compact spaces with thousands or a huge number of components without any communications than the push of a catch. Progressively bigger and more mind-boggling plans are being recreated utilizing the limited component strategy. With its expanding prevalence comes the motivating force to enhance programmed fitting calculations.

For three-dimensional lattice, the reasons why hexahedron is picked over tetrahedron as the limited component are 1) Hexahedron furnishes shape capacities with extra terms that may build the precision of the arrangement. Second request tetrahedrons are required to accomplish an indistinguishable precision from straight hexahedron [1-2] Hexahedron fit man-improved question. What’s more, 3) a hexahedral work diminishes the general component check. A tetrahedral work, for the most part, builds the component number 4 to 10 overlay over a hexahedral work. With less hexahedron, this converts into fewer hubs or degrees of opportunity, consequently shorter run times amid the genuine limited component investigation. With fewer levels of opportunity, post-handling and perception times can likewise be decreased. The methods which are utilized for programmed hexahedral work are mapping, clearing, average pivot, network-based approach, putting, bristle weaving and stubble weaving based putting [3-4]. The programmed era of top-notch hexahedral networks for subjective geometry would enormously lessen the time of making the limited component models. As hexahedral work era process is completely programmed, it is [5] Survey on fuzzy Petri nets for classification conceivable to produce a few components, which don’t have sufficiently high qualities for certain investigation. Thus, Performance, emission and combustion characteristics of a diesel engine with the effect of the thermal barrier coating on the piston crown using biodiesel are described in [7]. Investigation of Structural, SEM, TEM and Dielectric Properties of nanoparticles is derived in [6]. A solid post-preparing technique is introduced in this [8] Pull-in voltage study of a variously structured cantilever and fixed-fixed beam models using COMSOL Multiphysics paper. A completely programmed PC program in C++ is created given this proposed strategy. The as of now produced hexahedral work can be given as information this
program can take out or change the states of the hexahedrons.

**Classification of Bad Shaped Elements**

Three types of invalid elements are generated by using automatic mesh generator. These are doublets, triplets, and quadruplets. For the limited component investigation, the work ought to be unwound. The expression “tangled” work alludes to enhancing the nature of hexahedral work produced via programmed work generators networks, which contain modified components (equal terms are ‘invalid or “collapsed” networks). Work, which contains no rearranged and invalid components, is called ‘unwound,’ ‘legitimate,’ or ‘unfurled.’ In this review, a modified component has a non-positive nearby volume at any of its corners. A definite review is introduced next portraying how these are produced and how to expel or change them in the post procedure.

**Doublets**

Doublets form when two hexahedrons share two faces and thus in a mesh, doublets appear as pairs. At least one hexahedron of each pair will have deformed shape. An example of doublet pair is shown in Fig. 1.

The best position \( P \) can take the focal point of the polygon where it will have metric esteem (standard of value, one implies flawless, and zero or less means defective Islam 2005) zero for any of the hexahedrons of the combine. For this reason, it is impractical to enhance the quality of work by any smoothing strategy keeping the availability same. To enhance the quality, the work must be changed topologically. Mitchell (1995) displayed one review to perform such sort of progress which is called cushioning doublets. At initial, an arrangement of hexahedrons (incorporates a doublet hex) is picked with the end goal that the first and the last hexes of the set are neighbors to the doublet hex. At that point, that gathering of hexahedrons (therapist set) is isolated from alternate hexahedrons from the limit, and after that, the therapist set is re-associated with the old limit with a layer of new hexahedrons. This operation of isolating the psychologist defined from the first limit with a layer of hexahedrons is called padding. There are numerous alternatives of picking a psychologist set. The most straightforward way is picking just the doublet hex as psychologist set and cushioning. After cushioning both doublets of a couple, the circumstance looks like as appeared in Fig.2

![a) Pillowing in 2-D](image1)

![b) Pillowing in 3-D](image2)

![c) Inverted Element](image3)

**Triplets**

For this situation, a couple of hexahedrons (reversed) share three coplanar appearances (i.e., seven
hubs). In the figure underneath (Fig. 3 (an)), ax lines demonstrate these coplanar appearances (ABFE, EFGH, and BCGF). The extraordinary hubs of the hexes are D and A. F is the basic hub of the three regular faces that is likewise inside and not shared by some other hexes. No sort of smoothing or development of hub F can make these hexahedrons unraveled. To adjust the circumstance, hub D and A are converged to hub F, and both of the hexahedrons are erased. Evacuating these hexahedrons will likewise evacuate the coplanar countenances, and the circumstance will be made strides. All the hexes already had hub D, and A will have hub F. another network like face and edge data is changed as indicated by these progressions. Some of the time doublets (segment 2.2) are related with triplets.

A very small distance d (10-5 times the average edge length associated with the node) is applied to the node in a direction k (starting from x direction) to calculate the minimum metric (after) for this changed position. From these two metric values (dm and after, dm is the metric before the displacement) and d, the gradient vector is calculated by the following equation:

$$ gvec[k] = (\text{after } m|y - dm)/d $$

**Quadruplets**

This is another sort of invalid component created by stubble weaving. Two hexahedrons share four coplanar faces (ABFE, EFGH, FBCG and DAEH) (i.e., eight hubs) for this situation (Fig. 3(b)). So there are two inside hubs E what’s more, F that are not shared by whatever other hexahedrons except these two and their position can’t be adjusted to make both of the hexahedrons non-modified. The arrangement of this issue is to erase both these hexahedrons also, hubs E and F. Along these lines the inner four countenances of the quadruplet hexahedrons are additionally erased, and the circumstance will be moved forward.

**Optimization Algorithm**

The objective of the review is to move every hub to a superior position. To think about the positions, we utilize the nature of the hub under thought and additionally the most exceedingly bad quality from the set comprised of that hub and its neighbors. So another position of the hub is viewed as better if the most noticeably bad nature of the set enhances or continues as before and the nature of the hub makes strides.

![Fig. 3. Triplets and Quadruplets](image)

![Flow Chart of Post processing](image)
RESULTS AND DISCUSSION

Test Model-1: This is an example of a sweepable, and on map meshable volume (as a whole, without decomposing) of these produced hexahedrons by bristle weaving based putting calculation, 23 components had negative Jacobian and 50 had inward edges outside the adequate range. Just three stages of Laplacian smoothing modified all the transformed components and 43 different components. The improvement based smoothing altered the rest of the seven components in 10 seconds.

![Surface mesh](image1) ![Wireframe view](image2) ![Hex mesh](image3)

Test Model-2: The surface work of this model contains 1220 quadrilateral components. It is evident from the assume that the model has unsymmetrical surface mesh. After hexahedral work era handle, 2048 hexahedrons are produced which has four upset components. Those were redressed by improvement based smoothing.

![Front view](image4) ![Back view](image5)

CONCLUSION

An impressive research has been performed to adjust the nature of hexahedral work created naturally. The introduced technique includes evacuation of quadruplets, triplets and doublets and altering network issues when a couple of edges is shared by more than two components lastly changing the upset components by advancement based smoothing. If not expelled or adjusted, the nearness of these invalid components can bring about off base outcomes. The entire strategy is programmed, and it makes a great deal of hexahedral work unraveled. A certain something to note here is that not every one of the cross sections produced my bristle weaving based putting calculation is tangled work. Just for complex surface networks, these components can be created. This technique can work with professional software like PATRAN, FEMAP, and ABAQUS.

Ethical Clearance: Taken from, AMET University.

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Baby Monitoring System with Live MJPEG Video Streaming

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ABSTRACT

This paper concentrated an internet-connected baby monitoring device that streams live camera images and other vital information about the surrounding environment and make it available on the web. This helps the parents to monitor the baby from anywhere at any time, whether in the next room or away from home. The device can be kept physically at a safe distance away from the baby. All the parents need to do is to have a connected device such as a smartphone or tablet or a PC with an internet browser. There is no reason to install and maintain a separate mobile app. The device acts as a web server and connects to the Internet over an Ethernet connection. The microcontroller firmware runs on top of an RTOS to achieve this.

Keywords: PC, RTOS, Browser, Monitoring, Ethernet.

INTRODUCTION

There are a few solutions out there in the market today like baby alarm devices that use microphones to transmit sound and devices such as movement monitors that use sensors pads placed under the crib mattress [1, 2, 3]. But all of these devices are inherently limited in the transmission distance range and must be placed physically close to the baby is specified [4]. These devices typically use wireless connectivity, which is not a viable option considering the safety of the child. Active data communication based on new cryptography algorithm is discussed in [5]. Methods to secure cloud storage system using Encryption Techniques survey is presented in [6].

DESCRIPTION

Our project is an internet-connected baby monitoring device that streams live camera images and other vital information about the surrounding environment and make it available on the web. From this paper, the idea helps the parents to monitor the baby from anywhere at any time, whether in the next room or away from home [7, 8]. The device can be kept physically at a safe distance away from the baby. As mentioned all the parents need to do is to have a connected device such as a smartphone or tablet or a PC with an internet browser [9]. There is no reason to install and maintain a separate mobile app. The device acts as a web server and connects to the Internet over an Ethernet connection. The microcontroller firmware runs on top of an RTOS to achieve this.

The major features of this project are listed below.

Live MJPEG Video Streaming

The device can stream a clear live video feed. When the request is made the onboard microcontroller captures the JPEG images from the camera using the built-in DCMI peripheral and starts to stream it over the web in Motion-JPEG compression format at an acceptable rate between 10 and 15fps is mentioned [10,11]. The image resolution is fixed at either 470 x 272 or 640 x 480. The microcontroller has a large RAM area, about 256KB, which is a must for this kind of application.

Sound and Motion Detection

The device consists of a microphone sound sensor to detect loud noise and PIR sensor to detect any unwanted movement. The status of this sensor information is available on the web page for the parents to see.
Temperature Alert

The parents can see the temperature of the nursery live and will be able to identify when the room is too hot or too cold [12]. This will assist them to maintain the area in a perfect condition to keep the baby as safe as possible.

Lullaby Playback

The device can store four gentle lullabies in the memory card and a built-in speaker. Parents can play any of these lullabies to make the baby a happier one.

Night Vision Mode

An array of IR LEDs driven by a high current driver circuit provides the night vision capability. This feature helps the user to see the baby both during day and night.

Password Protection

Before connecting with the device, the user has to enter the login username and password which is a much-needed security measure to prevent others from accessing the content. Once logged in, the user is now fully able to access all the features of the device including the video feed.

Local Monitoring without the Internet

Even when an internet connection is not available, the user can monitor the baby if his/her mobile device exists on the same network as the baby camera device is connected.

Web Server

The device acts as a tiny web server responding to the user requests through HTTP application layer protocol. Here the web browser on the mobile device serves the client. Upon receiving the request from the customer, the web server running on the device serves the HTML web page and returns the response messages to the client over a dedicated TCP/IP connection. The web pages are stored in the non-volatile section of the microcontroller memory area. The device uses the LwIP open source TCP/IP protocol stack for its internet connectivity.

Embedded RTOS

A real-time operating system is necessary to handle the timely events and other multitasking requirements of the project. Here FreeRTOS is chosen to provide us with this ability. FreeRTOS is the market-leading real-time operating system in the world.

CONCLUSION

This paper presented the design structure of the Wireless Video Sensor Network Platform. Existing DASH frameworks convey video metadata through a manifest and begin video streaming with a unique initialization video segment; following video segments depend on the manifest and initialization segment for playback. In contrast, the WVSNP-DASH video segments convey necessary metadata through their name and can be played independently, i.e., each WVSNP-DASH segment is fully playable without reference to any other file or segment. This file independence simplifies the video capture and video file segment creation and streaming by a miniaturized video acquisition/sensor node.

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Conflict of Interest: NA

REFERENCES


Athletes Performance on Alcohol Effects

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ABSTRACT

The main reason for the review was to decide the Effect of Alcohol on Sports Performance in Athletes. In this review 15 male subjects of occasion 1500 meters were chosen however Stratified Sampling Method, from chennai city. The ages of the subjects were of 25 a long time or more. The competitors needed to experience pretest and posttest where the post test was directed in the wake of making the competitors expend 60 ml of liquor one night before the post test. The outcome was defined by utilizing Independent’s ’t’ Test. The outcome uncovers that factually there was no critical contrast (table ”t” value>calculated ”t” esteem). The factual procedure autonomous ”t” test was utilized to break down the information and the level of importance was settled at 0.05.

Keywords: Alcohol, Sports Performance

INTRODUCTION

By and large, liquor is hindering to games execution in light of the fact that of how it influences the body amid exercise. It does this in two fundamental ways. Right off the bat, since liquor is a diuretic, drinking as well much can prompt lack of hydration in light of the fact that the liquor makes your kidney create more pee. Practicing not long after subsequent to drinking liquor can aggravate this lack of hydration since you sweat as your body temperature rises. Consolidated, sweating and the diuretic impact of activity make drying out a great deal more probable. You should be hydrated when you exercise to keep up the stream of blood through your body, which is fundamental for coursing oxygen and supplements to your muscles.

“Parchedness prompts diminished execution,” says Professor Greg Whyte, a specialist in games execution. “Hydration too controls your body temperature so will probably overheat in the event that you’ve been drinking liquor.” Secondly, liquor meddles with the way your body makes vitality. When you’re processing, or separating liquor, the liver can’t deliver as much glucose, which implies you have low levels of glucose. Practice requires abnormal amounts of sugar to give you vitality. On the off chance that your liver isn’t delivering enough glucose, your execution will be unfavorably influenced. “On the off chance that your body is compelled to keep running from your provisions of fat as opposed to glucose, you will be slower and have less energy and won’t have the capacity to practice as seriously,” says Professor Whyte. Thus, your coordination, finesse, focus and responses could be unfavorably influenced as well. Both of these impacts are prompt which is the reason it’s not encouraged to practice or contend in game not long after subsequent to drinking liquor.

METHODOLOGY

15 competitors of age gathering 25 years or more were chosen from chennai City. The test led was 1500mts keep running on standard track where the competitors need to finish 1500 mts three and half laps of the standard track of 400 mts persistently. The execution was measured through taking down the planning of each competitor. The score in seconds is controlled when taken by the athletes to finish 1500mts in least conceivable time. For the information investigation free t-test was utilized as factual device. The level of centrality was 0.05. Effect of land and shallow water aerobic exercises on selected physiological and biochemical variables of obese adult

MEASUREMENT OF VARIABLES

For the purpose of establishing reliability of the data the tests was 1500mt run. One day recovery was given to the subjects between pre and post test.

Data Analysis

Table 1. Comparison of pre-test and post test 1500 mts run of the group

<table>
<thead>
<tr>
<th>Performance</th>
<th>Mean Pre-test</th>
<th>Mean Post-test</th>
<th>S.D (Pre and post)</th>
<th>T' Table Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1500 mts Run</td>
<td>375.776</td>
<td>334.192</td>
<td>36.091, 26.041</td>
<td>1.562</td>
</tr>
</tbody>
</table>

CONCLUSION

Numerous scientists guaranteed that admission of liquor one night prior to the opposition does not build the execution. Taking after conclusions were drawn after the examination of the information:

- There is no significant difference in pre and post-test of the group. Hence alcohol did not show any effect after intake.
- Intake of alcohol does not affect the sports performance in athletes after intake.

Ethical Clearance: Taken from , AMET University.

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REFERENCES

Students' Attitudes in Relation to Exergue Practices in Physical Education

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ABSTRACT

Exergames, or dynamic computer games, opened new conceivable outcomes for the broadening of Physical Education hones at school, enabling understudies to practice while playing computerized amusements. In this paper we introduce a review that concentrated on the understanding whether exergames could add to the advancement of positive understudy disposition toward Physical Education. In the review done, the state of mind of a gathering of 28 understudies was assessed under a twofold segment point of view including full of feeling and intellectual angles. The members went to an exergame lab once every week, for a time of 20 weeks. After this period, every one of them addressed the Student Attitude Toward Physical Education Survey (SATPES). Comes about prompted the conclusion that exergame hones have a decent potential to be incorporated into the Physical Education educational modules, opening new conceivable outcomes for the utilization of innovation in classes.

Keywords: Physical Instruction, Exergames, Disposition

INTRODUCTION

Dynamic videogames, or exergames, have opened new conceivable outcomes to consolidate stimulation with physical exercise in Physical Education (PE) classes. Similarly, exergames begun to be joined into logical research and instructive exercises as an option apparatus to bolster educating and learning [1]. This new worldview brought about an adjustment in context with respect to the relationship of computer games to physical action, prompting a few reviews showing the advantages of exergaming as far as increment in physical movement level [2][3], impacts in body organization [4], increment in vitality use [5][6], among other. In light of these outcomes, it ended up noticeably essential for Physical Education to research how these amusements can be consolidated in standard school rehearses. The work introduced in this paper concentrates particularly on the comprehension of how exergames may influence the disposition of understudies toward Physical Education. The term state of mind is regularly used to portray the aura of a person to react decidedly or adversely to something. Mentalities can assume a noteworthy part in understudy accomplishment in school [7]. Understudies with uplifting states of mind will probably focus in class, endeavor harder and accomplish higher evaluations, while understudies with negative mentalities are less inclined to take an interest in errands, they put less exertion into their exercises and have bring down achievement rates [8].

Understudies’ demeanors toward Physical Education have been explored for quite a while, with many reviews concentrating on curricular and basic parts of the teach [9][10]. In any case, there are few combined reviews relating understudies mentalities and general exergame rehearses in Physical Education, which is the concentration of this paper.

Exergames and Physical Education

With the approach of exergames, it wound up plainly conceivable to consolidate computerized diversions in Physical Education classes, utilizing them as an option instructive support to effectively settled practices [11]. Most exergames are sufficiently adaptable to be utilized with understudies with various
capacities and requirements. Move diversions, for instance, give different levels of trouble utilizing a similar music, in a way that youngsters with fluctuating levels of capacity can move together [12]. In addition, by consolidating body developments as a methods for cooperation and control, exergames may give an option answer for the issue that not all understudies feel spurred with games and mandate techniques in Physical Education [13]. Consequently, as exergames pick up acknowledgment as a contrasting option to games, treadmills and stationary bikes, Physical Education educators begin to get some information about their normal use in school [14]. Taking after this pattern, a few nations, for example, England, Canada, Australia and the United States, built up that exergames must be considered as a conceivable instructive device for PE classes [15].

While a large portion of the works displayed in this area attempted to add to the talk about the importance and the methods by which exergames can be presented in consistent Physical Education classes, the examination introduced here is distinctive in that it tries to assess whether exergames can add to the advancement of an uplifting disposition toward the train. Experimental proof to bolster the adequacy of exergames in Physical Education is as yet later, yet the discoveries exhibited so far show that there is a decent potential for the utilization of the recreations in classes.

ATTITUDE IN PHYSICAL EDUCATION

One of the focal inquiries in the exploration in Education is the distinguishing proof and comprehension of the elements that impact learning. One of these variables is state of mind [8]. The term is frequently used to portray the demeanor of a person to react emphatically or adversely to a protest, place, individual or movement. Understudies' state of mind toward Physical Education has been looked into for quite a while, with the fundamental reason for distinguishing elements that can add to positive or negative emotions toward the teach [7]. It has additionally been proposed that understudy’s state of mind assumes a fundamental part in Physical Education, considering that demeanors can impact the engagement and ensuing continuation of the understudy in works on including physical action [1].

Understudies who have uplifting demeanors are more adept to apply exertion, conform to directions and make progress in the assignments, when contrasted and understudies with negative states of mind [8]. In spite of the fact that understudies display diverse dispositions toward Physical Education because of different components, for example, past encounters in the teach, ability level, sexual orientation, age, review level, social class, ethnicity and handicaps [11], these mentalities can be altered in view of situational settings, for example, classroom condition, the assortment of exercises and substance incorporated in the educational modules [9].

METHODOLOGY

The fundamental question tended to by this work has been whether exergames could impact understudies’ states of mind toward Physical Education. Keeping in mind the end goal to answer this question, a review was done in a tuition based school in which an exergame lab was made to work in consonance with the school’s Movement Curriculum. Exercises in the lab were intended to contribute with the PE classes, and they included organized physical exercises with the exergames. The three titles were evaluated as appropriate for all ages as indicated by the Entertainment Software Rating Board (2014), which made them reasonable for a school domain. The XBox comfort related with the Kinect movement following instrument enabled understudies to play the amusements without the need to hold or append to their bodies any sort of hardware. In the research center, understudies were made a request to play distinctive recreations keeping in mind the end goal to enhance the exercises, to make practices including diverse body developments and to fluctuate physical power amid the class.

Participants

Understudies from seventh grade of Elementary School to the third grade of High School were welcome to take an interest in the venture, which would qualifies them for gone to the exergame lab once every week amid one of the two consistent PE classes. Twenty eight understudies enlisted in the venture (19 young men and 9 young ladies). Understudies were separated into five unique gatherings as indicated by their review, with ages going from 11 to 17 years (M = 13.5, SD = ± 1.82). Understudies and guardians/gatekeepers needed to sign an educated assent frame with a specific end goal to enable them to take part in the venture.

Data Collection

The instrument used to assess the disposition component was the Student Attitude Toward Physical
Education Survey (SATPES) created by Subramaniam and Silverman [21]. The instrument utilizes a 5-point Likert scale organized with the accompanying esteem:
1 (emphatically concur), 2 (concur), 3 (unverifiable), 4 (deviate) and 5 (unequivocally oppose this idea). Two factors identified with the develop demeanor were assessed by the instrument, relating to delight (full of feeling viewpoint) and saw helpfulness (intellectual perspective). After the replying of the poll, seven understudies were talked with (4 young men, 3 young ladies) to get a more profound comprehension about the outcomes gotten in the SATPES instrument.

RESULTS AND DISCUSSION

Poll information was accumulated to give comes about on the distinctive segments identified with the disposition of questionnaire.

Table 1: Average and Standard Deviation of attitude component In A 0-5 scale

<table>
<thead>
<tr>
<th>Component</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Affective (Enjoyment)</td>
<td>4.65 ± 0.39</td>
</tr>
<tr>
<td>(a.1) Curriculum</td>
<td>4.69 ± 0.39</td>
</tr>
<tr>
<td>(a.2) Teacher</td>
<td>4.61 ± 0.49</td>
</tr>
<tr>
<td>(b) Cognitive (Perceived usefulness)</td>
<td>4.17 ± 0.81</td>
</tr>
<tr>
<td>(b.1) Curriculum</td>
<td>4.01 ± 0.84</td>
</tr>
<tr>
<td>(b.2) Teacher</td>
<td>4.33 ± 0.79</td>
</tr>
<tr>
<td>(c) General attitude</td>
<td>4.41 ± 0.57</td>
</tr>
</tbody>
</table>

The following subsections discuss the results regarding each of the components considered in the questionnaire.

Affective component -Enjoyment

Considering questions related to the aspect enjoyment regarding the curriculum, there was a particularly positive attitude of students (M = 4.69, SD = ± 0.39). Some of the students’ comments in the interviews confirmed this finding:

“I found the activities very interesting because they put together the use of videogame with the actual practice of sports, making it fun”.

Previous research has already demonstrated that the appreciation for Physical Education is closely linked to the fun factor, asin the work by [10]. Related studies also found strong evidence linking curriculum elements to the appreciation of Physical Education. The personal attribute of the human is explained in the Human Personal Attribute towards Industrial Social Contribution [17]. In the case of the students’ remarks presented here, one realizes that not all students like the practices proposed in the discipline. Thus, it becomes important to propose alternative activities. Another student also commented the same topic:

“I liked it because it is a different activity, it is not that something we need to do with the ball, to play soccer, volleyball or handball. It’s a fun and different way [...] Every time there are new games, so it takes away some of the monotony”.

In agreement with these perceptions, it has been identified in another study that 88% of participants believed that Physical Education was tedious because they had to do the same things in every class. Similarly, it has also been found that students felt bored because of the repetition of the activities of previous years, a fact that contributed to a negative attitude toward Physical Education. Other studies also indicate a high number of students who would appreciate having a larger variety of activities and more novelty in PE practices, including the addition of active and fun activities [9][10]. Therefore it becomes evident that exergames have a significant potential to introduce a novelty factor in PE classes, bringing the digital world into practices and diversifying the PE curriculum. These ideas have also been reinforced by researchers who stress that exergames may increase students’ enthusiasm for Physical Education because of their innovative aspect. The obesity analysis and the aerobic exercises effects are presented in the Effect of land and shallow water aerobic exercises on selected physiological and biochemical variables of obese adult [16].

Other questiones of the questionnaire evaluated the affective component (enjoyment) in relation to the teacher. Results showed that students had a positive attitude (M = 4.61, SD = ± 0.49), a finding that is confirmed by a comment made by one of the students in one of the interviews:

“I think the participation of the teacher was pretty cool. He proposed activities, he tried to make as sheduleand [...] led the meetings well”.

Past research is lined up with this position, demonstrating that the most much of the time said calculate connection to the states of mind of understudies and Physical Education (37%) has been the educator, particularly his conduct [9].
By bringing together the consequences of inquiries identifying with the emotional part (fulfillment) as to the educational programs and educator, a normal of 4.65 was acquired, for a standard deviation of ± 0.39. These outcomes demonstrate a convincingly uplifting disposition as for the full of feeling part of the develop state of mind towards the practices completed in the exergame lab.

Cognitive segment - Perceived handiness

The poll additionally attempted to assess the intellectual part (saw value) in connection to the educational programs, giving one the most minimal midpoints. In any case, the outcomes acquired were likewise in the positive quadrant (M = 4.01, SD = ± 0.84). The perspective identified with educational modules value that was more present in the meetings was that of wellbeing, as worried in a portion of the understudies’ remarks, for instance:

“I think I lost more weight in the lab than in [regular] Physical Education classes and this is important to me.”

“I have no wish to do Physical Education because I do not like traditional sports that much, and also because it’s usually a [soccer] match and I play as a goal keeper. [...] I’m sure I moved a lot more playing Xbox than playing in real Physical Education.”.

Past research has demonstrated that the educational programs is one of the fundamental components to impact understudies’ states of mind toward Physical Education. Understudies’ craving to take part in exercises that don’t oblige them to exceed expectations scholastically additionally adds to their uplifting states of mind toward Physical Education. The examination of the appropriate responses in regards to the subjective segment (saw handiness) in connection to the instructor likewise demonstrated a positive understudy state of mind (M = 4.33, SD = ± 0.79). These outcomes might be clarified by some of understudies’ remarks in which they push their positive perspective of the instructor’s part in the gatherings at the exergame lab.

“The teacher gave us tips not only about what to do with the game, he also gave us bodybuilding tips [...] I found that very interesting”

“I remember the teacher was even telling us curiosities, answering things that some classmates asked”.

By bringing together the aftereffects of the inquiries with respect to the psychological segment (saw handiness) in connection to the educational modules and educator, a normal in the positive quadrant was gotten (M = 4.17, SD = ± 0, 81). Past research brings about the zone are lined up with the outcomes gotten here, recommending that PE instructors impact their understudies’ dispositions toward Physical Education. It has been appeared, for instance, that center school understudies that loathed Physical Education classes, additionally despised their PE educators. Another review demonstrated that instructor components, for example, sternness and strictness influenced understudy view of their educator contrarily, affecting their gratefulness for Physical Education. With a specific end goal to acquire the last outcomes identified with the develop state of mind, the aggregate normal was registered for all responses to the 20 questions. The outcome for the normal was 4.41, with SD = ± 0.57, which demonstrates an altogether uplifting state of mind toward the utilization of exergames in Physical Education classes. The most reduced score of the understudies who partaken of the overview was 3.6, a score that is still in the positive quadrant. These discoveries are lined up with past research comes about that show how exergames can be a viable approach to impact understudies’ drivers of physical movement.

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REFERENCES

Implementation of Semantic Comments for Instruction and Knowledge in Physical Education

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ABSTRACT

This paper for the most part concentrate on how and where connected information could be incorporated and utilized as a part of the advancement of semantic criticism for instructing and learning in physical training. Input may as of now be created in view of an ability display. To accomplish semantic interoperability and increment the level of reusability of criticism, ability ought to be spoken to as an unequivocally characterized, organized, and shared philosophy. By giving shareable methods for speaking to a capability model, chain of command or non-cyclic coordinated diagram, human and machine would be conveyed effectively in looking at skill structures and trading semantic criticism. Skill structures and semantic input could be distributed on the web utilizing connected information standards. Connected information permits both mentors and competitors to peruse the competitor's input and explore the related skill structures and preparing materials.

Keywords: Effective Learning, Learning Skill, CBST, Capacity Building, Empowerment

INTRODUCTION

The headway of CBST has made it possible to upgrade the info that contenders get in the midst of get ready. Contribution to contenders has been perceived as a key portion in motor capacity learning[13]. Contribution to CBST usually joins sensors and contraptions embedded into the diversions apparatus, and utilizes sensors associated with the contender, to get information about learning shapes and the achievement of proposed execution comes about[4-6]. Feedback adds to learning by empowering contenders to affirm their improvements, evaluate their progress, and choose the explanations behind their mix-ups. It in like manner rouses them to remain required in their planning, in the event that they see the contribution as strong. Thusly, the purpose of this investigation is to research the arrangement of intense feedback from a specific and scholarly perspective for the execution of CBSTStudy on the ideal ways of enhancing the quality of maritime education[7].

The scholastic arrangement for effective feedback can supportathletes in their achievement of the major arranged planning comes about, help rivals in recognizing the openings in their execution, and empower contenders to choose execution goals, to perceive what they have authoritatively acknowledged and what they need to acknowledge next, and judge their own learning progress. An outcome of periodized small side games with and without mental imagery on playing ability among intercollegiate level soccer players[8].

Proposed System

To build up an applied model of ability in the engine expertise area, a learning undertaking must be separated by investigation into particular quantifiable errands. In educating any new conduct a nearer estimation to the objective ought not be strengthened until the past one has been immovably settled. On the off chance that too extensive a hole between beforehand learned abilities and as of now anticipated that aptitudes is exhibited would the learner, their conduct may fall flat and preparing may need to continue at the point where the learner has over and again shown achievement. Figure 2 speaks to some paddling preparing results in view of the competency display. The proposed preparing results depict an
ability, and the topic to which that capacity applies. These portrayals speak to what the learner can do and how the accomplishment is fit for confirmation when learning has been expert.

To contrast accomplished execution and the required capability, the framework takes a gander at the scope of the required capability. For the case, the scope of the required capability for paddling is from 21 strokes/moment to 24 strokes/minute. The framework at that point contrasts the accomplished execution and the scope of the required capability.

CONCLUSION

In this paper we propose the advancement of semantic criticism for instructing and learning in physical training. We provide a machine-processable portrayal of learning results, and proclamations of competency that are machinereadable. Machine handling can offer interoperable and reusable assets and applications that are educationally viable for e-preparing. A competency articulation which can be perused, handled, and deciphered by machine adds to the programmed era of criticism, and offers a semantic structure for further preparing. The center expectations of the examination will be a test system showing the conveyance of viable criticism, and of successful designing and educational procedures for engine expertise competency improvement. Future work incorporates actualizing a model of the theoretical.

The framework will outline in creating a hole investigation of a competitor’s exhibitions. This includes appraisal of current competency and a correlation of competency. We trust the proposed approach helps competitors in finding a beginning stage and a productive course through the structure that will encourage competency building.

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REFERENCES

The Strategy to Make Concealed Educational Programs of Physical Instruction Expressly

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ABSTRACT

The games shrouded educational modules improvement and its part in the play, is in the inactive educational modules in physical instruction and physical training both cooperation, common infiltration of. Sports shrouded educational programs is to enhance educators' showing capacity of overwhelming and understudies acknowledge capacity vital way. Sports undetectable course prevailing is a great investigation, not just upgrades the games educational programs on understudies' beneficial outcomes, additionally enables the instructor always included information, to amass involvement, understand the implicit learning and express learning between generous simulative and kindhearted change, this sort of frame change can better advance the games educational programs part.

Keywords: Sports Education; Recessive Curriculum; Dominant Curriculum; Make Explicit

INTRODUCTION

Current physical instruction physical training educational modules change is one of the essential research points of. Lately, numerous researchers at home and abroad of the PE educational modules of prevailing and passive issue attempted dynamic research, propel the change of PE educational modules[1]; be that as it may, because of the impediment of the state of mind, numerous researchers have show educational modules and shrouded educational programs of social contrary energies together, either just underline on one hand, and disregard then again, both of two sorts of courses “ every obligation ”, plainly the two circumstances are not helpful for good utilization of games concealed educational modules part. Human Personal Attribute towards Industrial Social Contribution[3]to sports player for sponsorship. In this specific situation, so as to better build up the games concealed educational modules, advance games shrouded educational programs in physical training instructing and elevate understudies' general improvement to assume a more prominent part, this article through the investigation of P E latent course predominant need, proposes the games concealed educational programs unequivocal route, keeping in mind the end goal to further close the passive Physical Education educational modules and the association between, the better improvement of shrouded educational modules of physical instruction, play sports shrouded educational modules in physical instruction.

Sports Hidden Curriculum and the Relationship Between Dominant Courses

The prevailing educational programs additionally called show up in the educational programs, course or the formal educational modules, alluding to the school to show subjects, plan, or clear, earlier planning courses, school educational modules incorporated all composed exercises. Since learning is not a solitary school understudy adapting, but rather the aggregate exercises. In this aggregate movement, once in a while to stress control, level, rivalry, here and there to accentuate uniformity, shared consolation. Each school and each highlight the principle quality. In spite of the fact that these are not the principles of the school
educational modules, but rather the understudies required in the recommended course of study in the venture, understudies are likewise encountering a casual, practically zero earlier arranging, without a composed content educational modules, this is known as the “ latent course “. China in the nineteen eighties medium started to present and study the shrouded educational programs papers, alongside the training educational programs hypothesis research and change, the concealed educational programs is given careful consideration for physically challenged peoples [2 - 3] reason lies, numerous researchers trust that passive course predominant course and similarly vital. Sprout brought up: the shrouded educational programs can well meet certain showing target (particularly in quality, propensities, states of mind), and then predominant educational modules intends to remain longer. Understudies at the school in the development of this social character, later entering society part and understudies learning abilities for future work in the part of similarly vital. In view of these learning, an ever increasing number of researchers start to study and investigation of dormant educational programs in physical instruction and physical instruction relationship. In truth, all understudies must pass an uncommon procedure to disguise social standards, first in the school this littler society through successful preparing, and after that to the genuine society to wind up plainly a qualified resident. Accordingly, the games shrouded educational modules and plain games educational modules both relationship is close, [4] might be said be inseparably included, understudies encounter achievement and disappointment, euphoria and distress, will be the school sports concealed educational modules work impact. A periodical small side games with and without mental imagery on playing ability [5] described for increasing the mental ability of the sported persons.

**The Feasibility and Necessity to Make Latent Course Dominant**

In the previous couple of decades, the concealed educational modules have been inside and out review. Researchers for the most part concur that the shrouded educational programs on understudies’ advancement has critical impact on understudies’ socialization, has the inescapable impact. Step by step instructions to play a superior improvement and assume the part of passive courses this issue, notwithstanding deliberately give understudies effectively direct, affect, for the most part is through a legitimate approach to make passive course prevailing. Because of the shrouded educational modules is additionally called the concealed educational modules, educational programs, concealed educational programs, imperceptible, is alludes to the understudy in the learning condition (including the physical condition, social condition and social framework) in figuring out how to unforeseen or impromptu information, qualities, standards and mentalities, is planned for inconspicuous classes. Human Personal Attribute towards Industrial Social Contribution, along these lines, the concealed educational programs is casual, informal course, certainly. In particular, the passive educational programs qualities can be outlined as the accompanying: one is the scope of wide zone. Notwithstanding the overwhelming educational programs, concealed educational programs is all school social components of the set, practically everything is contained in that., inescapable; it includes all parts of grounds life and infiltrates in it. Two is the execution procedure potential. The concealed educational modules is not self-evident, backhanded, certain path, through their oblivious, non-particular mental response systems influencing understudies, training process on both instructors and understudies are “ potential “ normally known as “ the undetectable instruction “. Three is the impact of the potential, the shrouded educational modules is through mental oblivious face influence understudies, for example, understudy enthusiastic state of mind esteems impact, impact, improvement of sexual orientation part et cetera, it is dynamic, advancement, these impacts in a brief timeframe is difficult to overwhelming. The four outcomes are hard to measure. Latent course impact on understudies is not expected, the causal relationship is exceptionally fluffy, in the meantime, the concealed educational programs is the primary part in the understudies’ profound world in the field of non judicious, and these are hard to evaluate, so we of shrouded educational programs impact comes about to a great extent just a subjective examination. Without a doubt, in light of the camouflage, unusualness and sudden the good and bad, there is no total norms, now and then questionable, some of the time misconstrued.
The Ways and Measures of Recessive Course

Prevailing Latent course prevailing operation by methods for the concealed educational modules have preset and orderly arranging, in order to visual structures, and execution of viable association and administration, prepare control, assessment, fortifying its beneficial outcome, in this way guaranteeing the ability development quality extensive advancement. To begin with, reinforce the games shrouded educational programs of express attention to the need of. An outcome of periodized small side games with and without mental imagery on playing ability among intercollegiate level soccer players, as per the games showing impact on understudies, in the games instructing, we can take the physical instructing as the overwhelming educational modules and the passive educational modules, both splendid and dull constitute the entire physical training. Implied learning is regularly a man or association after a long haul aggregation of summing up the experience of the arrangement, it is with a solid individual shading. Put to the passive educating, is PE educators in their procedure of learning and instructing in the collection of individual experience, with the individual esteems, world viewpoint and point of view are compared, and identity and pastimes have extraordinary connections, has a place with the profound awareness classification. Express information alludes to everybody as everybody knows, general learning. Put to the games educating, the prevailing educational modules is indicated in the syllabus of PE learning substance and extension. Step by step instructions to build up the games concealed educational programs, remote sports shrouded educational programs part of the overwhelming, make instructors’ implicit information, advance understudies’ unsaid learning, is the games shrouded educational programs improvement. Execution of the key and the key is to enhance the change of PE latent course predominant fundamental comprehension, and after that change the current physical instruction educating style.

CONCLUSION

In the act of physical instruction, physical training educational programs is entirely as per national directions to bear on the educating, there are few development. With the advancement of the circumstances, the advance of the general public, particularly the execution of value instruction, physical training educational modules in the change. Instructions to understand instructors’ latent information strength is the fate of games educating the key, additionally advance the games instructing creative new way. In the new showing change, physical instruction is confronted with the troublesome assignment of. Since past games instructing is difficult to stir the excitement of understudies, PE educators are likewise exceptionally hard to enhance educating. However the games concealed educational programs of PE educator instruction prevailing for the immense number of direction, earnest to the training approach to execute it, this ought to be demanded for quite a while, additionally enhance the showing capacity of instructors and understudies to acknowledge capacity critical way. Sports concealed educational modules is a prevailing instruction ought to hold fast to the long haul instructing mode. Regardless of whether any type of instructing, ought to take undetectable course prevailing training, which not just adjusts to the idea of value training, is likewise a sort of humanism instruction execution. Sports undetectable course prevailing is a decent investigation, it is not just valuable to improving educational modules on understudies’ beneficial outcomes, additionally enables the instructor continually included learning, to amass involvement, understand the implicit information and express information between benevolent simulative and amiable change, this type of change with long haul essentialness, on games instructing assumes a vital part. This example is utilized not exclusively to make understudies acknowledge effortlessly, likewise can advance the new educational modules instructive change. Adjust to the circumstances training mood, as per the request of the general public and the requests of the circumstances, the continuous change and advancement, advancing the new improvement of physical instruction educating.

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REFERENCES


Chemical Modeling and Renewable Energy Based Power Generation

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ABSTRACT

This article addresses an earth friendly power centrality improvement for control time utilizing cow like pee. The motivation behind this examination is to system and examination with made and physical model of an inconsequential effort, chamber-based power plant to accumulate control from dairy creatures pee. The proposed exhibit works like a regular battery framework. Regardless, a released battery needs to reestablish by control with a specific genuine target to reactivate it. Then again, dairy animals pee based structure needs just to supplant old pee by new one to reactivate the structure. As no power is required for charging the structure, the well ordered accessible new pee from a dairy living arrangement could be a conceivable wellspring of efficient power source. A little scale demonstrate control plant in context of bull like pee is set up in a dairy create masterminded in the suburb of Dhaka city in Bangladesh to ask about the execution and likelihood of the proposed structure.

Keywords: Capable Power Vitality Headway, Control Period, Dairy Animals.

INTRODUCTION

In recent years, energy crisis and environmental protection is a great global challenge. The alkaline nature of fresh cow urine acts as a good electrolyte liquid. Therefore, energy from cow urine could be a possible source of renewable energy which can produce electricity by electrolytic conductions. Cow dung is used as a super solution for producing “Biogas” but cow urine counted as totally waste [1-3]. Waste to energy now used in cell technology where different types of sub solutes such as waste water, home garbage, urine etc. are reused. Moreover, biomass and bio-fuel energy also comes from the waste. Since the fresh cow urine acts as alkaline innate, therefore, cow urine may consider as the potential source of energy and there is huge opportunity to establish a smaller plant in cow farm to save conventional energy [4-6]. Photoreduction of CO2 by TiO2 nanocomposites synthesized through reactive direct current magnetron sputter deposition was described. Also the experimental methods for 9-[4-(Azidomethyl) phenyl]-9H-carbazole-3-carbonitrile and 1-[6-(1H-Indol-1-yl) pyridin-2-yl]-1H-indole-3-carbaldehyde was explained in [7, 8]. Crystallographic, experimental (FT-IR and FT-RS) and theoretical (DFT) investigation, UV–Vis, MEP, HOMO–LUMO and NBO/NLMO are studied in [9].

METHODOLOGY OF SYSTEM MODELING

Chemical Modeling

1) Electrolysis of water in anode and cathode

At the positively charged anode, an oxidation reaction occurs, generating oxygen gas and giving electrons to the anode to complete the circuit. Oxidation reaction at anode side:

4 OH⁻ (aq) + O²⁻ (g) + 2 H₂O (l) + 4 e⁻

2) H₂O (l) + O²⁻ (g) + 4 H⁺ (aq) + 4e⁻

Combining either half reaction pair yields the same overall decomposition of water into oxygen and hydrogen. Overall reaction:

2 H₂O (l) + 2 H₂ (g) + O₂ (g)
Decomposition of pure water into hydrogen and oxygen at standard temperature and pressure is not favorable in thermodynamic terms. Anode (oxidation):

\[ 2 \text{H}_2\text{O} (l) \rightarrow \text{O}_2 (g) + 4 \text{H}^+ (aq) + 4e^- \]

\[ \text{Vo(ox)} = -1.23 \text{ V}; \text{Vo(red)} = 1.23 \text{ V} \]

Cathode (reduction):

\[ 2 \text{H}^+ (aq) + 2e^- \rightarrow \text{H}_2 (g) \]

\[ \text{Vo(red)} = 0.00 \text{ V} \]

The standard potential of the water electrolysis cell is 1.23 V.

**Working principle**

Chiefly its an electrolysis impact of compound creation. Here chemcaslysynthesis of cow pee is being utilized for prime conduction with terminals where Copper plate comes tig with uric corrosive and rest of composition are influincing the response occured thus copper urate created. From the compound structure of bovine pee electrolysis of water is the deterioration of water (H2O) into oxygen (O2) and hydrogen gas (H2) because of an electric momentum being gone through the water. The electron needs to improve them to dispose of this distinction. In any case, they do this absolutely.

The synthetic responses in this source cause a development of electrons at the anode. This outcomes in an electrical contrast between the anode and the cathode. It is imagined that this distinction as a precarious develop of the electrons. Electrons repulse each other and attempt to go to a place with less electrons. In this framework, the main place to go is to the cathode. Be that as it may, the electrolyte shields the electrons from going straight from the anode to the cathode inside the battery. At the point when the circuit is shut (a wire associates the cathode and the anode) the electrons will have the capacity to get to the cathode. This is one method for depicting how electrical potential makes electrons course through the circuit. Be that as it may, these electrochemical procedures change the chemicals in anode and cathode to make them quit providing electrons. So there is a restricted measure of energy accessible in yield. When we revive a battery, we alter the course of the stream of electrons utilizing another power source, for example, sunlight based boards. The electrochemical procedures occur backward, and the anode and cathode are reestablished to their unique state and can again give full power.

**RESULT AND ANALYSIS**

**Table 1: Open Circuit Test for Dual Chamber**

<table>
<thead>
<tr>
<th>Urine Liter</th>
<th>Voltage (V)</th>
<th>Current (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>18.23</td>
<td>—</td>
</tr>
</tbody>
</table>

**Table 2: Short Circuit Test with Load for Dual Chamber**

<table>
<thead>
<tr>
<th>Urine Liter</th>
<th>Time Interval (Hr)</th>
<th>Voltage (V)</th>
<th>Current (mA)</th>
<th>Power (Watt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>0-3</td>
<td>16.03</td>
<td>613</td>
<td>9.826</td>
</tr>
<tr>
<td>12</td>
<td>3-6</td>
<td>14.96</td>
<td>427</td>
<td>6.387</td>
</tr>
<tr>
<td>12</td>
<td>6-9</td>
<td>13.02</td>
<td>196</td>
<td>2.551</td>
</tr>
<tr>
<td>12</td>
<td>9-12</td>
<td>11.96</td>
<td>49</td>
<td>0.586</td>
</tr>
</tbody>
</table>

A small scale prototype power plant based on cow urine was established in a dairy farm located in the suburb of Dhakacity in Bangladesh as shown in fig.2 to confirm the viability of the proposed urine-based power plant. The experiments are performed with three segments where fresh urine is applied as catalyst, and electrodes are kept unchanged. The experiments along with measurements are described in the following subsections.

**Experiment-1**

Each chamber has 6 cells which fulfilled with fresh urine. Per cell contains 2 electrodes and in total 24 electrodes were used in total system. Open circuit test for dual chamber of urine solution is shown in Table-I. Result of short circuit test with load is shown in Table-II. Measurements are taken every 3 hours time interval, and it is observed that both currents and power decreases in time as illustrated in Table-III.

**CONCLUSION**

This paper portrays the compound and physical demonstrating of a power plant which is approx. 14W in limit utilizing 108 liters of cow pee on a little dairy
cultivate in the suburb of Dhaka city in Bangladesh. The yield affirmed the suitability of the proposed demonstrate. The proposed frameworks were embedded to check the concoction response with cathodes' condition inside certain season of interim where dairy animals pee constantly utilized as prime impetus. In this framework, it can be inferred that if legitimately terminals are cleaned every week with refined water then it will manage for a long stretch which shows the supportability of pee based plant to create environmentally friendly power vitality.

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**REFERENCES**

Study of Physical Education

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ABSTRACT

Physical Education and games presume necessary element in individuality progression handle. Early introduction is fundamentally judged by your wellness level. So physical appearance matter a considerable measure when we highlight the attributes of identity. Government’s part is exceptionally basic in such manner as arrangement ought to be developed such that physical instruction will end up noticeably essential subject from essential level and is being embraced by lion’s share of populace. Physical training contributes a ton in the improvement of all part of identity like wellbeing, mental status and social alteration and so forth. As it is an acclaimed saying that ‘early introduction is the last impression’.

Keywords: Personality, Development, Fitness, Physical Education.

INTRODUCTION

A physically dynamic lifestyle impacts people’s wellbeing. Meta-explanatory reviews demonstrate that general interest in physical movement over the lifetime is connected with a 20–40% lessening in danger of all-cause passing. Games are organic cum engine exercises which smooth the advance of a person to create and control his physical make-up. Can likewise be portrayed as exercises including physical exertion and aptitude in which an individual or group contends with each another for the aim of stimulation.

Each country in this world is profoundly worried about the wellness of their men, ladies and youngsters perceiving that physical wellness described the key and added to glad and valuable living. Aristotle said the body is the sanctuary of soul and to achieve concordance of the body brain and soul, the body must be physically fit”. Nixon and Jowett expressed a sound personality in the sound body is a short yet full depiction of a cheerful state in this world; he that has these two, has minimal more to wish for As physical instruction helps being developed of aggregate identity of individual, nobody can deny its significance in the advancement of fundamental expertise, basic for day by day life movement of people and social capability required for good native. As indicated, games can be named too composed and organized physical exercises with organized developers’ represented with guidelines and controls. He additionally focused on that a decent games program must be adapted towards building up an ‘over all’ which mean growing physically, socially skillfully, rationally, candidly and ethically person (that is known as identity improvement) that is satisfactory in the group and with great wellbeing. Sports if legitimately associated can accomplish around 50% (half) or more instructive focus of the general public. Sports and diversion have been fundamental piece of the curricular of foundations all through history.

CONCEPT

To social researchers, identity is the whole of practices, demeanors, perspective, and convictions that are normal for a person. Our identity qualities choose how we change with our general public and how we respond specifically circumstances. No two people have similar identities. Every individual has his or her own specific manner of interconnect with other individuals and with his or her social condition. Human Personal Attribute towards Industrial Social Contribution, A few arrangements of identity attributes depicting a person’s conduct, have
been created, a hefty portion of which have been utilized as a part of research and can be taken a gander at in various ways. In the first place, late research has assessed individuals utilizing boundless arrangements of identity measurements and gifted them into the “Enormous Five Personality Traits” The term identity mirrors the unmistakable way of a man and how he ponders other and about himself. Identity is an arrangement of physical and mental attributes that reflect how a man looks, considers, acts, and feels. Really an identity is a lifestyle of a man and his inclination to carry on with connection to the earth and encompassing, and his outlet of feeling. An outcome of periodized small side games with and without mental imagery on playing ability among intercollegiate level soccer players

- Extraversion - active, amiable, emphatic
- Agreeableness - Good-natured, putting stock in, steady
- Conscientiousness - Responsible, tried and true, diligent
- Emotional steadiness - unworried, secured, loose
- Openness to encounter - Imaginative, inquisitive, progressive

A moment way to deal with taking a gander at identity qualities is to partition them into social attributes, individual origination characteristics, and passionate change attributes, and afterward to consider how those classifications meet up powerfully.

- Social characteristics are surface-level qualities that mirror the way a man appears to others when associating in different social stages. Critical thinking style, in view of the work of Carl Jung, a prominent clinician, is one measure speaking to social characteristics. It mirrors the way a man approaches gathering and assessing data in taking care of issues and deciding.

PERSONALITY DEVELOPMENT

Pre-adulthood is a basic formative stage amid which we watch not just the best changes in levels of physical movement additionally the best changes in identity. There is motivation to consider that these affiliations won’t not be fundamentally unrelated. Ponders have discovered that game interest adds to the advancement of vital fundamental abilities and long haul wellbeing related personal satisfaction. Through game investment, young people pick up certainty, learn new physical abilities, grow vital social connections, create authority aptitudes, and pick up fulfillment by progressing in the direction of objectives. An outcome of periodized small side games with and without mental imagery on playing ability [7] for improving the ability of the students. It is sensible, in this manner, to consider that game interest may add to identity change amid immaturity. A vital question is whether diverse methods of physical movement effectsly affect identity change. For example, group activities join physical movement with elevated amounts of social connection, though singular games frequently consolidate abnormal amounts of physical action with low levels of social communication. International player culture described in [8] for improving the self confidence and ability of the Indian player. It is intriguing to investigate the potential contrasts between movement modes in their impacts on identity steadiness and change amid youth.

CONCLUSION

According to the investigation of writing and finding of different research demonstrate that games assume huge part in identity advancement handle. Having so confused structure and physiological setup a human body is difficult to characterize so identity is likewise exceptionally discrete marvels and extremely hard to expand. Identity improvement is a long lasting procedure yet age between childhoods to grown-up age is extremely significant in such manner. A different hormonal change takes places amid this age. Games are a key segment in this procedure. Physical appearance is inferring power amid youth and amusements help in this perspective. Sports give stage to youthful era to outlet their feelings which are expected to let them rationally and candidly steady. So recreations help everybody to build up their identity and by along these lines national improvement happens.

Ethical Clearance: Taken from AMET University

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Scrutinizing Physical Condition, Bustle and Strength in Physical Education: its Contemporary and Expectation Circumstances of Fitness

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ABSTRACT

Different government approaches, procedures and reactions in England throughout the years have highlighted schools and physical instruction to be instrumental in tending to wellbeing and the emphasis on wellbeing has been reinforced inside resulting corrections of the National Curriculum. While this may appear empowering, concerns have been communicated that such approaches and administrative control progressively bear elements of as per influential traditions and that these have prompted progressively far reaching wellbeing reconnaissance in schools. Connected to this are long standing worries over the way in which wellbeing is tended to in schools and physical instruction, and also over a portion of the checking measures and practices utilized inside the educational modules. This article, thusly, presents discoveries of a ponder which planned to decide the nature, commonness and motivation behind observing wellbeing, physical movement and physical wellness inside the physical instruction educational modules and build up physical instruction instructors' perspectives of and ways to deal with observing. In any case, various issues and restrictions related with checking and a portion of the schools' checking practices were recognized, and the individualistic nature and per influential traditions reflected in and fortified through observing were recognized as possibly hazardous. It was in this way recommended if the discoveries are run of the mill, at that point checking practice is right now not in a great condition of wellbeing. The article closes proposing a path forward for checking inside physical instruction as a few suggestions for practice.

Keywords: Scrutinizing, Physical Condition, Physical Bustle, Physical Strength, Physical Education, Supervision, Counsel.

INTRODUCTION

All the more particularly, adding to general wellbeing by means of advancing strength attractive ways of life and expanding physical action has been seen as one, if not the most, critical target of physical training. This is confirm by different government approaches, methodologies and reactions throughout the years which have highlighted schools to be instrumental in tending to wellbeing and expressly included physical instruction in such manner. While the above might appear to be empowering at first glance, concerns have been communicated that such strategies and administrative direction progressively bear elements of a per influential traditions praising examination, estimation, appraisal and responsibility and that these have prompted progressively far reaching wellbeing reconnaissance in schools, that is, observing and gathering data about and on youngsters' wellbeing and bodies.

However ostensibly, and in acknowledgment of schools developing duty regarding youngsters' wellbeing, it is proposed schools are squeezed to participate in medical problems rather straightforwardly and barely and to try and advance practices which are conceivably hurtful to the strength of youngsters. In spite of this be that as it may, takes
note of how little is thought about how youngsters, educators and others encounter the current systems of reconnaissance. The current evaluates of schools’ effect on the wellbeing of youngsters simply noted are identified with longer standing worries over the route in which wellbeing is tended to in schools and physical instruction. Various analysts have discovered physical training educators’ learning and comprehension of wellbeing and additionally wellbeing advancement to be restricted, constrained and even imperfect and for them to regularly embrace a ‘don’t’, “implementation” and “wellness” center to the conveyance of wellbeing that is commanded by a wellness for execution talk and practices, for example, wellness testing.

The above might clarify the proceeded with prevalence of wellness testing inside schools, with it being normal and even necessary practice inside numerous physical instruction programs. Also however, it appears the observation measures schools utilize augment well past wellness testing. Cases that are referred to in the writing incorporate weighing and measuring youngsters, taking skin fold estimations, utilizing heart rate screens or pedometers, investigating kids’ lunch boxes, unique mark observing and actualizing wellbeing report cards. While some checking measures and practices may fill some helpful needs, and advocates of observing would assert energetically that they do, they can similarly be hazardous and have been scrutinized on various grounds. Regarding wellness testing, claims have been made that it advances solid ways of life and physical action, propels youngsters to keep up or upgrade their physical wellness or physical movement levels, encourages abilities, for example, objective setting, self-observing and self-testing, and that it advances uplifting states of mind, and improves subjective and full of feeling learning. So also, reasons announced for observing physical action inside the educational modules incorporate to advance dynamic, sound ways of life, build up how dynamic youngsters are, decide if they are meeting current physical action rules, and to help meet the prerequisites. An outcome of periodized small side games with and without mental imagery on playing ability among intercollegiate level soccer players also described in [11].

METHOD APPRAISAL

The example for the overview included leaders of Physical Education (LPEs) from auxiliary schools from crosswise over England. A proportionate, stratified examining methodology was received to choose the schools from which the LPEs were drawn, with the factors used to stratify the example being the sort of school and the extent of the Local Authority in which the schools were found. Altogether, state auxiliary schools were chosen to be required in the review. Having chosen the schools, surveys were sent to the Head instructors and LPEs inside each. Expectations were intentionally chosen to finish the poll as they are in charge of the plan and conveyance of the physical training educational modules in their schools. The review was intended to accumulate information on the physical instruction division’s practices and methodologies identifying with checking wellbeing, action and wellness and the LPEs’ perspectives on observing in the educational modules. The survey included distinctive areas which concentrated on wellbeing, physical action and physical wellness thus, and the structures were coded for follow-up purposes. After development, a last reaction rate of thirty-eight-point-four percent was accomplished. The quantitative information from the returned polls was gone into SPSS sixteen point zero for examination and enlightening measurements were utilized.

CONSULTATION

For stage two of the exploration, a purposive example of LPEs was drawn from the first overview test. In light of the discoveries of the overview, forty schools were chosen by the nature and degree of their observing of wellbeing, action and wellness and their topographical spread. Letters were again sent to the Head educators and the LPEs of the schools welcoming the LPEs to be required in the meetings and eighteen reacted emphatically. While the meetings and inquiries varied by each school’s checking hones, regular issues were investigated including the LPEs’ encounters, perspectives, mentalities and decisions concerning observing, and in addition any broad issues or concerns they had. The meetings were led in a reasonably calm room, recorded with the assent of the interviewees, and kept going in the vicinity of thirty and fifty minutes. A short time later, the information was interpreted and the transcripts were electronically sent to each LPE approaching them to check them for precision. The information were then coded and ordered into developing topics.

RESULTS

The overview uncovered blended perspectives concerning the duty of schools for checking understudies’ wellbeing, action and wellness. More
than forty percent of LPEs schools do have a duty, while twenty-six point three percent differ and a third was indeterminate. Further, it ended up plainly apparent from the meetings that most LPEs considered that the duty regarding checking wellbeing, action and wellness ought to lie with the physical instruction division as well as with the whole school, and in addition with guardians, wellbeing experts and society in general.

**DISCUSSION**

Wellness testing was given the best accentuation and was the most generally rehearsed, with roughly ninety percent and fifty-six percent of schools required in wellness testing or obligatory testing, individually. This finding agrees with past reviews that have revealed testing to be typical inside the optional physical training educational programs. It could in this manner be contended that the way of life of per developmental highlighted by creators, and was plainly reflected and being fortified inside physical training and physical instruction instructors’ practices inside these schools. This point will be inspected advance later. Various reasons have been proposed to represent the noticeable quality of wellness testing in physical instruction which might be applicable here. Physical wellness and wellness testing additionally highlight in the syllabi of many authorize courses. Subsequently, it could be contended educators know about and feel moderately great and certain directing wellness testing and therefore keep on relying verifiably on it.

**CONCLUSION**

The discoveries from this review have uncovered observing, and specifically wellness checking, to be a typical element inside the physical training educational modules in many schools. The key reasons LPEs gave for observing mirror those detailed in the writing and, among others, included to advance wellbeing, physical movement and physical wellness, and to spur understudies and build up their insight and comprehension of wellbeing, action and wellness. In the meantime however, various issues and impediments related with observing and some checking practices were recognized, some sketchy practice was highlighted, and the individualistic nature and per developmental culture reflected in and fortified through checking were recognized as possibly risky. In the event that the strength of wellness testing and a portion of the sketchy practices uncovered in this review are run of the mill, and if observing is led uncritically and in disengagement, at that point it is recommended that checking practice is as of now not in a decent condition of wellbeing and is probably not going to prompt the objectives delineated before.

![Physical Condition (%)](image)

Fig. 1. Physical condition variation by percentage
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Analyses of Transient Low-Temperature Gas Kinetics and Plasma Chemistry of Hydrocarbons-Condensable Supersonic Jet Facility

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ABSTRACT

Lempus-2 office is planned and worked to study procedures of bunch development and plasma-synthetic responses that incorporate iotas, particles, and groups, in supersonic planes. The office is outfitted with current diagnostics apparatuses and sub-atomic shaft, electron-pillar, mass-spectrometer, spectrometer, and laser frameworks for testing and tweaking mechanical procedures in a research center condition. One of the key favorable circumstances of the talked about office is that in a solitary framework and a solitary investigation, it joins the apparatuses for the enactment of transient and relentless state supersonic stream with self-supporting or nonself-managing release, and stream examination utilizing electron-pillar spectroscopy and sub-atomic shaft mass spectroscopy. Dry roughing and high-vacuum directs empower exact diagnostics of artificially responding forms in for all intents and purposes any gas blend, including hydrocarbons. The office fills various needs, from bunch surface collaboration examines with thin film and surface structure arrangement, to high-weight stream extensions that copy rocket spouts at high heights, to mechanical process advancement, principally centered around hydrocarbons. Points of interest of key utilizations of the office are exhibited that incorporate the gas flow of group streams, the arrangement of heterogeneous bunches, the investigation of plasma-science of hydrocarbons, and the thin film affidavit.

Keywords: Aerospace Test Facilities, Clustering Methods, Electron-Beam Applications, ION Beam Applications, Natural Gas.

INTRODUCTION

Crucial and innovative parts of synthetic responses in low-temperature plasmas have been examined widely in the most recent decades, with many devoted meetings and expansive number of authentic distributions tar-geting the field. One of the less secured, however regardless imperative subjects is plasma science in gas bunches. It is outstanding that the free development of gas blends in supersonic planes brings about sharp reduction of gas translational gum based paint ture. As the temperature drops to cryogenic esteems, the gas moves to supersaturation state. The buildup procedure starts when the quantity of impacts between gas particles in the extension is adequately huge. To begin with, little bunches are shaped amid the nucleation procedure, which then develop into bigger buildings through monomer-group and cluster-cluster impacts [1].

The LEMPUS-2 office expands on already created framework LEMPUS [2]. The new framework, likewise created at the Department of Applied Physics of the Novosibirsk State University, has every one of the instruments for the examination of gas streams in an extensive variety of physical conditions and bunch parameters. It gives a testbed to concentrate physical and concoction forms in supersonic bunch flies and empowers innovations in view of such procedures. Groups might be of various sorts, sizes, and vitality states, and conditions of accumulation; constituent monomers, either particles or atoms, may have distinctive degrees of excitation. The arrangement of heterogeneous groups is likewise conceivable.
Crystallographic, experimental (FT-IR and FT-RS) and theoretical (DFT) investigation, UV–Vis, MEP, HOMO–LUMO and NBO/NLMO of (E)-1-[1-(4-Chlorophenyl) ethylidene] thiosemicarbazide was discussed in [7]. Crystal growth, spectral, thermal and optical properties of an organic single crystal–Dye doped hippuric acid was discussed in [6].

Description of Lempus-2 facility

The general arrangement of the facility is shown in Fig. 1. Note that LEMPUS-2 is designed in a traditional multisection layout, where specialized sections are all connected to the main chamber. The main (primary) chamber (1), which is a vacuum chamber, is a 700-mm diameter, 1200-mm long horizontal cylinder. At one end, the cylinder is sealed with a flange that has a window along its longitudinal axis. The other end is linked with a two-section molecular-beam module through ISO250 vacuumlock. The vacuum pumping system of the chamber consists of a booster turbo molecular pump (2) TMP2203 manufactured by Shimadzu, and a helium cryogenic pump (3) Cryo-Torr8 by Helix Technology. They provide a total pumping rate of up to 3500 L/s in N$_2$, with a residual pressure in the vacuum chamber ranging from $10^{-4}$ to 100 Pa.

Applications of Lempus-2

The facility is developed to study processes of cluster formation in supersonic jets of gases and gas mixtures, plasma-chemical reactions, including those involving clusters, cluster jets interaction with surface and the formation of various films and structures at the surface; supersonic jets with high stagnation-to-background pressure ratios that emulate space- craft nozzles, and technological processes involving hydrocarbons. Some details of these studies are given below.

High Flow Rate Nozzle Expansions

Cluster formation in supersonic chemically reacting gas jets typically requires high densities of expanding gases and, consequently, high flow rates, while maintaining high vacuum in the expansion chamber. Note that the first quantitative studies of cluster formation processes in supersonic jets date back to mid-20th century [8–10]. Most often, the restrictions that vacuum pumping systems impose on the flow rate of expanding gases were overcome by pulsing the gas expansions [1–3], with research in this field still ongoing [2]. The opportunities that pulsing of a supersonic jet may provide were first shown in [7]. The advantages of such a pulsing are well recognized, as it allows for the following:

![Fig. 1. Scheme of the experimental setup LEMPUS-2.](image-url)
1) Flow rates, temperatures, and gas densities not possible in steady-state jet;
2) Relatively low performance vacuum pumps to be used;
3) High efficiency when costly carrier or trace gases are used.

Moreover, higher background gas pressure in the vacuum chamber reduces that time. Therefore, the use of valves with low-duration gas pulses may result in a fully transient (and thus poorly characterized) flow at the point of interest downstream from the gas source, even though the flow in the vicinity of the nozzle exit is quasi-stationary.

**Gas-Surface Interactions**

The vacuum and diagnostic capabilities of the LEMPUS-2 facility can be used to study the gas-surface interaction processes, and to investigate the formation of various films, layers, and structures on the surface. The electron-beam method allows excitation and ionization of molecules and atoms, which in turn stimulate elementary chemical reactions, including radical formation, inside the jet.

**CONCLUSION**

A sub-atomic bar vacuum office, LEMPUS-2, is displayed, outlined and worked at the Novosibirsk State University. The office is furnished with current demonstrative apparatuses alongside sub-atomic bar, electron-bar, mass-spectrometric, spectrometric, and laser frameworks. The office gives a testbed to itemized examination of mechanical procedures in research facility. One of the key preferences of the office is its capacity to use, in a solitary trial run, distinctive ionization and excitation frameworks to study transient and enduring state supersonic planes, both gathering and gas-just, utilizing electron-pillar spectroscopy and sub-atomic bar mass spectroscopy. Its beat administrations give vitality and material
proficiency. The office is being utilized to concentrate supersonic under-extended planes, crest surface associations, radical and particle arrangement, excitation procedures and concoction response in gas and particulate stages, bunch development forms, and numerous other. The applications go from shuttle drive to material handling to hydrocarbon transformations.

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Analysis and Antibiotic Vulnerability Testing For Urinary Region Diseases Using Surface Improved Raman Spectroscopy Tools

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ABSTRACT
Urinary Region Diseases (URDs) are probably the most widely recognized bacterial illnesses, particularly in ladies, bringing about a huge number of doctor's facility visits and a cost of 1.6 billion dollars consistently in the only US. As of now, analysis is performed with two consecutive urine societies, for species recognizable proof and anti-microbial helplessness testing, which require an aggregate of 48 hrs. The restrictions of the present plan can be overcome by the improvement of a Surface Improved Raman Spectroscopy (SIRS) based demonstrative. The proposed innovation would: (i) distinguish the nearness of microorganisms (effectively evaluates the focus and indicates the bacteurimic tests), (ii) arrange the causative microscopic organisms (~94% rectify grouping), and (iii) decide the affectability of the microbes to different anti-infection agents (81-100% right order contingent upon the anti-toxin). These outcomes exhibit that SIRS can be utilized for finish, quick, precise, and cheap POCT for urinary tract and other bacterial diseases.

Keywords: Urinary region Disease (URD), Surface Improved Raman Spectroscopy (SIRS), Anti-Toxin.

INTRODUCTION
Urinary Region Diseases (URDs) are the absolute most normal ailments of bacterial birthplace, particularly in ladies, bringing about 7 million office visits and 1 million crisis division visits, with 100 thousand hospitalizations, and a cost of 1.6 billion dollars consistently in the only US [¹]. At present determination is performed utilizing a pee test from the patient which is first investigated under the magnifying lens and along these lines refined for 24 hrs to evaluate the nearness of the microbes and distinguish the bacterial sort? Checking at least 10⁵ province shaping units for every ml of urine (cfu/ml) brings about a conclusion of URD. The bacterial species are distinguished by investigation and biochemical tests[²]. Nonetheless, to successfully treat the disease and endorse the right anti-toxin, the vulnerability of the microscopic organisms to some basic anti-toxins must be likewise assessed[³].

Raman spectroscopy, which has a place with the more broad class of the vibrational spectrocopies, has been utilized over the most recent couple of years to distinguish microbes with negligible example arrangement and control[⁴]. Raman dispersing is the inelastic dispersing by test atoms of few photons (around 1 in 10⁷) bringing about a misfortune or pick up of vitality because of the collaborations of the photons with the particles concoction bonds[⁵]. The vitality contrast between the occurrence and scattered photons brings about a Raman range with pinnacles which are normal for the atomic structure and obligations of the substance. The frail Raman flag, which restricts the appropriateness of the procedure as a state of-care-test (POCT) can be increased by misusing the marvel of Plasmon reverberation[⁶]. In Surface Improved Raman Spectroscopy (SIRS), the nearness of metal nanoparticles contiguous the specimen can build the Raman signals a few requests of greatness (up to 10¹⁴ at times).
PROPOSED SYSTEM

Keeping in mind the end goal to effectively measure the nearness and distinguish the types of microscopic organisms in pee, tests containing different groupings of the microorganisms were utilized. These examples comprised of pee from sound volunteers blended with known amounts of microscopic organisms separated and refined from URD patients. The examples in this review included 16 Proteus, Klebsiella pneumonia and E. coli tests at different focuses. Each example was partitioned into 16 test containers of 5 ml each (aggregate of 80 ml of urine). Phosphate Buffered Saline (PBS) was added to 2 tests while seven anti-infection agents were added to the rest of the 14 (2 each). The specimens were hatched for 0 hrs (i.e. measured promptly) or 2.5 hrs at 37°C. The antimicrobials utilized included Augmentin, Amoxicillin, Cefaclor, Cefuroxime, Cefazolin, Ceftriaxone, and Ciprofloxacin. For every bacterium an ordinary antibiogram was performed to compute the base inhibitory focus and decide the affectability of the microorganisms to every anti-microbial.

For the motivations behind this review 100 µm measurement silver nanoparticles were utilized. The nanoparticles were readied in view of a system already depicted in the writing which included dissolving 90 mg of AgNO3 in 500 ml dH2O, heating to the point of boiling, and including 10 ml of a 1% sodium citrate arrangement, and permitting to bubble for one hour. The optical properties were confirmed utilizing a business spectrophotometer.

So as to maintain a strategic distance from the solid Raman signal of the different dissolvable and cell parts of pee, which overpowers the Raman motion from the microscopic organisms, the specimens were first gone through two channels. The primary channel, which had a pore size of 5µm, held any cells are bigger flotsam and jetsam which could be available in the pee, while the second channel, with a pore size of 2µm, held the microscopic organisms and took into account every single fluid part to be washed off. Silver nanoparticles were added to the channel and Raman spectra were gathered from the microscopic organisms. (Fig. 1).

Raman spectra were gathered promptly (0 hrs) and after presentation to anti-microbial (2.5 hrs) utilizing a business Raman spectrometer (iRaman, BWTek, Inc). The gadget was outfitted with a 532 nm laser source conveying around 50 mW of energy to the specimen. The determination of this framework was 3.0 cm⁻¹ and the spectra secured the scope of 300-3300 cm⁻¹. The specimens were uncovered for 20 s taking the normal of 12 estimations (4 min add up to). Amid the introduction to the Raman laser, the specimen was checked in a winding example under the bar to guarantee that the flag gathered spoke to the genuine normal of the specimen and the precision did not experience the ill effects of conceivable in homogeneities in the dissemination of the microbes on the channel. The information gathered was preprocessed to evacuate spiking clamor, electronic commotion and the fluorescence foundation. The clamor spikes were supplanted by inserted values between the edges of the spike and the electronic commotion and fluorescence foundation by low-pass and high-pass separating individually.

For the measurement of the bacterial fixation in each specimen, the aggregate power of the high-wave area (2900-3100 cm⁻¹) was utilized since it was found to correspond with the logarithm of the focus. The logarithm of the assessed fixation was figured from a
direct capacity fit to the force of the Raman high-wave
district. An edge was resolved, where tests over this
limit were viewed as positive for an URD.

CONCLUSION

In view of the pilot concentrate portrayed here,
SIRS can shape the premise of a framework for quick,
exact, and cheap POCT for urinary tract and other
bacterial contaminations. The proposed philosophy
effectively fulfills all the fundamental strides for an
entire URD analysis. In the first place, it can recognize
the nearness of microscopic organisms prompting a
quick analysis of URD since it effectively measures the
focus and can obviously isolate the specimens over
the 105 cfu/ml. Second, it can recognize the causative
microbes with around 94% right arrangement and, at
last, it can decide the affectability of the
microorganisms to different anti-infection agents with
81-100% exactness relying upon the anti-microbial.
SIRS may likewise be helpful in concentrate the
methods of resistance of anti-toxins, for example,
ciprofloxacin.

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268-275.
Modern-Integrated Triggering System For Nuclear Physics Experiments

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ABSTRACT

This paper concerns the progression of a consistent, reconfigurable gear enacting system that expects to energize setting up and getting of data from nuclear material science investigate. This system replaces a basic enacting structure that included dull plan assignments of Nuclear Instrumentation Module equipment. The new system is a model-facilitated enrolling game plan in light of Scilab, and gives an approach to decipher a visual setup show into code to program a FPGA-based reconfigurable hardware organize. This reconfigurable stage replaces various affiliations and sections of the old system that must be wired-up physically for examinations. A close trial of the old and new structures was done, including examination of safe arranging operation. The new system has different central focuses, particularly: saving time in setting up tests, an office to timeshare exorbitant NIM equipment, and diminishing wear and tear on rigging. In any case, the testing in like manner showed issues with the new system, for instance, longer latencies and jitter diverged from the old structure. Answers for these issues are kept an eye on; however also work is relied upon to upgrade responsiveness and versatility of the new system to make it applicable to a more broad extent of the examinations.

Keywords: Triggering system, Integrated computing, VHDL code, FPGA.

INTRODUCTION

This paper identifies with the change of a model melded, reliable impelling frameworks proposed for use at iThemba Laboratory for Accelerator Based Sciences, a social gathering of multi-disciplinary labs controlled by the National Research Foundation of South Africa [1]. This paper identifies with atomic material science dissect done at the middle in the Western Cape that joins recognizing evidence of significance and particles at quick, in the nanosecond run and speedier. A case application that uses this kind of foundation is the right estimation of material quality utilizing accurate affirmation of gamma radiation. These examinations taking all things into account rely on upon in the wake of recognizing specific sorts of joint endeavours between particles that happen in short sees of time [2]. The execution of region frameworks for these exchanges is a test for low power investigate centre trials where the gear should be dubious to little duties of centrality occasion in short portrayals of time [3]. A noteworthy piece of this burden is perceiving the right joint endeavours between particles pertinent to the consider thought about, and the way toward detaching these relationship from foundation impacts. In this paper, we utilize the term ‘relationship of excitement’s to suggest a specific sort of between particles correspondences concentrated on amidst an examination. The new starting structure displayed in this paper is a reaction to overhauls made in the lab to engage and furthermore streamline setting-up and testing of activating for specific sorts of low-importance atomic trials. This new framework gives a speedier hopes to accomplice NIMs and setup parts of the activating foundation. A Model-Integrated Computing approach has been taken after for this new structure, by which triggers are displayed obviously and hence along these lines changed over into rigging depiction tongue code sent on a FPGA. The FPGA replaces parts of the direct hardware, and hard-wired relationship, of the past framework.
**METHODOLOGY**

The goal of the new starting structure was to engage the way toward arranging and testing impelling frameworks for low-vitality atomic material science tests. The examination creates begun with impression of tests utilizing the past activating framework. This included researching the hardware, starting setup and different assets make utilization of in examinations [4]. The examination displayed an imperative bit of time was spent in examinations included planning, accomplice and testing NIM contraptions for the starting instruments. In like manner, the inciting structure was seen as a perspective for progress. In light of these measures, the trigger board was picked up as a reconfigurable stage to supplant parts of the direct activating framework. With a specific extreme goal to make the structure more open to physicists, a MIC approach was taken after so that establishing operations could be depicted clearly and a while later made a comprehension of by PC into an executable shape. As necessities be, a custom displaying tongue was wanted to address trigger framework follows, and a model mediator was finished to change over these models into a shape that could be asked for and passed on onto a FPGA orchestrate.

**Phase 1: NIM electronics and identifying HDL equivalents**

A HDL combinational premise delineation of a physical NIM is considered. These NIM accomplices can unmistakably essentially supplant NIM modules with modernized information sources/yields or NIM modules that can be acknowledged utilizing combinational technique for thinking and appropriate moved/fundamental change work environments open on the FPGA compose. This at first stage included composed work diagram and execution trials of HDL reciprocals wandered from physical NIM modules. These HDL utilize utilized standard HDL building squares, for example, flip-flops, and confined state machines and catches, and strategies were suggested. HDL accomplices were conveyed for all the fundamental NIM modules, for example, tickers, concede modules and support. HDL accomplices were not made for the greater identity boggling NIMs, especially those that required fundamental wellsprings of information not extraordinary with the ports open on the V1496 arrange. NIM hardware can be diverted at various levels of operation, as outlined by Story. The behavioural level of abstracting NIM gadgets was picked as this suited courses of action conferred as circles and procedures which sensibly passed on starting operations found in the investigation office.

**Phase 2: Evaluation of MIC development options**

An accumulation of displaying conditions are open that bolster indicate disentangling APIs or modules to change over models into code. The running with indicating instruments were asked about: Mathworks Simulink, the Generic Modeling Environment, Ptolemy II and Scilab [5]. Scilab would be utilized, with the Xcos graphical model director, as this thing hustled to familiarize and essential with develop a custom demonstrating vernaculars with graphical pictures. Additionally purposes behind picking Scilab was its likeness to Simulink, its wide use and amazing on the web bolster like trades.

**Phase 3: Development of machine-interpretable models**

The inciting models made for the MIC structure are recommended as FPGA-supported Trigger Models in this paper. These FTM structure was depicted in Scilab to address NIMs and interconnections between these that can be sent as programmable strategy for thinking on the V1496 board. Data and yield ports that interface the FPGA to outside sources were melded into the models language made. Figure 1 demonstrates a portrayal FTM. The squares with thick guests and adjusted corners address NIM relating modules sent on the FPGA. The little squares are standard splitters. The hexagonal pieces are parallel trigger yields interface with outside ports. It shows up in portrays a fortunate event trigger, in which two outer wellsprings of data that agree in time inside a predefined restrict makes a trigger yield induce. The Event Trigger square jolts the yield of COIN and causes the bit arrangement enrols to record the trigger respects and a timestamp. The Java API for the Scilab/Xcos graphical modeller was utilized to code the model mediator. A library of NIM equivalent VHDL substances was made; including a non specific execution for every NIM level with that could be set in a FTM appear. This library was made to improve execution of both the code time frame and mix of the VHDL in Quartus II. Documentation for the FTM, which included case models and data for every NIM proportionate, was made.
making documentation of an examination speedier; and moreover empowering the utilization of variety control programming to help specialists in checking extraordinary diagrams.

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**Conflict of Interest:** Nil

**REFERENCES**


**RESULT**

![Fig. 1. An FTM Model](image1)

![Fig. 2. Quartus II RTL view and Timing Diagram](image2)

**CONCLUSION**

Accordingly, the new structure gives a way to deal with enliven the highlights of changing organizing settings amidst the cycle of arranging and testing triggers. All masterminding related bungles could be settled by utilizing the NIM Square with modules in FTM models, inferring physicists utilizing the structure would not have to learn HDL coding. This model-based structure also engages settings to be spared,
Physical Education: College Physical Education Informatization Development Research

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ABSTRACT

The wide use of data innovation in the instruction quickens the advancement procedure of the informatization of school physical training, and displays more difficulties to it. This exposition overviews the present circumstance of informatization in school physical training, and recommends a portion of the approaches to reforce and extend the procedure.

Keywords: College Physical Instruction, Informatization, Research

INTRODUCTION

Informatization is the world’s present monetary and social advancement of the pattern. Since the 1990s, with the sight and sound innovation and the expanding ubiquity of the Internet, Information innovation is changing the method of creation of the human culture, method for working, living and learning methods. At a similar time the training thought, showing strategy and showing means are likewise delivered extensive effect. Education informatization is the data instruction framework as one of the essential components, to advance the instruction modernization process. College physical training as a vital piece of value training, how to use the data innovation to school sports bring chances of improvement and accelerate the procedure of games informatization, is the present advancement of school physical training must face the critical theme.

Reviewed papers, An outcome of periodized small side games with and without mental imagery on playing ability among intercollegiate level soccer players [5]. Human Personal Attribute towards Industrial Social Contribution [6]. Culture Shock on Learning of International Students in India [7]. Study on the ideal ways of enhancing the quality of maritime education, training and research [8].

The Influence of Informatization on the College Physical Education

Modern Present day correspondence innovation on human culture creation and life will have an inconceivable effect, likewise give capable support on games. Informatization advances the school sports idea and example change, more accommodating in games showing means and techniques for the fast refreshing.

Sports Education Resources Digitization

Alongside the PC level significantly raised, the conventional circle sort stockpiling way as of now can’t fulfill the rapid advancement of train improvement, substantial measure of picture information, specialized examination in the customary instruction implies there is a tremendous challenge. However, informatization is a decent answer for this issue, it can make the educating of a lot of data video and other data exceptionally concentrated. not just capacity sum is extensive, quick transmission speed, additionally simple to get to and protect forever. School instruction digitization, data development for games showing digitization gives an enormous stage.

Sports Education Resources to Presents Diversification

The customary school sports instructing has the unity, Mainly educator teacher is offered need to, through the divider diagram, content for helper educating. In the entire showing process, instruction frame exhausting, methods for a solitary, understudies’ learning without energy. Through developing sight and sound data platform, students can through the video is exceptionally instinctive comprehension of the venture itself about the development of the screen, and can watch in the heart of the icon of focused scene,
enhance learning premium. The educator can play online computer game, gives the understudy a chance to feel rivalry environment. In an instinctive feeling innovation activity in the meantime, the preparation of understudies’ emotional, social esteems grow, so dull educating has turned out to be differentiated, dynamic, clear, the mind boggling specialized activity scene.

Sports Education Teaching Resources of Network

Sports training informatization development ingests the magnificent showing assets, fantastic courses recordings, household propelled showing thought and the logical technique, and as per the attributes of the school and the equipment level, to upgrade the plan, gain from each other. Students can likewise be founded on individual premiums, in the data organize stage, seek your most loved games showing video, make up in genuine learning in learning crevices and openings, subsequently better get done with learning specialized developments.

Sports Education Teaching Scene Virtualization.

The customary games showing for the most part is to utilize conceptual dialect to express innovation behavioral basics, making showing absence of interest. and the games showing circumstance of virtualization implies that games instructing can dispose of the physical space and time restrain, through the PC reproduction innovation and video educating, the theoretical of the specialized development recreation before understudies, and make understudies be less demanding to comprehend and ace, to improve the enthusiasm for learning.

Physical training showing quality made strides

Data innovation connected in school sports, which is gainful to enhance the showing condition, enhance the understudies capacity to break down the issue and illuminate, and advance logical physical preparing, and to understand the logical administration of school physical instruction, to develop understudies’ advancement soul and practice capacity.

Information Technique is Applied to Analysis the Current Situation of College Physical Education

Student Use of Network and Other Information Technology Condition

China Internet Network Information Center (CNNIC) released “thirtieth China Internet development report”. The report data shows up to the end of June 2012, the Chinese Internet users reached 538 million, Internet penetration is 39.9%. The first half of 2012 the netizen in increments of 24500000, popularity rate increased 1.6 percentage points. Netizens degree structure, college degree or above the crowd of Internet users than the basic saturation, ascendant space is limited. Therefore, college students have already had to accept the network capacity, the urgent need to the information technology application in sports teaching. The traditional teaching, the teacher had no time to communicate with each student, between the teachers and students lack of interaction and collaborative learning. But the information resources changed all that through powerful interactive open system, provided students with extensive exchanges and learning opportunities, greatly mobilized the enthusiasm, initiative, creativity.

College Teachers Using the Network Information Technology Condition

Part of college physical education department of the web search shows that effective use of modern information technology, sharing teaching resources from the actual demand gap is big. (see table 1).

![Table 1](image1)

<table>
<thead>
<tr>
<th>Teacher Class</th>
<th>Number</th>
<th>On Key People</th>
<th>Ratio</th>
<th>Computer Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer teacher</td>
<td>20</td>
<td>20</td>
<td>100</td>
<td>40</td>
</tr>
<tr>
<td>Mathematics teacher</td>
<td>40</td>
<td>30</td>
<td>75</td>
<td>25</td>
</tr>
<tr>
<td>Sports teachers</td>
<td>60</td>
<td>22</td>
<td>36</td>
<td>20</td>
</tr>
</tbody>
</table>

![Table 2](image2)

<table>
<thead>
<tr>
<th>Ability to use</th>
<th>Network tools making</th>
<th>Computer teachers</th>
<th>Other teachers</th>
<th>Sports teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scientific research</td>
<td>Inquiring the material</td>
<td>Commonly used</td>
<td>Commonly used</td>
<td>Commonly used</td>
</tr>
<tr>
<td>Network tool</td>
<td>E-mail</td>
<td>Commonly used</td>
<td>Commonly used</td>
<td>Commonly used</td>
</tr>
<tr>
<td>Communication tools</td>
<td>QQ, WeChat</td>
<td>Commonly used</td>
<td>Commonly used</td>
<td>Commonly used</td>
</tr>
</tbody>
</table>

Table 2 shows that all kinds of teachers in the use of information technology in the daily routine work condition. If the teacher of physical education in the use of computers and network operation mode and cognitive problems do not try to take seriously improve, university sports teaching, scientific research,
training and other aspects of the road will go narrower more, original ideas will not be a breakthrough.

**College Sports Information Development Deficiency**

College sports information already have basic conditions and hardware conditions. The implement of informative subject sports teachers' quality enhances unceasingly, teaching means continuously improve and guarantee the implementation of college sports information, at the same time also exists some shortage.

**Lack of Information Technology Development and Industrialization of Outstanding Scientists, Technical Experts, Engineering and Technical Personnel**

At present, our college physical education department still did not master computer soft, hardware debugging technology of making webpage. Personnel department all, enclosed operation and lack of joint cooperation research pattern, caused our country some information technology long-term can not reach the world's advanced level. To promote college sports information rapid development must cultivate sports and computer integrated professional talents.

**Country to College Sports Information Industry Investment Shortage**

China and the western countries is different, our country university economy also mainly rely on state-owned assets to support, the collective and private capital strength is still very weak. Enter the universities sports information industry the collective and private capital strength is relatively small, has not been formed a certain scale.

**Teaching Basic Computer Skills to Further Improve**

Education modernization in a fast-paced, modern information technology has already entered the classroom. Only clear the modern information technology teaching and traditional sports teaching relations, modern information technology teaching in physical education teaching can play a very good auxiliary function. Modern information technology teaching cannot be used as the main teaching method in physical education teaching, it is auxiliary teaching a kind of teaching means and forms. Teaching content and teaching method on teaching plays the decision role. Therefore, teachers should strengthen the computer application ability, play to the advantages of modern information technology teaching, and realize the modernization of physical education teaching.

**Physical Education Resources Need to Regulate Integration**

Multimedia in sports teaching, has led to a new round of physical education multimedia courseware development upsurge, repetitive development phenomenon is more serious. For example “Volleyball “ “Basketball “ “tennis “ “aerobics “ courseware, content with the one in the school and individual development should be repeated hundreds of versions, among which there are fine, but mostly crudely made, some example view is hardly accurate. Video picture select hasty, causing a lot of visual pollution and waste of human resources.

**Accelerate the College Sports Information Advice**

College PE informationization of our country is not only an important part of education information, but also an important foundation for the development of sports science. It to our country education informatization construction has an important meaning, is also the difficulty of informatization construction and the needs of large power and long construction should be the key.

**Clear Physical Educators of the Connotation of Information Ability**

Sports educators are divided into two kinds: one kind is sports teachers, one kind is sports education managers. As a sports teacher, the connotation of the information ability should be embodied in: has a certain information technology knowledge, and have the ability to use information technology and subject information of our cognitive ability. This goal is through the information awareness and utilization, improving PE Teachers’ teaching performance. The sports education managers, information skills will be reflected in education management of all levels. Physical education management high-level policymaker information competence should be reflected in the good value for physical education information. From the perspective of the economics and good value of education and the social value of
Angle to planning and management value sports education information; Sports education management middle controller’s information ability connotation should be embodied in good control of the existing sports education information and make it get rich;

Physical education management implementation of information competence should be reflected in the use and operation has control over physical education management information. “Discovery and business - regulation and rich - use and operation” formed a from the macro control to microcosmic operation of the complete physical education information management chain. In the information economy society today, the chain of the endoplasmic reticulum determines the physical education informatization advance speed.

Create Sports Education Quality Resources Complementary and Sharing Platform

Physical education teaching quality resources refers to all and physical education teaching related teachers, knowledge information, the location, the equipment and excellent teaching management idea and management mode, etc. Resources complementary and sharing is to point to break the boundary, regional and timespace boundary, according to the using efficiency maximization principle to achieve physical education teaching quality resources cross each other to use and Shared. For school sports education is concerned, at present our country sports education not only regional gap obvious, at the same time, the same region between intercollegiate sports teaching development is not balanced. Therefore, to achieve the quality of physical education resources sharing is the important way of realization of sports education equality.

Advance in the Research of Physical Education Science and information

Along with the development of modern science and information technology development, education research method is scientific and information toward the direction development, In sports science system appeared a lot of new knowledge growing point. Thanks to modern science and the support of information technology, the sports science and philosophy, social science, mathematics and the gulf between natural science is gradually be exalted.

Sports education researchers use computer implementing education experimental data of scientific calculation and mathematical statistics, use the network search and collect information and data, use office software to undertake literatures and report or thesis writing, and use multimedia technology to describe the motion characteristics and process sports material. Especially in recent years in the cloud computing technology and 3D simulation technology support, sports skills to describe the outcome of the implementation, so that physical education teaching of sports project demonstration standardized as possible. Therefore, only by the theory of social science as the basis, and modern science and information technology integration, in order to enhance the level of physical education research.

Strengthen the Higher Education Institutions’ Informatization Construction and Students’ Information Ability Cultivation

Most of the country’s basic physical education and higher physical education teachers are derived from higher physical education colleges. Therefore, higher sports education colleges and universities own informatization construction is the physical education of the informatization construction of the most important and the most basic work. Students’ information education and information ability training, will have a direct impact on our country’s basic sports education informatization construction and propulsion. China’s higher education colleges and universities sports information education and the information ability cultivation should be through the secondary teaching system to impart knowledge, through the course assignments and social practice to cultivate ability. Basic training target in the present curriculum based on the content, increase the knowledge the depth and expand its application scope.

CONCLUSION

Countries should strengthen the college sports information industry investment, in the policy be inclined support, take various financing actively developing college sports information industry, so as to make the physical information onto the fast lane.
Ethical Clearance: Taken from AMET University

Source of Funding: Self

Conflict of Interest: Nil

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Improvement of Sports Performance by Yoga

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ABSTRACT

Yoga has been rehearsed for around 5,000 years. There is confirmation that the act of yoga enhances physical and mental execution. Although most stances are not dynamic in nature, they do in truth send oxygen to the cells in the body by method for cognizant profound breathing and supported extending and restriction of various muscle gatherings. Whatever game you decide to sharpen, yoga can upgrade and supplement your capacity. Most games assemble strong quality and stamina, frequently in particular territories of the body. Yoga can profit proficient games people, it is important to investigate what is required to play a game and play it well. It is all around recognized that to play any game, should build up the fundamental aptitudes and constantly prepare the body with the goal that we can apply the skill in a refined and cleaned way. This clearly requires impressive time, vitality and responsibility regarding rehearse the ability within reach. Having a body that is adaptable, solid and controlled is likewise another essential thought, on the off chance that one is not ready to move the body with the beauty, speed and speed required, and then execution will be dull. In this way, we can state that yoga is exceptionally advantageous to everybody particularly for sportsmen.

Keywords: Yoga, Sports Performance, Capacity Building, Physiological Changes, Health Consciousness

INTRODUCTION

Yogic systems, which go for physical and mental selfculture, have persuading logical bases and create reliable physiological changes. Silver yoga exercises improved physical fitness of transitional frail elders is presented in [1]. It has been accounted for that yogi are fit for astounding accomplishments of perseverance what’s more, controlling their autonomic capacities. The effect of yoga exercise intervention on health related physical fitness in school-age asthmatic children is determined in [2]. There is proving that the act of yoga enhances cardiorespiratory effectiveness and execution remainder. Physical activity and health is discussed in [3]. In a prior work from our research centers, we have exhibited that subjects prepared in yoga can accomplish a condition of profound psychosomatic unwinding related with a huge lessening in oxygen utilization. Yoga is both preventive and remedial and has appeared to offer both physical and mental advantages to the body and brain. Effects of Hatha yoga and African dance on perceived stress, affect, and salivary cortisol is discussed in [4]. In the event that we backpedal to the underlying foundations of the word, we find that the expression “Yoga” has its starting points in Sanskrit. It intends to join – Yoga causes the body to join with the other imperative mystical parts of the psyche and soul. Rapid stress reduction and anxiolysis among distressed women as a consequence of a three-month intensive yoga program is determined in [5]. It is additionally frequently characterized as a way of life which intends to have a solid personality inside a sound body. Most just characterized, yoga is an arrangement of stances or ‘asanas’, combined with breathing systems, which assist give quality and adaptability to the body while making a difference to adjust the psyche and its reasoning. Effects of Yoga and Meditation on Clinical and Biochemical Parameters of Metabolic Syndrome is described in [6]. Dissimilar to other physical types of activities, similar to the high impact exercise, by rehearsing yoga, one can accomplish physical wellbeing, as well as mental and profound prosperity. There is an extraordinary need of yoga and yogic practices to be educated and furthermore to practice yoga, to overcome physical, mental and physiological
Positive impact of yoga and pranayam on obesity, hypertension, blood sugar, and cholesterol is explained in [7]. Our brain and body is fit for bearing the heap of strain to a certain restrict. On the off chance that strain proceeds past that utmost, then the adjust of the psycho-physiological procedures is bothered, and that comes about into different side effects of maladjustment the psyche communicates the pressure as motivations that spill out of the cerebrum to different muscles of the body. Effect of land and shallow water aerobic exercises on selected physiological and biochemical variables of obese adult is said in [8]. In this manner the practice is a perfect supplement to different types of activity and an outrageous preferred standpoint to any game. The “stances” are the physical positions that facilitate breath with development and we hold these positions to extend and fortify diverse parts of the body.

Benefits of Yoga on Sports Performance

Mental Health

Let us initially start with the advantages of Yoga on mental wellbeing. All things considered, great psychological well-being is of central significance for being sound physically also. Culture Shock on Learning of International Students in India is discussed in [9]. As prompted above, breathing system shapes a necessary part of Yoga. Do I hear you asking “how?” It truly is extremely fundamental – by breathing profound and right, something that you would be doing when you rehearse Yoga, you are breathing in more oxygen and enabling the cells of your body to have access to that oxygen for a more extended timeframe. Analyzing women empowerment in working conditions: A study on women employees is determined in [10].

Strength

Ever pondered, why so a considerable lot of us, in the wake of a prolonged day’s work, come and plonk ourselves, on our home couches, with almost no vitality to try and bring a glass of water for urselves. This is brought about by absence of internal quality. Certain asanas of the yoga help create internal quality. Internal quality is basic in doing everyday exercises and in keeping you from wounds. This is particularly valuable, as we develop old and need more vitality and quality to do the same movement.

Flexibility

The popular notion that you need to be flexible in order to do yoga is incorrect; it is really the other way round – you should do yoga so that you can be more flexible. If you have a flexible body, you find it easy to do tasks. A lot of poses in Yoga concentrate on stretching and improving your flexibility.

Memory Improvement

Yoga helps in holding data better and for a more extended timeframe because of its attention on fixation and contemplation. By breathing right, concentrating and reflecting, more blood streams to the mind, making it supple and prepared to acknowledge more data and imitate that data when required.

Cardiovascular

Yoga helps in holding data better and for a more extended timeframe because of its attention on fixation and contemplation. By breathing right, concentrating and reflecting, more blood streams to the mind, making it supple and prepared to acknowledge more data and imitate that data when required.

Psychological Effects Of Yoga

1. Relive from stress and mental depression
2. Self discipline
3. Relaxation, self control
4. Help athletes to achieve flow and get in the zone

Other Benefits

1. Increase the breath capacity
2. Improve blood circulation and flexibility
3. Increases the motion and mobility
4. Increases the mental focus, clarity and concentration

CONCLUSION

As highlighted above, scientist discover that yoga in games as essential as other think it encourages us in various ways and distinctive levels in a games men life. We have enhanced our execution by day by day yoga rehearsing with a specific end goal to play out a
donning activity proficiently and successfully, a man needs to have a high level of fixation and center with a mind that is quiet and controlled. Yoga can encourage a sportsperson to have equality of brain and control of their contemplations notwithstanding amid push or potentially affliction. Yoga can assume a key part in developing mind control and fixation which encourages a sportsperson to perform at their pinnacle leaves and yoga encourages us a great deal.

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Conflict of Interest: NA

REFERENCES
New Polymer Crosslinking Chemistries for Cable Insulation

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ABSTRACT

Peroxide crosslinked polyethylene is the real protection material utilized as a part of the present electric links conveying voltages over 5 kV. Peroxide-interceded crosslinking presents link producing challenges in that there is a penchant for untimely crosslinking (sing) in the extruder. Furthermore, peroxide-intervened crosslinking creates side-effects that should be expelled from the link before conclusive link development. Novel natural peroxides and crosslinking coagent advances have been intended to address these difficulties. A novel peroxide, isopropenyl dicumyl peroxide, was found to significantly enhance the imperviousness to burn. Moreover, the novel peroxide diminished the requirement for degassing, since a lot of the crosslinking side-effects progressed toward becoming joined to the polyethylene amid crosslinking. A novel coagent, 2-methoxy-4-allylphenyl allyl ether, gave fundamentally higher burn retardance at a given level of crosslinking when contrasted with organizations without coagent. Polyethylene protection mixes crosslinked utilizing these new added substances showed fantastic scattering component and dielectric consistent esteems, demonstrating guarantee for requesting high voltage protection applications.

Keywords: Cross Linked Polyethylene, Peroxide, Coagents, Scorched.

INTRODUCTION

More than 50 years back, polyethylene was presented as a protection material for electric power links. Polyethylene’s innate attributes of durability, imperviousness to chemicals and dampness, low temperature adaptability, and astounding electrical properties, alongside minimal effort and simple processability, make it an exceptionally attractive material for protecting electric power links [1]. Since its presentation, there have been various huge advances in materials innovation that have added to polyethylene’s proceeded with position as the material of decision for protecting electric power links [2].

The presentation of crosslinked polyethylene in the 1960’s was a huge material progression. Crosslinking of the polyethylene enhances its execution by taking into consideration higher working link temperatures and enhanced physical properties versus thermoplastic polyethylene [3]. For instance, a link protected with crosslinked polyethylene is appraised for 90 C constant working temperature versus a 75 C consistent working temperature for a thermoplastic polyethylene insulation.1 There are two fundamental sorts of crosslinking innovations used to deliver crosslinked polyethylene for control link applications [4]. These crosslinking innovations are dampness cure and peroxide cure. In the dampness crosslinking innovation, a vinyl alkoxy silane is added to the polyethylene in either the polymerization procedure or a disconnected response handle [5]. The silane-containing polyethylene is blended with a crosslinking impetus, expelled onto a conductor then crosslinked by introduction to water in a disconnected procedure. Dampness dispersion through the polyethylene is an essential variable that can influence the rate of the crosslinking procedure [6].

The dampness cure innovation is basically utilized as a part of electric power links appraised 5 kV or less where a unilayer of material is connected to the transmitter. In the peroxide crosslinking innovation, a natural peroxide is added to polyethylene, and the peroxide-containing polyethylene is expelled onto a
The conductor then crosslinked in an online handle instantly in the wake of being connected to the conductor [7]. The peroxide crosslinking process is done in a nonstop vulcanization operation. The peroxide crosslinking innovation is essentially utilized as a part of electric power links appraised over 5 kV where various material layers are connected to the transmitter [8-9]. The synthetic polymer [10] plastics become an integral part of contemporary life. Excess use of plastics and indiscriminate dumping of it in soil and water is polluting the environment and other living organisms. To overcome this problem, the production and applications of eco-friendly biodegradable products (such as bioplastics) from microbes are becoming inevitable from the last decade and also good alternatives of synthetic polymers. Keeping this point in mind the present study aimed at isolating and identifying the poly 3-hydroxybutyrate (PHB) producing bacteria from marine sources that can be effectively utilized for the synthesis of bioplastics. For isolation of poly 3-hydroxybutyrate producing bacteria, spread plate technique was followed using E2 mineral medium. After incubation, based on the morphological characteristics 32 strains were isolated and identified from the sand dunes plants of rhizosphere vegetation of Chennai coast. While staining with Sudan Black, six strains viz., AMET 5103, AMET 5111, AMET 5113, AMET 5121, AMET 5124 and AMET 5128 were identified as poly 3-hydroxybutyrate producing bacterial strains. In [11], the influence of different weight percentages of glass fiber (GF) reinforcement on the mechanical properties of nylon (PA6) composite is investigated. Test specimens of pure nylon, 95% nylon + 5% GF, 90% nylon + 10% GF, 85% nylon + 15% GF and 80% nylon + 20% GF are prepared using an injection molding machine. In the experiments, tensile tests and impact tests are carried out. The obtained results reveal that mechanical properties of the nylon composites are significantly influenced by the weight percentage of glass fiber. From the tensile test results, it is observed that pure nylon has the lowest elastic modulus and yield strength whereas 80% nylon + 20% GF composite shows the highest elastic modulus and yield strength. Moreover, pure nylon shows the lowest tensile strength while 80% nylon + 20% GF shows significantly improved tensile strength.

**Peroxide Crosslinking of Polyethylene**

The peroxide crosslinking process for polyethylene is started with the primary request thermally determined homolytic cleavage of the peroxide bond, as appeared in Figure 1 for the instance of dicumyl peroxide. The subsequent alkoxy radical can either extract hydrogen from the polymer to frame a polymer radical or experience beta scission to shape a methyl radical and acetophenone. Thusly, the methyl radical can likewise digest a hydrogen iota from the polymer to frame a polymer radical. Two of the subsequent polymer radicals can join to frame a covalent carbon-carbon bond between polymer chains bringing about crosslinked polymer.

Peroxides with a scope of half-lives are accessible. In light of its cure energy as spoken to by its half life and additionally cost and accessibility, dicumyl peroxide is thought to be a standout amongst the most effective peroxides for profitably crosslinking polyethylene.

![Fig. 1. Peroxide Crosslinking Reaction Sequence in Polyethylene](image)

**Novel Peroxide Structure**

While dialkyl peroxides are the peroxides of decision for crosslinking polyolefins, coagents in light of terminal carbon-carbon twofold bond usefulness are an especially powerful class of added substances that are utilized together with peroxides in crosslinkable polyethylene compounds. Therefore, it was important to investigate dialkyl peroxides that contain bunches...
with terminal carbon-carbon twofold bonds. Peroxides related basically to dicumyl peroxide were functionalized with isopropenyl bunches in light of the speculation that they would give cure coagent usefulness (cure support or potentially sear retardance) and additionally bring down the centralization of peroxide decay results by joining of the carbon-carbon twofold attach to the polymer amid crosslinking. To test this speculation, we arranged and assessed isopropenyl dicumyl peroxide (Figure 2).

The isopropenyl dicumyl peroxide (IDP) was blended into low thickness polyethylene material that was planned with exclusive cell reinforcements to meet the stringent warm oxidative maturing necessities for link protections utilized over 5kV. A dicumyl peroxide (DCP) control test was additionally arranged with a similar cancer prevention agent containing low thickness polyethylene material. The peroxide level in the IDP detailing was coordinated the cross connecting level of the DCP control, as demonstrated by the most extreme torque (MH) in a moving pass on rheometer (MDR).

**CONCLUSION**

The utilization of peroxide cross connected polyethylene in electric power links appraised for 5 kV or higher applications keep on growing. Peroxide-interceded cross connecting presents link fabricating challenges in that there is an affinity for untimely cross connecting (singe) in the extruder. Also, peroxide interceded cross connecting produces results that should be expelled from the link before definite link development. The predominant natural peroxide used for cross connecting of polyethylene is dicumyl peroxide. Novel sciences have been distinguished that are reasonable for link protection and address the difficulties displayed by the present science. A novel peroxide science has been distinguished, isopropenyl dicumyl peroxide, that conveys enhanced sear resistance and can lessen the link degassing necessities. A novel apt, 2-methoxy-4-allylphenyl allyl ether, gave fundamentally higher burn retardance at a given level of cross connecting. Polyethylene protection mixes cross connected utilizing these new added substances exhibited brilliant electrical properties that meet the requesting high voltage protection necessities.

**Ethical clearance**- Taken from AMET University.

**Source of funding**- Self

**Conflict of Interest** - Nil

**REFERENCE**


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Estimation of Soil Corrosion in Shangri-La County Based on GIS

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ABSTRACT
Soil disintegration is one of the genuine cataclysmic events in China. Soil disintegration control is the principle substance of the extensive administration of the stream bowl. Soil disintegration in moist district is fundamentally brought about by pressure driven disintegration. In this paper, Shangri La County is taken as a review region; the 2014 Shangri La County soil disintegration sum is figured by altered soil misfortune condition (RUSLE). The arrangement of soil disintegration power of Shangri La County is investigated by different variables influencing soil disintegration circumstance.

Keywords: Soil and Water Loss; Soil Disintegration; RUSLE

INTRODUCTION
Soil disintegration is the primary substance of soil and water misfortune forecast, and it is imperative to gauge soil disintegration logically and sensibly. Soil disintegration will crush the land assets, so that the natural condition has turned out to be more terrible. Cause dry season, residue, surges, avalanches and other catastrophic events. In this manner, it is important to utilize the logical and sensible strategies to gauge the measure of soil disintegration [3][4]. Re-examined Universal Soil Loss Equation is utilized to evaluate the yearly normal soil misfortune brought about by surface disintegration and chasm disintegration. Base on the superposition count, utilize the current information of the review zone and embrace the all inclusive soil misfortune condition to assess the dirt disintegration sum [3][4]. It is dependable contrasted and the dirt disintegration modulus strategy and it has a wide application go contrasted and the near technique.

The amended widespread soil misfortune condition RUSLE is to evaluate the measure of soil disintegration of the Shangri-La County [3][4]. Consolidate the land utilize sort and slant; investigate the dirt disintegration force and the association with it. Finally settle the comparing establishment of Shangri-La County of complete administration of water and soil.

Facts AND Ideas
This paper utilizes the information including remote detecting information, advanced rise demonstrate information, meteorological information and land base guide information. Remote detecting information is 2014 Land sat 8 Oil picture; 30 m determination OEM information, Tibetan Autonomous Prefecture of soil sort outline; Shangri La city arrive utilize characterization delineate; Precipitation, mean yearly precipitation information.
There are three primary explanations behind picking the re-examined all inclusive soil misfortune condition rather than the all inclusive soil misfortune condition: First, RUSLE show manufactured a PC demonstrate. It can furnish clients with applicable specialized and client manual. Synthesis, optical and dielectric studies on novel semi organic nonlinear optical crystal by solution growth technique has been explained in[7]. Second, the RUSLE display gives a database of pertinent parameters and factors required by the model. Clients can pick as per the real circumstance. Third, RUSLE show more nitty gritty estimation of the different elements and procedures in light of years of research results. It incorporates: (I) The estimation of precipitation disintegration figure considers the snowmelt disintegration and the effect of melancholy in western China. (2) The figuring of soil erodible elements joined with the change of seasons and the estimations of the credibility of some uncommon sorts of soil were defined. (3) Slope and incline length consider figuring’s incorporate blends of different sorts of slants. (4) The proportion of cover administration components is figured by duplicating the surface unpleasantness, pre-arrive utilize, soil dampness, edit cover and surface cover by five sub-elements. (5) The computation of soil and water protection measures has enhanced the figuring of belt cultivating, porch and high culturing. The changed all inclusive soil misfortune condition RUSLE is an enhanced USLE for the general soil misfortune condition, which has a more extensive application go and a higher exactness contrasted with USLE, Synthesis and EPR Studies of Copper Metal Complexes of Dyes Derived from Remazol Red B, Procino Yellow, Fast Green FCF, Brilliant Cresyl Blue with Copper Acetate Monohydrate has been explained in[8].

Rainfall corrosion factor(R factor)

R speaks to precipitation disintegration calculate, which alludes to the potential effect of precipitation on soil disintegration. It is a critical marker for assessing the transportation and stripping of the dirt. The recipe of month to month size of Wischmeier is received. In the recipe, P is the mean yearly precipitation (mm), and the month to month precipitation (mm) is shown by Pi. This review gathered the review range and the encompassing six locales 2012-2014 years of month to month precipitation information. In view of six locales of normal yearly precipitation information and in view of the recipe (2), it can be ascertained by every precipitation station the yearly normal precipitation erosivity R. Furthermore, substitute the Kriging insertion strategy for spatial introduction and get the precipitation disintegration drive spatial circulation outline and this paper receives Chemical modification on reactive dye adsorption capacity of castor seeds has been explained in[9].

Soil corrosion factor (K Factor)

K alludes to the level of precipitation disintegration on soil for dealing with and partition and in addition the disintegration of trouble. Because of information insights impediments, who proposed the computational technique. The technique depended on the information of soil molecule structure and soil natural cell based information.
CONCLUSIONS

According to “Chinese soil erosion intensity grade classification standards”, it can be divided into 6 levels of soil erosion in the water. Soil erosion modulus of Shangri-La County is 844.72 t/ (km²·a), which belongs to the slight erosion area. The percentage of soil erosion with micro erosion and slight erosion was 63%, which was the highest. The percentage of soil erosion with moderate erosion was 30%, and the rest was intensity and extreme intensity erosion about 7%. It was the major soil erosion control area. According to the rainfall erosion map, erosion occurs mainly in greater rainfall in Shangri-La County, Southeast of the area, location of Shangri-La County is 1853 located in northwestern Yunnan Province. So it will in trend with Yunnan Province as a whole region from the southeast to northwest region decreasing trend. Combine soil erosion intensity classification map of Shangri-La County with slope classification map, in the lower part of the central area, the main area is mainly micro erosion and slight erosion. Shangri-La County edge higher terrain, steep, and occur mainly moderate erosion.

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Growth of Underwater Sensor Unit for Studying Marine Life

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ABSTRACT

In this paper propose a ROV framework (remotely worked vehicle) outfitted with sensors and camera to screen the marine life and offer effect estimation for the situation of oilrigs operating at a profit Sea store. The robot is furnished with a low determination simple camera for continuous picture utilized by the pilot of the ROV and a HD camera for video recording of the marine biological system; the sensors (IMU and weight sensor) are additionally utilized for helping the pilot move the unit. All the electronic segments in the robot are mounted on an uncommonly outlined edge utilizing AutoCAD and made utilizing a 3D printer. They will be set in a watertight fenced in area that can withstand profundities up to 100 meters. The information originating from the sensors are broke down utilizing a LabView interface.

Keywords: Underwater System, Sensors Placement, Marine Life Monitoring, Labview Interface

INTRODUCTION

The untethered submerged vehicle is called AUV, which is free from a tie and can run either a prearranged or rationale driven course. The contrast between the AUV and the remotely worked vehicle (ROV) is the nearness (or nonappearance) of a direct hardwire (for correspondence as well as power) between the vehicle and the surface. Notwithstanding, AUVs can likewise be (allegorically) connected to the surface for direct correspondence through an acoustic modem, or (while at first glance) by means of a RF (radio recurrence) and additionally an optical connection.

In this paper also referred in, Synthesis of lead titanate nanoparticles via sol–gel technique and its characterization [7]. Synthesis and Study of Optical properties of MgO based TM oxide (TM= Cu, Mn and Zn) nanocomposites[8].

METHODOLOGY

The submerged checking framework is coming about input past research displayed at [1] made by our group, with effect in the field of maritime hardware. Procedures and techniques for building submerged frameworks working under obsolete [2, 3]. The principle issues that happen in this sort of frameworks are the means by which exemplification of hardware and information and picture transmission[4][5]. The venture thought is to give a basic and economical framework to supplant jumpers work and furthermore to send a genuine data about the marine condition.
The ROV (Remotely Operated Vehicle) framework displayed in this article is a submerged remotely worked vehicle. ROV is a fastened portable submerged gadget[6]. This is associated with a host framework and a PC to send by links the data from the profundity. Observing the framework sent on a mission into water is accomplished by methods for a workstation at the surface. The station at the surface gets the data required and the conceivable notices from the ROV. The principle data sent from the workstation is: directions, development bearing, increasing speed, the sort of the mission (Figure 2).

The initial phase in the improvement of this framework was the advancement of a serial correspondence convention (i.e. RS232, RS484, TCP/IP) which will empower the trading of information streams between the ROV and the GCS. As per our past research [7], we have sent information organized in two exhibits: one is the information sent from the ROV and the second is the information sent from the GCS. Each exhibit comprises of factors (i.e. values from the introduction on the xyz tomahawks, profundity, joystick’s tomahawks positions, and so on.) and afterward, the accepting microcontroller parses the exhibit in whole number esteems utilized for moving the robot or for the Lab View interface. The data sent by IMU sensor from the ROV are displayed on the Lab View interface (Figure 4). The area of the robot is distinguished, the directions transmitted to the workstation being viewed as the 0 point where the development into the water starts. The development of the ROV is accomplished by methods for the brushless engines, the course and the increasing speed being transmitted by the joystick from the workstation. The ROV speaks with the GCS from Arduino Mega board usind RS232 serial correspondence. The GCS’s ARDUINO sends the information to be shown on the PC utilizing USB correspondence. The Lab View interface appear on the picture and realistic the data about the ROV facilitated. The information are separated and spared in a cushion on Arduino and after that is exchanged to the PC.

**CONCLUSION**

During our research, in this paper figured out how to manufacture a model for recording submerged inside profundities of 10 meters and knowing the introduction and the primary position of the robot, the pilot does not need to watch over the ROV, going to look into a ship wreck or submerged surrender. The subsequent stages into building up this unit are to change the material of which the walled in area is made and update the engines utilized for development submerged and to make the unit independent utilizing FPGAs and Video Processing.

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REFERENCES


Energy Harvesting Based on Piezoelectric Components

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ABSTRACT

This paper describes an approach to harvest electrical energy from mechanically energized piezoelectric components. In the wake of draining petroleum derivatives and the harm it perpetrates on mother earth, makes it a convincing case for an inexhaustible and maintainable wellspring of energy. Our venture is a stage toward that path. The essential thought is to return to utilize the energy consumed by us in day by day course of life. In particular, we endeavored to change over weight applied on the ground by people while strolling or by vehicles going headed straight toward energize piezoelectric components. While the marvel of piezoelectricity is notable for quite a long time, to tackle its potential we have come to fruition with a novel philosophy of associating piezoelectric components with an able hardware to yield most extreme power. The Piezoelectric sensor which gives voltage on the use of weight is unregulated DC Voltage. The DC Voltage got is gone through a power molding source and afterward given to a capacity source. The rate at which the capacity source gets charged is the place our module emerges as a proficient and imaginative module to bridge the plenteous potential energy. There is a scarcity of energy produced from a solitary Piezo-Electric transducer.

Keywords: DC-DC converter; Energy harvesting; Schottky diode; Renewable and sustainable energy source; Lithium Ion battery;

INTRODUCTION

Today we as people are progressively getting to be plainly reliant on machines in our everyday life. These machines unfortunately don’t work without anyone else, they require energy. Energy in one way or the other is expending energizes. Sadly as our needs are expanding energizes are diminishing at a quicker rate and one day these fills won’t suffice to our requirements. Energy is something that can be changed over starting with one frame then onto the next shape on the off chance that we know the right intends to do it. So imagine a scenario where we can utilize a type of energy that we get from our day by day exercises. We joined the utilization of piezoelectricity and we were fruitful in accomplishing enough energy to charge a Lithium-Polymer battery of 600mah in 7 hours by merely using the weight applied by people. Piezoelectricity deals with the fundamental rule of stress being connected to electric charge being created; it is from multiple points of view specifically corresponding. For our situation we utilize the piezo transducers. Piezo transducers are sensors that change over mechanical anxiety connected to them into electric energy. By focusing weight on a specific touchy point on the transducer we see that it produces considerable power. In this paper we examine the utilization of these transducers by really associating 200 such pieces and afterward utilizing dc-dc converters to make it more productive and make utilization of it in this day and age. We have built up a model wherein we associate several many Piezoelectric sensors taken after by a blend of all around outlined hardware that includes productively planned DC-DC converters, (schottky) diodes, charging circuit the remarkable plan of saddling and taking this particle of energy and changing over it into a considerable measure of energy which thusly will charge a Lithium Ion battery in couple of hours paper described the development mechanically applicable especially in remote ranges where it is uneconomical to transmit power by...
conventional means. Mobile phone towers situated in the remote regions is a valid example.

**Principle and Block Diagram**

The idea of changing over mechanical energy into electrical energy was at first done utilizing the idea of a dynamo. Dynamo is a machine for changing over mechanical energy into electrical energy, normally by methods for pivoting curls of copper wire in an attractive field. In dynamo to work appropriately we need to unequivocally chip away at it, alongside other weakness of a dynamo in today’s world we basically can’t bear to invest time producing energy. So we concentrated on Piezoelectricity.

Mechanical pressure or strain on a poledPZT transducer changes the dipole minute, making a potential contrast. Pressure along the heading of polarization, or strain opposite to the course of polarization, produces voltage of an indistinguishable extremity from the poling voltage. Strain along the heading of polarization, or pressure opposite to the bearing of polarization, creates a voltage with extremity inverse that of the poling voltage. These activities are generator activities i.e. the transducer changes over the mechanical energy of pressure or strain into electrical energy. This conduct is utilized as a part of our venture. Estimations of voltage produced by applying worry to a piezoelectric fired component are straightforwardly relative up to a material-particular anxiety. Henceforth, our principle point was to build up an effective model that will produce however much voltage as could reasonably be expected. We have utilized paste firearm sticks to fill this need. These sticks ingest additional weight keeping away from harm and they likewise help to focus weight on the focal point of the PZT giving noteworthy measure of voltage.

**Working Principle**

Above block diagram is a diagrammatical portrayal of the stream of our venture. We initially procure the energy from Piezo electric fix which is unregulated; pass that unregulated power through LTC3588 which includes control molding, energy stockpiling and power administration. We then utilize the required measure of energy to supply to the heap. Stack for this situation is the Lithium Polymer battery. Working of the created module is fundamentally in view of the anxiety connected on the Piezo fix. Once the anxiety is connected it will disfigure and mechanical energy will get changed over into electrical energy utilizing the Piezo electric wonder. The energy changed over is then gone through the LTC 3588 IC at pins PZ1 and PZ2, which then goes it through the incorporated low misfortune connect rectifier in order to get positive esteems at the yield. From the datasheet we comprehended that the maximum yield that we can get is 3.6 V which is deficient to charge the vast majority of the lithium particle batteries.

![Fig. 1. Block diagram of Module](image)

**Fig. 1. Block diagram of Module**

There can be an issue of current streaming in inverse heading so for a similar we utilize a diode for no invert current, as we are attempting to make the framework proficient we chose a diode with a low voltage drop for this situation we utilized a schotky diode. The figure 2 demonstrates the characteristics of a schottky diode regarding an ordinary p-n diode.

![Fig. 2. Comparison of Schottky diode with PN diode.](image)
RESULTS AND DISCUSSIONS

The analysis of the rate of charging and investigation of yield accomplished is portrayed from the figure 3. The proportionality chart for Piezo transducers associated in arrangement and parallel is additionally to given to underline our outline viewpoint of interfacing a few transducers in parallel. The outcomes we finish up are delineated in the figure 3. The rate at which the battery charges is subject to the level of excitation of the Piezo transducer fix, which is reliant on persistent development over it. Higher excitation relating to nonstop and ideal weight the time taken by the battery to get charged was 6.4 hours. In this way, the review demonstrates the power for battery is straightforwardly relative to the measure of weight connected by the client and rate of clients ignoring the Piezo fix. Additionally, the LTC 3588 coordinates a low-misfortune full-wave connect rectifier with a high productivity buck converter to frame an entire energy collecting arrangement advanced for high yield impedance energy sources, for example, Piezo transducers.

CONCLUSIONS

As discussed in this paper and appeared in the execution and its examination we have made this framework to be effective and additionally shortsighted. As days pass by our necessities regarding expending energy will increment thus a contrasting option to this must be available, Piezoelectricity is by all accounts our most solid option in light of the fact that not at all like other sustainable assets it isn’t screwed over thanks to something which has prerequisites; for instance, sunlight based boards require sun, windmills require wind, and so on. Be that as it may, on account of piezoelectricity as proposed by us, it requires us people to put some sort of weight on the Piezo fix, which can then give out energy. A very much actualized framework can be a friend in need to our energy emergencies. Today 33% of India doesn’t get energy at all and on the off chance that we could help enhancing the status then we without a doubt ought to. We are certain with our examination that by the utilization of good quality piezoelectric transducer and working with the energy effective IC’s, for example, LTC 3588 we can want to further expand the effectiveness of capacity of energy from the strolling activity in our shoes or by actualizing in levels of autos or underneath railroad tracks where there is constant vibration. Appropriate innovative work in the field of piezoelectricity can end up being a major stride in giving efficient power energy and natural protection.

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REFERENCES

An Artificial Neural Network Based Risk Management Model For Marine Navigation Systems

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ABSTRACT

The hazard evaluation is a critical intends to get the status of framework security and an imperative premise to create security arrangements also. Taking the coordinated route framework as the exploration question, this article proposes an assessment model which can apply to the framework of hazard appraisal taken by the neural system and the fuzzy hypothesis. The model utilize the fuzzy assessment strategy to quantize the hazard components of the framework, to make the fuzzy framework yield as contribution of neural system framework and the hazard an incentive as the yield of the system, to make the preparation of system by ascertaining the estimation of those examples and to approve with illustrations. The investigation demonstrates that it is a functional technique to certain degree.

Keywords: Ship Coordinated Route Framework, Fuzzy Neural Network, Risk Management

INTRODUCTION

The ship incorporated route framework is a framework, bringing together naturally through the PC a wide range of direction types of gear which are autonomously utilized as a part of boats to give the high-exactness, solid bearing, the speed, the position, the stance, the water profundity, the unwavering quality and the degree and so on for guaranteeing the boats’ execution of security, route, position and operation adrift. An Early Warning System for Technological Innovation Risk Management and Forecasting Obsolescence Risk and Product Life Cycle With Machine Learningare discussed by [1] [2]. Chance appraisal is one strategy to decide the probability and seriousness of mischances and hazard, utilizing the standards and techniques for the frameworks building to recognize and dissect the danger components existing in the frameworks. As in ship incorporated route framework chance evaluation, because of the multifaceted nature of the framework, there exists a substantial number of security elements also, fuzzy elements, it has certain fluffiness and a multifaceted general appraisal issue. Prediction models aided postoperative decision making based on neural network and support vector machines is described by [3]. We select the ship incorporated route framework as the question of study, utilizing the coalition with the fuzzy systematic progression handle and ANN to survey the security assessment of the framework, exploiting the element which fuzzy complete assessment can comprehend the general joining issues for changing the subjective conclusion to the quantitative determination and the righteousness that ANN can disperse or store the data, parallel preparing, and keep raise the fitting accuracy from self-learning, joining the logical calculations and the expertise’s, enhancing the velocity of the hazard evaluation of the coordinated route framework in not lessening the precision furthermore, the target of the first appraisal. Adaptive neuro-fuzzy inference system for predicting norovirus in drinking water supply and Multilevel prediction of missing time series dam displacements data based on artificial neural networks voting evaluation is discussed by [4, 5].

Fuzzy neural Network

BP Neural Network is broadly utilized contrast with the other neural system models. It’s made by sources of info, yields and many concealed layers, and each layer is worked by numerous crunodes, which is called neuron. Risk Assessment Model of Ship Integrated Navigation System Based on Fuzzy
Artificial Neural Network is explained by [6]. Every neuron gets a flag from the neurons in the past layer, at that point communicate to the majority of the neurons in the following layer, gone through a constraining capacity, than communicate to yield layer, finally read the yield values. A recurrent Elman neural network - based approach to detect the presence of epileptic attack in Electroencephalogram (EEG) signals is discussed by [7]. The neuron crunodes work as a rule is S-work. BP Neural System can be understood any complex nonlinear mapping relationship from contribution to yield, and with great speculation capacity. The common structure of BP system is appeared in Figure 1. The BP learning process works can be is partitioned into the forward engendering and the back-proliferation process. In the past procedure, the info data is handled from the information layer through concealed layer, at that point transmitted to the yield layer, neurons in each layer just have impact in the neurons in next layer. In the event that the yield are not what you are needed, at that point spread into the back-proliferation prepare. The blunder between the real esteem and system yield backpedal to unique connection way, by adjusting the weights of neurons, to lessen the blunder. At that point change to the forward proliferation, cycle over also, over until the mistake is not as much as the given value. In the preparation of the system taking in, the measures of preparing tests are pý accepted a settled example with the info and yield models to prepare the network. In the event that the yield are not what you are needed, given the mistake a chance to flag back-proliferation from the yield. What’s more, adjust the weighting coefficient until the yield near the coveted yield dk. After the weighting coefficient have been balanced, and after that information different simples to learn, until all of the simples are prepared.

Risk Management model using Fuzzy Neural Network

In the hazard evaluation of the ship incorporated route framework, the fuzzy, muddled nonlinear connection and the dynamic changes consistency are existed between each assessing pointer and hazard class of hazard elements. Fuzzy complete assessment can illuminate the general joining issues for changing the subjective analysis to the quantitative determination, however it’s hard to alter as affirmed the participation work and the weight function. The neural system can mirror the self-assertive and muddled nonlinear mapping filiations from contribution to yield and keep raise the fitting accuracy from selflearning. We will build up the model of the framework hazard appraisal joined by fuzzy exhaustive assessment and neural system in this article.

Show framework structure

The model of the hazard appraisal of the ship incorporated route framework based by fuzzy neural organize contain two sections: fuzzy framework and neural organize, mix the fuzzy grouping strategies in the existed neural system, speaking to the fuzzy enrollment as neural system input. We pick the single shrouded layer BP neural system as the system demonstrate, it has input layer, concealed layer and yield layer, what’s more, the amount of yield of the system speaks to the hazard class of the hazard calculate. The model structure is appeared in the figure 2. There are three fundamental stride: First of all, we dissect the majority of the affected probability elements, ascertain the heaviness of each impacted element, appraise the impacted components depended by related reports and mastery’s in this area. Furthermore, with treating consistency and quantization the components affected the safe state of the ship coordinated route framework; we utilize it as the contribution of ANN and set up the model of ANN. At long last, we make the hazard evaluation to the ship coordinated route framework in the wake of preparing ANN with the history assessment information.

Fuzzy preprocessing

Simulated neural system is master in treating quantitative information, however absence of the treating and break down capacity to the subjective markers in control data [9]. In view of the indeterminacy of the hazard figure file esteem, we quantize and accommodate the sheltered hazard
components of the ship incorporated route framework in utilizing of the fuzzy appraisal to be the yield of fuzzy framework and the contribution of the neural system. The particular strides are as following: 1) We look further the materials indicating to the ship incorporated route arrangement of the evaluating fit, think with area master, break down the impact figure in view of affiliation break down. The fuzzy structure of the impact calculate is figure 3. The top layer implies the indented targets which decide the framework’s sheltered. The principal layer incorporates the greater part of the principle variables affected the objective. Under components are in the following layer.

RESULTS AND DISCUSSION

Developing three layers BP neural system, the input layer has ten info trademark amount, for example, Route Sensor0NavigationComputer0Control Programming System0Data Processing System and so forth. We discover fourteen neurons of the concealed layer by the test. The transitional layer exchange the capacity by tansig, the yield neuron by logsig, and the preparation work of BP system is trainlm. The hazard class is showed up at the point when there is just a single yield trademark amount. The specialists evaluate the hazard considers and give surveyed estimation of the hazard figures as the example set. We will build up a nonlinear mapping between the info and yield in the wake of preparing the system. We take ten gatherings trademark amounts of information and yield as the learning test, and test five gatherings. In the figure 3, it is the preparation deviation bend. We can see the preparing examination result from anticipated esteem and genuine yield esteem ascertained by ANN in figure 4. From those figures, it is demonstrated that the two esteems are comparative. We can likewise find that the neural system has more self-adaption capacity and estimated the hazard esteem evaluated by fuzzy assessment with high-accuracy.

Fig. 2. Risk management model using FNN

Chance appraisal utilizing ANN

There are four systems to make the hazard appraisal of the ship coordinated route framework by utilizing BP neural system; 1) Those existed fuzzy far reaching assessment cases are gap to the preparation test and the test test. Settling the design parameter of the organize; the quantity of the neural, learning coefficient also, mistake satisfactory points of confinement of information layer, shrouded layer also, yield layer. The system instatement is the association weight of the system. 2) The information vectors are utilized that had been fuzzy handled and exhaustive assessment benefit of learning tests to constitute the coveted yield vector, which is as the reference for the system prepare. At that point we compute the real yield estimation of every neuron units in the covered up what’s more, yield layers. 3) All the weights and limit of the system are balanced by the recipe (1) - (3) then give the precision and end of the preparation. Which is \( \varepsilon > 0 \), \( E \leq \varepsilon \) 4) The prepared neural system model is tried by utilizing the preparation fuzzy thorough assessment test. In the event that the exactness rate is over 90%, the model is usable; else, we need to reselect the specimen to test the system demonstrate.
CONCLUSION

In this article, we utilize the fuzzy neural system of the send coordinated route framework to make the hazard appraisal receiving the evaluation technique with F-AHP what’s more, BP neural system, embeddings the fuzzy participation review into BP neural system, and pre-treat the contribution of neural system, take the yield of fuzzy framework as the contribution of neural system. The yield is the hazard esteem. The demonstrate utilized the neural system without the human element what’s more, the clearly subjective fixing is the nonlinear procedure. In the wake of preparing the simulated neural system, we appraise the hazard class of the hazard components to an accessible path for intelligentize of the hazard appraisal of the ship incorporated route framework.

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REFERENCES

General Medicinal Data Management Framework
Configuration of Distributed Computing

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ABSTRACT
By applying the group human services into the management of interminable malady, to understand
the change from the conventional is uninvolved wellbeing administration mode to the dynamic mode.
Import and present the idea and qualities of distributed computing in light of breaking down the
current issues of the present medicinal data framework, at that point advanced the general engineering
of the General Medicinal Data Management framework in light of distributed computing. From the
distributed computing layer, specialist co-op layer and client get to layer three viewpoints, individually
plan the structure and understand the capacities for the framework, and furthermore present the key
advancements utilized as a part of the procedure, for example, Hadoop system, MVC, information
representation, and diagram controls. Show the impact of general therapeutic data administration
framework as B/S structure. At long last condense the benefits of distributed computing on therapeutic
data administration, and appear forward the possibility of the medicinal information mining.

Keywords: General Medicinal Data Management Framework, Distributed Computing, Hadoop system, MVC.

INTRODUCTION
In recent years, individuals’ expectations for
everyday comforts keep on improving, unending
infections which create due to awful eating and living
propensities likewise start to come into our lives and
influence our wellbeing[1]. Remote experience for a long
time demonstrates that, applying the group
therapeutic management into the administration of
perpetual ailment can get preferable impacts over basic
treatment at a similarly ease[2]. Under the foundation
of therapeutic data, various types of medical data
frameworks have been broadly utilized as a part of
group medicinal management, the present restorative
data frameworks comprise of electronic medical record
framework, checking data framework and
physiological data framework et cetera, to give
therapeutic information stockpiling, administration
and helper treatment administrations for individuals[3].
Be that as it may, with the advancement of data
innovation and the expansion of medicinal
administration necessity, there are as yet numerous
issues to be illuminated[6]. From one perspective, the
restorative assets are excessively scattered, making it
impossible to oversee midway, the operation of
various frameworks need to take a great deal of cost.
Then again, the sizes of individual restorative
information increment persistently, how to do
powerful capacity and arrange has turned into a basic
issue[5].

Distributed computing gives Internet-driven
services of information stockpiling and figuring as
required, it has many preferences, for example, high
unwavering quality, high wellbeing, versatile
processing and adaptability[6].Quantum of Ebola Virus
Disease Occurrence and Quantum of Research
Publications: A Scientrometric Analysis is presented
in [7].Interactive Big Data Management in Healthcare
Using Spark for medicinal data management [8].As
indicated by the scattered, huge and basically
extraordinary qualities of restorative information
assets, this paper draws lessons from the local and
remote significant research accomplishments and
encounter, and presents the idea of distributed
computing into the therapeutic data framework, at that
Proposed System

The plan objective of the general medical data management framework is to understand the request based dispersion of therapeutic assets, and the effective management of enormous medicinal information. By utilizing important wellbeing accreditation to control client get to, and make patients and little to-medium-sized medical organizations call information which convey in the cloud database, in the interim transfer the inhabitants’ medicinal records, review reports and related therapeutic data documents to the cloud server. The general engineering of the general medicinal data management framework is appeared in Fig.1, including distributed computing layer, specialist organization layer and client get to layer.

The distributed computing layer is the base layer of the framework, by utilizing the premise of existing equipment and programming to manufacture the distributed computing condition and give important capacity and registering administrations for the whole framework, which incorporates conveyed information stockpiling, enormous information handling and non-social database innovation. Disseminated document framework conveys on a substantial number of normal equipment, joined with the parallel programming innovation, it can give information operation of high throughput and blame tolerant for applications, then non-social database can take care of the issues of restorative information stockpiling of medicinal field due to various sizes and sorts of records.

Service provider layer is the middle of the road connects between distributed computing layer and client get to layer; it works in distributed computing condition and makes full utilization of high information stockpiling and registering capacity of distributed computing, to diminish the setup necessities on customer equipment. This layer not just needs to interface with distributed computing layer and client get to layer, call the assets of distributed computing layer to guarantee the security and strength of information stockpiling and the effectiveness of information preparing, and handle the demand from client get to layer and criticism the outcomes, additionally needs to give a few capacities, for example, client data administration and wellbeing management services.

User access layer concentrates on the data correspondence with specialist organization layer, as the human PC collaboration interface of the framework; it doesn’t play out the real computation and information handling operation and mostly epitomizes the UI of displaying information data benefit for client. This layer gives medicinal application administrations identified with wellbeing by building up neighborly and advantageous interface, which incorporate client verification, individual wellbeing records management, physiological information observing, wellbeing learning advancement, and master counseling service.

CONCLUSION

This paper presents the new thoughts and new innovations of distributed computing in view of the investigation of the present advancement circumstance of therapeutic data framework, at that point plans and builds up the general medicinal data management framework. The framework acknowledges conveyed capacity and proficient preparing of general medicinal information, and gives information management services to clients as B/S structure. With the size of medical information continually increment, how to unearth sensible and viably the verifiable data of therapeutic information and locate the potential esteem turn out to be extremely fundamental. With the assistance of the effective information handling capacity of distributed computing, consolidated with the relating calculation for restorative information investigation, the outcomes can give an essential premise to settling on choice in medicinal treatment.
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Integrated MOSFET-Embedded Cantilever Sensor Diagnostic System using MEMS in Biomedical

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ABSTRACT

Recent advances in nanotechnology ensure broad and reasonable potential for the change of imaginative and predominant recognizing and demonstrative procedures in biomedical field. In particular, the scaled down scale cantilever area perspective in light of direct transduction of nuclear limiting actuated surface stress into a nano-mechanical development of little scale cantilevers has pulled in noteworthy thought for stamp free acknowledgment of biomolecules. As another choice to the directly sent optical, piezoresistive, and capacitance nanomechanical acknowledgment strategies, we display another electronic transduction perspective including two-dimensional littler scale cantilever shows with geometrically organized metal-oxide semiconductor-field-affect transistors (MOSFETs) introduced in the high tension district of the scaled down scale cantilevers. We have shown that the redirection of the scaled down scale cantilever provoked by specific ligand-analyte limiting events prompts a correct, quantifiable and reproducible change in the exhaust current of the MOSFET shrouded in the little scale cantilevers. High present affectability of MOSFET embedded stage engages perceiving nano-scale cantilever redirection from specific biomolecular confining events at low centralization of analytes with affectability in the parts-per-trillion region. We have shown ultra-unstable acknowledgment of streptavidin-biotin based biomolecular affiliations and biomarkers for cardiovascular ailments. Our novel acknowledgment parts offer a splendid stage for variety of different biomolecular recognizing applications, stretching out from clinical diagnostics and common checking to prescription disclosure, and moreover gas and substance identifying by organizing receptors on MOSFET cantilevers.

Keywords: MOSFET-Embedded, cantilever, MEMS, Biomedicine.

INTRODUCTION

Biomedical field is moving at a bewildering pace starting late, on account of advances in science and arrangement, and additionally to physical sciences and building, which have dispatch the middle biomedical research higher[1] than any time in recent memory. Harnessing great conditions of physical sciences and working in biomedicine has occurred at various levels, from high affectability biochemical diagnostics to prescription movement livelihoods[2]. Among a couple creating distinguishing and diagnostics approaches, the little scale cantilever acknowledgment perspective, particularly, has pulled in amazing thought starting late. The modification in the surface stress due to the specific biomolecular limiting event among test and concentrate on the surface of a little scale cantilever realizes physical contorting of the scaled down scale cantilever shaft in the extent of 10 – 100+ nanometres[3]. The directly passed on nanomechanical winding ID frameworks use distinctive disclosure modes including optical, piezoresistive, and capacitance systems. Each system encounters inborn obstacles, especially for the most part deployable sensor structures, fit for working under negative environmental conditions. In any case, we have starting late showed that nanomechanical bowing of cantilevers can incite imperative changes in the electronic characteristics of introduced metal-oxide-semiconductor-field-affect transistor (MOSFET) inside the cantilevers Design and performance analysis of MIMO-OFDM system using different antenna

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configurations is discussed in [6]. Thusly, when specific ligand-analyte confining events occur in the midst of presentation, the redirection of the scaled down scale cantilever inferable from adsorption-incited surface stress at the functionalized distinguishing layer prompts correct, quantifiable and reproducible change in the drain current of the embedded MOSFET, along these lines giving another name and optics free electronic banner transduction framework Reactive Power Pricing Using Group Search Optimization in Deregulated Electricity Market is explained in [7].

Device Fabrication

The cantilever bunches were produced with the standard microelectro-mechanical structures (MEMS) development, a comparative procedure used for making PC chips, with immaterial process dares to engage expansive scale fabricating obliging next to zero exertion. Gold secured silicon nitrate littler scale cantilevers, where affirmation segments are immobilized regularly with thiol science, are used as a distinguishing cantilever [4-5]. Uncovered silicon nitride scaled down scale cantilever is used as reference. The differential exhausts current between the recognizing and the reference cantilevers limits systemic tumult and natural irritations (see Fig. 1).

RESULT

We have shown that the MOSFET introduced cantilever stage is prepared for giving identifying and demonstrative credits to a wide collection of bio-compound analytes. Figure 3 area of streptavidin-biotin cooperation using MOSFET arrange. Because of the high limiting inclination, biotin-streptavidin is an extraordinary model structure for endorsement of any new biomolecular disclosure arrange. Help; in light of the fact that various proteins can be expeditiously biotinylated, it furthermore acquaints a sensible model system with research the potential for new acknowledgment organize for protein-protein confining events. The ponder ID versus VDS qualities for n-MOSFET-embedded transistor, at VG=5V, shows a unimportant change in ID (Fig. 2) when the streptavidin immobilized gold little scale cantilevers are submerged in PBS. Littler scale cantilever contorting as needs be of streptavidin-biotin limiting prompts lessens in ID as gathering of biotin addition from 100 fg/ml to 100 ng/ml. The contorting results from augmentation in compressive nervousness happening on account of the stunning electrostatic or steric intermolecular participation. No exhaust current change was seen in SiNx cantilevers with biotin, where no coupling events happened.

CONCLUSION

We trust that MOSFET-inserted smaller scale cantilever approach ushers another time in detecting innovation, whereby rising bio-nano structures can now be promptly incorporated on a set up and demonstrated CMOS building stage.

Ethical Clearance: Taken from AMET University

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Conflict of Interest: NIL

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Gamma Spectroscopy: High Resolution CAM for Imaging in Nuclear Physics

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ABSTRACT

In Nuclear science essential research and, especially, in gamma spectroscopy, the utilization of an imaging pioneer can be to an exceptional degree steady to reduce the Doppler Broadening influence in examinations where the gamma-bar source moves with high speed. In this work, we propose to utilize a beginning at starting late made gamma camera, in context of scintillator coupled to an arrangement of Silicon Drift Detectors, for such kind of tests. The camera, fittingly changed as per conform to high noteworthiness territory, has appeared, in preparatory estimations with a one cm thick scintillator, a spatial confirmation of two millimetre with a collimated source.

Keywords: Nuclear, Gamma rays, Scintillator, Doppler

INTRODUCTION

In nuclear material science basic research and, particularly, in gamma spectroscopy, the usage of In nuclear physical science major research and, particularly in gamma spectroscopy, the position affectability of an identifier is to an amazing degree vital to diminish the Doppler Broadening influence in examinations where the gamma-column source moves with high/relativistic speed. Such impact winds up perceptibly more noteworthy as the v/c of the source increments or the separation source-marker reduces. The standard is appeared in Fig. 1. The confinement of the gamma-bar affiliation district inside the profitable stone will diminish and right such impact recouping the trademark presentations of the locators [1]. In this way, gamma-column locators that could give high position confirmation in this high-hugeness range could be expected to be utilized to recuperate from Doppler developing. In this work we propose the use of a gamma camerain light of Silicon Drift Detectors to experience its unprecedented execution to the degree spatial confirmation for the sort of its usage.

Fig. 1. Principle Architecture

The HICAM gamma camera, used for this appraisal, has starting late demonstrated incredible shows for low-essentialness gamma-bar imaging by...
virtue of its high inalienable assurance [2]. To improve the affirmation capacity at high energies, a sensible gem thickness ought to be picked. Additionally the optical treatment of the profitable stone sides acknowledges an essential part in the camera appears. Current channelling in time-domain airborne electromagnetic data [3] this paper described the time domain based electromagnetic data performed with the scintillator of one cm thickness, covering the sidelong backings a retentive dull tape and changing the material for the top. The dull sides have been gotten a handle on to permit a fundamental duplication with a centroid technique, in spite of the way that they lessen the light hoarding and along these lines intensify the vitality confirmation. Inversion of airborne EM data using thin-plate models [4] described the review concentrated especially on two principal materials: diffusive and reflector coatings. A uniform illumination with a gamma source was made to assess the light storing up, separating the electrons acquired in both spectra. The measure of electrons is immediate identified with the measure of photons collected by the SODs structure and contribute clearly in both spatial and importance confirmation. Minesite groundwater contamination mapping [5] described the underwater contaminations for spectroscopy.

RESULT AND ITS DESCRIPTION

A test was finished adjusting the point between the course regular to the region plane and the collimated section, moving the collimated bar it. With a specific genuine target to check the structure capacity to see the shaft heading, five estimations were performed at around 5 types of degrees. Since the centroid methodology doesn’t permit an era along the Z focus point, the photographs demonstrate genuinely the projection of the shaft on the XY plane as it [6-8]. Developing the point prompts an improvement of the projection length. A relative test was repeated illuminating the scintillator from the short side. The light was made in two focuses, one nearer to the upper surface, and one nearer to the base surface. The XY pictures relating to the two light spots are appeared in Fig. 2 and Fig 3. While the estimation nearer to the top is all around duplicated, the other one demonstrates a not acceptable picture, because of the limitation of the centroid technique. As a general rule for this situation, gamma occasions make light to just few SDDs near the brilliance point, which has an unmistakable weight in the centroid condition. In like manner the focuses are manoeuvred into the fixations encompassing five clear issue ranges.

![Fig. 2. Exponential absorption of Gamma Rays](image1)

![Fig. 3. Irradiating the scintillator from its short side](image2)

Future Works

Trial tests with various significant stones and more prominent thickness will be done and specific optical pharmaceuticals will be gotten the chance to overhaul the centrality affirmation. Exact techniques will be besides utilized for the stimulation of the position of affiliation. Centroid-based estimations, truly, would exceedingly repel the imaging shows for more prominent thickness degree foreseen that would amass productivity of the pioneer.

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Image Denoising Using Dual Tree M-Band Wavelet Transform

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ABSTRACT

Image denoising is process of removing the noises from an image that are added to it by means of manually or naturally. In this paper presents an image denoising scheme based on the wavelet transform called as Dual Tree M-Band Wavelet Transform (DTMBWT) is discussed. The noise that is added in this scheme is the Gaussian noise. By using the soft thresholding the noise image the co-ordinates of the image can be altered and the noise can be removed and the retrieval of the original image can be obtained by inversing the wavelet function (i.e., IDTMBWT) scheme. Finally SNR, PSNR values for noised and denoised images are calculated to measure the performance of out denoising scheme.

Keywords: Image Denoising, DTMBWT, Gaussian, IDTMBWT, PSNR

INTRODUCTION

Image denoising is one of a significant image processing task, in the field of computer applications. There are many a type of denoising methods are available and some of them are reviewed below. In order to remove the noise from the camera raw image as image denoising algorithm based of fuzzy block matching is discussed. This approach is used to find the similar blocks by the use of type-2 Fuzzy Logic System (FIS). Then the similar blocks are averaged by weighting are obtained by FIS

Group LowRank Representation (GLRR) based image denoising system is explained. In this the corrupted HSI is divided into overlapping patches and joined together into a group for reconstructing a whole image by means of low rank representation. The paper is about that the photons limited rule in processing the image that stats the number of photon present in bits per pixel is usually binary. This acts as a Bayesian denoising method for binary photon images and single-photon images.

For the minimization of noises in ultrasound images as method based on fully driven data extension is explained. In this a hyperbolic wavelet transform is calculated before applying astabilization of multiscale variance approach by means of Fizz transformation.

A HSI denoising system based on Monte Carlo sampling (MCS) is discussed in. This approach makes the image to incorporate on both spectral information and spatial information for denoising of HSI images. In order to guide the extraction rule for end member’s spatially homogenous regions the system discussed uses the SSPP prior for spectral immixing. The extraction of endmember’s enhanced calculation leads to enhancement of denoising estimation.

PROPOSED METHODOLOGY

Our proposed methodology is based on the image denoising process by means of the DTMBWT algorithm. Here the system consists of steps like adding Gaussian noise to the original images and the decomposing it by means of DTMBWT algorithm. After a soft thresholding method is used to change the co-ordinates and then the original image can be obtained by using the inverse operation of DTMBWT process. The complete framework of our approach is as shown is fig 1.
CONCLUSION

Our proposed system is a new image denoising method that is based on a wavelet transform known as DTMBWT. The noise added here is the Gaussian noise and is decomposed by DTMBWT process. By soft thresholding method the co-ordinated of the images are altered and then the noises are removed by using IDTMBWT. The method is tested on well-known standard images, in which their peak to signal noise ratio and root mean square error values can be calculated to analyze the performance of our image denoising method.

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Conflict of Interest: Nil.

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Largeinformation Issues in Computational Chemistry

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ABSTRACT

Advanced information have turned into a deluge immersing each zone of business, science and building disciplines. In the time of Big Data, getting qualities and bits of knowledge from a lot of information utilizing rich examination turns into a vital separating ability for intensity, achievement and administration in each field. Researchers and specialists of various areas are progressively clamoring for components to oversee and break down the enormous amounts of data now accessible keeping in mind the end goal to get new answers and concentrate from it greatest esteem. Computational displaying and reenactment is the focal innovation to several of these spaces. Subatomic Dynamics (MD) is a computational reenactment system that portrays the physical powers and developments of interfacing minute components such IoT’s and particles. MD has essential applications in the fields of science, biotechnology, pharmaceutical industry, vitality, atmosphere or materials science, among others. Propelled MD calculations incorporate Molecular Mechanics (MM), as well as Quantum Mechanics (QM) approaches, raising essential huge information challenges still to be dealt with. MD reproductions play out an iterative procedure producing a lot of information in spilling. Current programming innovation is a long way from having the capacity to oversee, dissect and envision the to a great degree substantial and complex informational indexes created by critical sub-atomic procedures. This paper investigates the current enormous information constrains in the Computational Chemistry field, particularly in the MD forms. To beat these testing circumstances, this work give direction to future research incorporating propels in adaptable calculations for information investigation, dynamic inquiry innovation, information models and capacity techniques, parallel executions, I/O improvement, and intelligent visual investigation what’s more, investigation of MD information.

Keywords: Big Data; Computational Chemistry; Molecular Dynamics; Quantum Mechanics

INTRODUCTION

The idea of Big Data for the most part alludes to information that surpasses the preparing limit of traditional database frameworks. Information is too huge, moves to too quick and additionally does not fit in established database based models [1]. To address these new difficulties, inquire about advancement on versatile parallel and adaptable calculations is essential [2]. Computational displaying and reproduction are vital to various logical and designing areas, being a decent case of Big Data era and examination [3]. Fundamental reproduction information is regularly 4D (three spatial measurements and time), yet extra factor sorts, for example, vector or tensor fields, various factors, different spatial scales, parameter studies, and instability examination can build the dimensionality. Work processes and frameworks for interfacing, stockpiling, overseeing, picturing and examining this information are as of now at the limit [4]. Furthermore, as calculations develop in many-sided quality and constancy and keep running on bigger PCs and groups, the investigation of the information they produce will turn out to be all the more difficult still [5]. A generally perceived utilization of computational reproduction is in Molecular Dynamics (MD). MD is a strategy situated in factual mechanics to process the harmony and transport properties of a many body framework. It portrays the physical powers and developments of connecting infinitesimal components such IoT’s and atoms [6]. The frameworks are, by and large, exceptionally complex in their connections and
shaped by an extraordinary number of particles. As an outcome, it is typically difficult to portray their properties in a diagnostic way, so MD utilizes the numerical strategies to accomplish an approximated arrangement of the issue. They can give the positions and speeds of all particles at each time-step and can be utilized to address particular inquiries concerning the infinitesimal and perceptible properties of a model framework. It makes them an important instrument that reveals insight into spots and issues that are not really available by different strategies being of extraordinary enthusiasm for some territories of science, biotechnology, vitality, pharmaceutical industry or materials science, among others[7].

Sub-atomic DYNAMICS BIG DATA CHALLENGES

MD reenactments give to a great degree huge and sensibly complex informational collections and streams, raising essential computational and specialized huge information challenges [11]. MD reproductions consider the developments and interrelations of tiny components, for example, IoT'sand particles giving in every cycle practical extensive volumes of information, relating to the directions of IoT'sand atoms. MD recreation comprises of numerically fathoming the established conditions of movement for an accumulation of collaborating particles [8]. For doing this, it is required some law depicting the common connections between the particles in the framework. This law is as a rule obscure, yet it can be approximated with various degrees of precision and authenticity by a compel field or it can be demonstrated by methods for electronic structure count [9]. From the entrenched tenets that oversees the material science of the framework and given the underlying places of the particles, the powers following up on each molecule are ascertained from complex scientific condition. This is the most tedious piece of all MD [10]. When every one of the powers had been figured, the new positions are assessed by propelling the reenactment a period step (regularly just 1 or 2 quadrillionths of a moment), and the procedure is rehashed (commonly a large number of time) to accomplish the characterized time scale, as of now constrained to milliseconds for little procedures. For instance the investigation of basic glasses ought to require a framework with 8 x 1010 particles and 107 emphaseses [12]. The space required to store the data of a straightforward iota in every cycle is 0.1 Kilobytes approx. Along these lines the reenactment would be creating on continuous 0.01 kb/particle x 8 x 1010 iotas = 80,000,000,000 Kilobytes for each cycle. Accepting that the current most advances frameworks would be capable of deal with this procedure, the emphasis speed would be going from 0.1 to 10 seconds which implies that the frameworks ought to have the capacity to oversee around 75 Terabytes of data for each second and an aggregate sum of information of 710 Exabyte’s[13]. One of the non specific testing objectives of elite MD reproductions is to display critical atomic procedures that happen on the millisecond time scale—around two requests of size past the span of the longest current MD reenactments, and produce the best possible stockpiling, connection, perception and investigation offices for these truly a lot of information[14]. These MD reproductions are perplexing, expensive and set aside long opportunity to wrap up. Capacity to do incremental investigation of information inside the reproduction, for instance, to break down directions when they are made is a rousing test and furthermore a major in addition to contrasted with current innovation. It would abstain from squandering exorbitant assets (time and figuring exertion) when the running examination is not lined up with the normal outcomes. The inhibition action of Formazan Derivatives on the corrosion of mild steel in hydrochloric acid medium was proposed and analysed in [16].
addition to contrast with current instruments. The communication of such live investigation would give the abilities of including/erasing/changing the sort of examination that is being made on the reproduction. To accomplish those objectives, progressed intuitive continuous inquiries for huge information streams are required [15]. Programming framework for parallel imitations. The restricted length of a MM MD recreation does not guarantee that the sum total of what states have been investigated, and subsequently, amounts that are assessed amid a MD are not generally completely met. To associate bitterly the test in research facility at atomic level to what is seen at plainly visible level, it is important to run and handle (checking, treat failover, and so on.) a large number of MD reproductions in parallel (imitations). The present MM MD reproductions utilize one to two or three many imitations so it is as yet a test to make utilization of exascale registering to deal with 103 – 106 copies, each utilizing parallel HPC assets, and make parallel HPC assets convey in a productive way so as to screen and to quicken factual meeting towards some coveted properties [16]. Visual exploratory examination. Current representation instruments for MM MD recreations need on coupling the perception motor to conveyed examination. Accordingly, examination should be possible just successively, i.e. by stacking and investigating precomputed comes about which can represent a trouble when numerous directions should be examined. New strategies are expected to intelligently investigate and break down vast scale and long haul MM reenactments both continuously and disconnected.

QM MD situation Data stockpiling

Because of the intricacy of MD QM techniques, not all data in QM MD recreations can be put away. Insights are performed on a subset affecting the nature of results that are gotten. Along a solitary direction, the data produced is in the petabyte arrange (N increased by 107 octets for each reenactment step, where N = number of particles). It is vital new information models and information stockpiling answers for effectively store and examination of the Exabytes of data that will be produced along QM MD reproductions.

CONCLUSION

The overall limitations of MD reenactments were dissected calling attention to the absolute most applicable issues that need to show signs of improvement and how they could be profited by Big Data arrangements. We infer that the treatment of huge measure of data created by the MD recreations require new information models, inquiry innovations and capacity answers for the propelled examination over gigantic information permitting intelligent investigation of the information archive. Likewise, an ongoing inquiry of dynamic extensive informational collections could be a superior answer for manages a lot of information in spilling created by MD reenactments. In addition, the MD examination could be enhanced through a novel profoundly adaptable and intelligent work process giving moment visual criticism.

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Maritime Bureaucrats at Ocean: Crisis Occurrence and Necessity for Health Working Outs

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ABSTRACT

On dealer ships, the restorative treatment including crisis mediations on the high oceans are done by maritime bureaucrats who need to pass a 40 hours therapeutic refresher course like clockwork so as to meet global necessities. This examination intends to demonstrate the most incessant sorts of therapeutic crises on the high oceans and to evaluate the seafarers’ learning about their treatment. Four-sixty-fivemaritime bureaucrats who taken an interest in the restorative refresher course at the Institute for Occupational and Maritime Medicine in Hamburg, inside the period from 2006 to 2013, were met about their experience of genuine infections and mishaps on load up, which had prompted a crisis port call, a course deviation or a departure. Besides, before the course the bureaucrats were made a request to answer eighteen fundamental therapeutic inquiries concerning normal restorative issues on board. As indicated by this investigation, genuine crises on board are most much of the time identified with injury or cardiovascular maladies. Considering the procured restorative learning, there is by all accounts a need to prepare deck bureaucrats inside these fields all the more seriously. Considering the learning of seafarers about therapeutic issues specifically before going to their restorative refresher course, the five years interim with no type of refresher course seems, by all accounts, to be too long to ensure satisfactory medicinal treatment by the lay people on board.

Keywords: Healthcrisis on the High oceans, Health Refresher course Maritimebureaucrats Enlightening Contents.

INTRODUCTION

Marine represents a high hazard occupation inside a disengaged domain. As indicated by late tele medicinal reports, the most as often as possible watched restorative crises were identified with surgical (forty-six percent), inner (twenty-seven percent) and urological (six percent) wellbeing issue. While on traveler and bigger research transports a ship’s specialist is compulsory and mindful, on dealer vessels the therapeutic treatment of these ailments, including crisis mediations, is completed by maritime bureaucrats, the chief and his substitutes who are, actually, restorative laymen. Consequently, all maritime bureaucrats on seagoing vessels get propelled restorative preparing as a major aspect of their examinations at oceanic colleges/institutes[1-3]. The fundamental abilities that must be accomplished by the bureaucrats are composed down in universal prerequisites. The most critical universal prerequisite for preparing guidelines as a rule are the Standards of Training, Certification and Watch keeping (STCW) discharged by the International Maritime Organization (IMO). Any seafarer, including appraisals, who needs to join a dealer vessel, must demonstrate that he meets the base norms of competency in rudimentary emergency treatment to make quick move after experiencing a mischief or other medicinal crisis[4].

Furthermore, bureaucrats must be prepared in therapeutic care and the treatment of harmed people while they stay on board. The restorative degree ranges from applying wraps, setting an intravenous get to, suturing wounds and directing solid painkillers. Model tests of ocean nutrient enhancer “TAKUMI” in deep-sea basin [5]. Application of Geographic information system to calculate the probability of piracy occurrence [6]. Inside the structure of the underlying therapeutic training at college which comprises of more than one-twenty hours of educational cost, the future
bureaucrats find out about life systems, every now and again happening infections, tropical ailments, general patient care, pharmacological rudiments, revival, hypothermia and the capacity to take a total medicinal history for tele restorative guidance[7]. The pronouncement of social insurance will be supplanted by another “Oceanic Medicine Regulation” which is as of now passing an endorsement procedure by the German parliament. Inside this new direction, the five year interim and the forty hours term for therapeutic refresher courses will stay unaltered. This brings up the issue whether this period is fitting to guarantee that the bureaucrats in charge of medicinal services can oversee therapeutic crises adrift adequately. In this way, this examination intends to assess the information of seafarers about therapeutic issues, specifically before going to their restorative refresher course as directed by law.

**METHOD**

**Investigating Assemblage**

Inside the period, the Institute for Occupational and Maritime Medicine in Hamburg performed forty-one therapeutic refresher courses with four-sixty-five maritime bureaucrats. These bureaucrats were made a request to take part in the present willful investigation. It was ensured that the seafarers’ outcomes in this unknown review would not have any impact on the issue of their testament of Health Care. All the maritime bureaucrats requested that concurred partake.

In Germany, there are ten medicinal refresher courses endorsed by the branch of wellbeing in charge of every government state. As maritime bureaucrats on an excursion more often than not pick a preparation foundation near their place of living arrangement it is expected that the members of the Hamburg Health Refresher Course are illustrative of maritime bureaucrats in Germany.

Despite the fact that it can’t be barred that a few members had changed their vessel sort or their voyage course over the span of time, in the creators’ experience it is likely that by far most of the bureaucrats analyzed held their usual working spot and zone of exchange amid their word related profession.

**Survey**

Straightforwardly before going to the Hamburg therapeutic refresher course, the seafarers were made a request to fill in a poll with respect to medicinal points. In its initial segment, the bureaucrats were met about their experience of genuine infections on board; these were characterized as intense wellbeing issue or miss-chances which had prompted a crisis port call or change of the arranged course; for instance to exchange an evil subject by helicopter. In the second piece of the survey the bureaucrats were asked for to answer eighteen fundamental restorative inquiries that had been produced by three doctors with long-lasting knowledge in the field of sea prescription. The issues reflect subjects of the base guidelines of seafarers’ (therapeutic) instruction given inside the universal Standards of Training, Certification and Watchkeeping. They were identified with the principle orders of inner and surgical pharmaceutical and additionally two inquiries to pertinent to the oceanic themes of toxicology, irresistible ailments, hypothermia and medicinal treatment that represents a solid test for the restorative layman, for example, thorax pressure or bladder cut. In view of tele-medical encounters adrift, in this examination most inquiries alluded to surgical and inward points, as these were the dominant part of crises and experienced ailments on board dispatches. At long last, the maritime bureaucrats were made a request to state how very much set they up felt to adapt to a therapeutic crisis utilizing school marks from one to five, where one is the best and five is the most noticeably awful review.

**RESULTS AND DISCUSSION**

A sum of one-three-three seafarers (twenty-eight point six percent) announced that they had already been faced with no less than one genuine medicinal crisis - with a normal number of one point six (from one to eight). The lay answers of the seafarers have been perceived inside the accompanying sub-classes, in diminishing request: injury, cardiovascular maladies, extreme gastrointestinal ailments, genuine skin or pneumonic contaminations, neurological, and urological illnesses and also consumes. Abridging cardiovascular illnesses, extreme gastrointestinal sicknesses and urological ailments as inner infections (thirty-eight percent) and injury as surgical maladies (thirty-eight percent) demonstrates that the fundamental piece of genuine therapeutic crises adrift can be found inside these two fields.
With reference to the essential therapeutic inquiries, a normal of seventy point seven percent of the aggregate score had been accomplished (from twenty-six point eight percent to hundred percent). Over ninety percent of the seafarers gave revise answers to toxicological and irresistible inquiries, while inner and surgical inquiries and in addition those about hypothermia and therapeutic treatment were addressed accurately by sixty percent to sixty-five percent of the members.

**CONCLUSIONS**

As indicated by this examination, genuine crises on board (prompting deviation to a crisis port call) are most much of the time identified with injury or cardiovascular sicknesses. Considering the worldwide least guidelines set up by the Standards of Training Certification and Watchkeeping and the obtained restorative information, there is by all accounts a need to prepare deck bureaucrats inside these fields all the more seriously. Considering the information of seafarers about restorative issues straightforwardly before going to their medicinal refresher course, the five years interim with no type of refresher course has all the earmarks of being too long to ensure sufficient therapeutic treatment by the lay people on board. In Germany, low-qualified emergency treatment suppliers - that are legitimately required in each organization aground - need to go to an underlying medical aid course of sixteen hours length and an emergency treatment refresher course no less than at regular intervals. In examination with these emergency treatment suppliers to seafarers, a two year interim for refreshing the seafarers' medicinal learning shows up likewise to be proper.

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is schwerer Unfälle und der häufigsten Erkrankungen an Bord; Diplomarbeit Sommersemester 2009 (Doctoral dissertation).
Model of Fuzzy Recognition Based on the Syndrome Differential Method

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ABSTRACT
According to the disorder separation arrangement of five zang-organs, consolidated with moving toward rule in the fluffy science, the fluffy acknowledgment model of heart framework essential disorder was set up initially, and afterward the program was composed in view of this model. 200 restorative records of heart framework were tried reflectively with the program. Result: The exact rate of disorder separation program was 84.5%. The nonlinear mapping between heart essential disorders and manifestations could be recreated by utilizing fluffy acknowledgment. The possibility of this paper could be connected to disorder separation arrangement of five zang-organs, which would give system to disorder institutionalization.

Keywords: Syndrome Differentiation Model, Fuzzy Recognition, Syndrome Elements

INTRODUCTION
The disorder separation arrangement of five zang-organs concentrates the fundamental disorders with single illness area and sickness include initially, and after that arrangements with the mind boggling and variable disorders essentially by naturally consolidating the essential disorders. Disease location characters and basic syndromes of five-zang system is discussed [1]. In any case, there are a few variables preventing the advancement and use of this disorder separation framework. For instance, to begin with, the manifestations are depicted fuzzily; second, there are intricate nonlinear mappings from side effects to disorder components; third, there are mind boggling mix rationales from disorder components to the essential disorders; et cetera. Fuzzy mathematics and syndrome differentiation and treatment of TCMare described [2]. Fluffiness alludes to the non specific fluffy character of the things, showing the exhibited “both various stuff” in the move of the things’ distinction. Syndrome element characteristics and its correlation with coronary angiographyare explained[3], TCM terms are constantly portrayed fuzzily, for example, anorexia, weakness, stomach distension, tight heartbeat, and so forth. Subsequently, disorder separation is a procedure of fluffy arrangement in the perspective of fluffy science. Fuzzy set theory is discussed [4]. N dimensional arrange framework is set up in n dimensional Euclidean space, where each organize pivot relates to a manifestation and the Fuzzy C strange points clustering algorithm. Disease location characters and basic syndromes of heart system are described [5]. At the point when some indication is certain, the relating pivot is 1, generally 0. Along these lines, a gathering of side effects compares to a point in this space. A genome-wide association study identifies two new risk loci for Graves’ disease is discussed [6]. For n side effects, there is an arrangement of 2n focuses. Take this set as a universe X, X={x1, x2, x3, ..., x}. Disorder is an obsessive speculation of illness areas and components in the present stage. Fuzzy C strange points clustering algorithm is described [7]. Since there are fluffy mappings from side effects to disorder components, if the diverse ailment areas and elements are viewed as various fluffy subsets in X, the reasoning of TCM disorder separation is changed to a question: how comparable are the patient’s clinical appearances to the changed fluffy subsets. Survey on fuzzy Petri nets for classification and Glaucoma detection using Fuzzy C-Mean (FCM) are discussed by [8, 9].
Establish the fuzzy recognition model of TCM syndrome differentiation

Evaluate TCM syndrome elements

Master survey of heart framework disorder components was created. The indication record was isolated into five classifications and given weights by significance: 1(VI), 0.75(I), 0.5(C). At that point 21 specialists of TCM diagnostics were welcome to assess the significance of indications in every disorder component separately.

Confirm memberships between symptoms and syndrome elements

Table 1: The Membership between symptoms and syndrome element

<table>
<thead>
<tr>
<th>No.</th>
<th>Night Sweat</th>
<th>Mild Fever</th>
<th>Intermittent fever</th>
<th>Fast pulse</th>
<th>Thread pulse</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.75</td>
<td>0.75</td>
</tr>
<tr>
<td>2</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.75</td>
<td>0.50</td>
</tr>
<tr>
<td></td>
<td>0.75</td>
<td>0.75</td>
<td>0.75</td>
<td>0.25</td>
<td>0.25</td>
</tr>
<tr>
<td>20</td>
<td>1.00</td>
<td>0.75</td>
<td>0.75</td>
<td>0.25</td>
<td>0.25</td>
</tr>
<tr>
<td>21</td>
<td>1.00</td>
<td>1.00</td>
<td>0.75</td>
<td>0.25</td>
<td>0.75</td>
</tr>
<tr>
<td>Validation</td>
<td>1.00</td>
<td>0.93</td>
<td>0.88</td>
<td>0.63</td>
<td>0.58</td>
</tr>
</tbody>
</table>

Establish fuzzy recognition model

Fluffy acknowledgment of infection areas and components had a place with gathering acknowledgment, and could be acknowledged with moving toward standard. It incorporates the accompanying strides: first of every single, fluffy arrangement of infection areas and elements were built up with L.A.Zadeh technique. The fluffy arrangement of infection areas was depicted as (2) and the fluffy arrangement of illness components was (3) (take note of: The sign “∈” and “/” were not whole of divisions, but rather the images for components and participation of fluffy sets)

\[
L = \sum_{i=1}^{n} \frac{W_{L_i}}{X_i} \quad (2)
\]

\[
P = \sum_{i=1}^{n} \frac{W_{P_i}}{X_i} \quad (3)
\]

Indications of a patient could be viewed as a fluffy set B of the universe X. The nearby degree amongst B and L, B and P was processed. The higher the nearby degree was, the more comparable the two sets were. In the event that a fluffy set was characterized as \(D_{B,A} = \{A_k \mid \sigma(B, A_{k}) \in [1,n]\}\), combinations of (B, L)and (B, P) shaped the fundamental disorder \(Z\) and were skimming limits, contingent upon the constitution, etiology, infection condition and situation. There were most likely a few ailment areas and elements that coordinated the condition above. The last disorder was a natural blend of various fundamental disorders made out of infection areas and components. The condition of close-degree was appeared as (4).

\[
\sigma(B,A_k) = \sum_{i=1}^{n} \min(B(x_i) \land A_{k}(y_i)) / \sum_{i=1}^{n} \max(B(x_i) \lor A_{k}(y_i)) \quad (4)
\]

Applications of TCM fuzzy recognition model

In light of above fluffy acknowledgment show, a program was outlined with Windows Presentation Foundation. It contained 125 side effects, 22 basic disorders of heart framework, 417 ordinarily utilized Chinese herbs, 24 fluffy enrollment elements of disorder components. The running procedure of this program was appeared in figure 1.
CONCLUSION

TCM finding is nonlinear, fluffy and complex. Along these lines, it is hard to ponder by customary scientific measurements or information mining. New strategy in light of speculations of TCM ought to be intended to manage the subjective fluffy calculates TCM conclusion. Under the hypothetical direction of disorder separation arrangement of five-zang organs, the fluffy acknowledgment model and program of TCM heart framework fundamental disorders were built up as indicated by the hypothesis of fluffy acknowledgment. Review examination had demonstrated that the TCM fluffy acknowledgment model could acquire dependable outcomes. It was the way to this model enrolment capacities ought to be characterized sensibly. There are such a variety of components that have affect on disorder separation, in this way, we ought to thoroughly examine and contrast the elements of various strategies with manufactured participation capacities, for example, master’s judgment, expository chain of importance process, fluffy multivariate measurable, and so forth. The possibility of this paper could be connected to disorder separation arrangement of five zang-organs, and make commitments to TCM disorder institutionalization and data.

Ethical Clearance: Taken from AMET University, committee.

Source of Funding: Self.

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REFERENCES

Estimating Probability Distributions in Mutual Information Using Empca Approach

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ABSTRACT
Mutual information (MI) has been widely used as a similarity measure in medical image registration (MIR) for more than a decade. Preliminarily, a number of bins, which is used in evaluating the probability distribution of grey levels, have influenced the performance of MI. Consequently, it can influence the precision of MIR and may prompt a wrong therapeutic conclusion. In an examination of pictures from various modalities, it is more tests to pick such an ideal number of receptacles. With a specific end goal to fulfill such a test, we propose another cross breed strategy in light of the procedure of a desire augmentation for primary segment examination (EMPCA) and the idea of Scott’s manag. We have analyzed and evaluated our approach based on MRI images: T1, T2 and PD. The experimental results have shown that this approach can find a more appropriate bin number which can improve the performance of MI in terms of its accuracy compared to others.

Keywords: Mutual Information; EMPCA; Scott; Probability Distributions

INTRODUCTION
MI computation is based on the probability distributions of the intensity values in those medical images [1]. To compute probability, the intensity values are divided the frequencies of them into the bin (range of values). The bin number is an important parameter, which can influence the reliability of MI computation [2]. The bin number that is too large may result in the loss of crucial information. On the other hand, the bin number that is too small may result in unreliable data [3]. Therefore, finding an optimal bin number is an important issue in MIR [4].

In the range of remote detecting picture enrollment, impacts of histogram binning have been proposed to concentrate the heartiness of MI and standardized MI. The receptacle numbers utilized as a part of their review are from 4 to 256 [5]. In any case, those past works have connected the settled container numbers in figuring MI, and this can impact the enrollment comes about and computational time in inflexible changes [6]. Also, when multimodal pictures with various powers concern, it is hard to have a proper determination of a canister number for each picture [7]. In light of the thought of versatile receptacle number determination, Sturge’s administer is one of a notable approach on the choice of histogram canister number. It can enhance the precision and proficiency of MIR [8].

For the probability distribution calculation, which combines EMPCA and Scott’s rule? The advantage of EMPCA solves the sensitivity of the Scott’s rule to grey levels in medical images.

The Notion of Mutual Information
where \( H(A) \) and \( H(B) \) are the marginal entropies of \( A \) and \( B \) respectively, \( H(A, B) \) is the joint entropy, and \( H(A|B) \) and \( H(B|A) \) are the conditional entropies of \( A \) given \( B \) and of \( B \) given \( A \) respectively.

\[
H(A) = - \sum_{x \in A} p(x) \log p(x) \tag{4}
\]

\[
H(B) = - \sum_{y \in B} p(y) \log p(y) \tag{5}
\]

\[
H(A, B) = - \sum_{x \in A, y \in B} p(x, y) \log p(x, y) \tag{6}
\]

\[
H(A|B) = - \sum_{x \in A} p(x|B) \log p(x|B) \tag{7}
\]

\[
H(B|A) = - \sum_{y \in B} p(y|A) \log p(y|A) \tag{8}
\]

where \( p(a) \) and \( p(b) \) are the marginal probability distributions and \( p(a, b) \) is the joint probability distribution. \( I(A, B) \) or MI is a measure of the degree of mutual dependence between the two random variables \( (A \) and \( B) \). However, MI can be expressed as a Kullback-Leibler measure which is not defined in terms of entropies but distance between the joint distribution \( p(a,b) \) and the distributions related to complete independence \( p(a)p(b) \), as shown in (9).

\[
I(A, B) = \sum_{a \in A} \sum_{b \in B} p(a, b) \log \frac{p(a, b)}{p(a)p(b)} \tag{9}
\]

**Hybrid EMPCA-Scott Algorithm**

The hybrid EMPCA-Scott algorithm is the selection of bin number in the calculation of MI by combining the EMPCA [11] and the modified Scott’s rule as shown in Fig. 2. Our proposed algorithm is provided in Table I. The first step involves extracting some important information from the source image. By using EMPCA [11], the random vector \( PC \) of intensity values in source image \( S \) are generated by the dominant PCA eigenvector. In step 1.4, the E-step, the random vector \( PC \) is used in finding the coefficients \( c \) which are best fit to observations \((s)\). Step 1.5, the M-Step, uses those coefficients \( c \) to update the random vector \( PC \) to the minimum.

**Experimental Evaluation and Results Discussion**

In the assessment of our trial, we utilize MRI T1, T2, and PD pictures (223×187 pixels) of brains [9] as the source and the objective pictures. Furthermore, we embrace the current methodologies presented in the test keeping in mind the end goal to contrast their outcomes and our proposed calculation depends on evaluating the canister number \( k \) of the likelihood appropriation of MI computation in non-unbending picture enlistment (see Fig. 3).

It can be observed that our proposed algorithm has produced lower registration errors than other adaptive bin number selection approaches [7-8] in the cases of T1-T1, T2-T1, T2-PD, PD-T1, PD-T2, and PD-PD registrations (see Fig. 4 for visual assessment).
CONCLUSION

In this study, we have proposed the hybrid EMPCA-Scott algorithm for finding the bin number in the probability distribution estimation of MI. Our approach can lessen the impacts of the dark level on MI figuring based MIR. In our future work, we will adapt our approach to other MI techniques, e.g., normalized MI, conditional MI and second-order MI, in order to improve their performance, and we will compare them on both rigid and non-rigid image registration.

Ethical Clearance: Taken from AMET University, committee.

Source of Funding: Self.

Conflict of Interest: nil.

REFERENCES

Natural Lifeevaluation of the Nanophosphate Lifepo 4/C Battery Chemistry Used in Electric Vehicles

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2Professor, VidyaaVikas College of Engineering & Technology, Tiruchengode

ABSTRACT

There is currently many different lithiumion chemistries available on the market and several newplayers are in the research and development process;however, none of them is superior to the other chemistriesin all aspects. Relatively low price, long cycle and calendar lifetime, and intrinsic safety of the nanophosphate LiFePO4/C lithium ion chemistry make it possible to consider this chemistry for electric vehicle applications. This paper investigates the lifetime of the nanophosphate LiFePO4/C battery chemistry when it is used for full electrical vehicles. The investigation is performed considering a semi-empirical calendar and cycle lifetime model, which was developed based on extended accelerated lifetime tests. Both capacity and power capability degradations during calendar and cycle life ageing are considered and quantified. Finally, the developed battery cell lifetime model is used to study the capacity and power capability degradation behavior of the tested nanophosphate LiFePO4/C battery for two electric vehicle operational scenarios.

Keywords: Batteries, Electric Vehicles, Lifetime Estimation, Lithium Ion.

INTRODUCTION

Recent improvements in lithium ion (li-ion) batteries make electrically propelled vehicles a more realistic concept than it was several years ago [1]. Especially improvements in li-ion batteries lifetime, safety, power and energy density were crucial and currently almost all commercial car manufacturers are developing their own fully electric vehicle (EV) based on this battery technology. However, even though many parameters of li-ion batteries have been improved, EVs are still inferior in comparison to the traditional combustion engine cars particularly when it comes to their range, battery lifetime, safety, and refuelling time.

The family of li-ion batteries is broad and a lot of different chemistries are currently available on the market; furthermore, there are several chemistries in the early development or research stage [2]. The choice of the particular chemistry gives li-ion battery unique characteristics and limitations. Many research papers benchmark these technologies in context of their suitability for the EVs [3-5]. Nevertheless, due to many different aspects, which have to be taken into account, it is still very difficult to bring different lithium ion technologies to a common denominator and assure a fair comparison between them (Fig.1). Since the first development in 1996 [6], the importance of the lithium iron phosphate (LFP) based batteries has continuously grown, particularly in the last years. Currently, despite of their lower energy density, batteries with LFP cathode are starting to be considered also for fully EVs. This is due to their superior characteristics like long cycle and calendar lifetime, high power capability (during both charging and discharging), intrinsic safety, low self-discharge rate and very flat discharge curve, which allows for the availability of maximum power in the wide range of the SOC interval [3]. Different aspects of the suitability of LFP/C batteries for electric vehicles have been extensively studied in
The focus of this paper is to study the lifetime of nanophosphate cathode based li-ion batteries when they are used in fully EVs. The studies are performed based on semi-empirical lifetime models developed from accelerated lifetime degradation testing of the nanophosphate LiFePO4/C battery cells. The tested nanophosphate battery cells have unique performance in comparison to standard LFP/C cells, offering higher power, excellent safety, longer life and greater usable energy [10]. 

**METHODOLOGY**

The lifetime of commercial LiFePO4/C cells is in the range of years depending on the operational conditions. Moreover, operational stresses for the batteries, which are propelling EVs, are difficult to determine because they depend on the climate in which the EV is operated and the style of driving. Thus, determining the lifetime of these batteries is a difficult and time-consuming process, which requires extensive laboratory tests. Consequently, it is much more appropriate and less time and energy consuming to perform accelerated lifetime testing of the battery cells at different operating conditions, rather than test them and normal operating conditions.

There can be distinguished two main contributions to ageing of the li-ion batteries: calendar and cycle ageing. In this work, calendar ageing is defined as irreversible loss of battery capacity and power capability during storage; cycle ageing is defined as the irreversible loss of battery capacity and power capability, which is caused by either by charging or discharging state.

In order to estimate the lifetime of li-ion batteries by means of accelerated lifetime tests, accelerated calendar lifetime tests and accelerated cycling lifetime tests were carried out in parallel. Based on the obtained results, the li-ion battery cell lifetime model was developed and parameterized. Moreover, to monitor the lifetime degradation of the battery cells, their capacity and power degradation were periodically checked, during battery cells ageing, at room conditions (25°C).

Accelerated lifetime tests were performed under different stress factors: temperature and cycle depth for cycling tests and temperature and average state of charge (SOC) level for calendar lifetime tests. Moreover, the cycling lifetime tests were performed for the worst possible charging case, which assumed fast recharging of electric vehicles within 15 minutes (4C charging rate). Three battery cells have been used for each of the performed calendar and cycling test case. Thus, the possibility of obtaining ageing results coming from outliers was mitigated and in the same time the obtained results showed certain statistical relevance. The desired lifetime model was parameterized by considering the average degradation results that were obtained from the three LFP/C battery cells, which have been considered for each performed test case.

The results of the accelerated calendar and cycle ageing tests were quantified in terms of capacity and power capability fades. Based on these results, lifetime models have been built for the two aforementioned parameters, as presented. Thus, the degradation of the selected LFP/C battery cells could be recalculated for different operating profiles and various temperature levels.

**Cell under test**

Nanophosphate LiFePO4/C cells from one of the leading market manufacturers were selected for testing and their parameters are presented in Table I and shown in Fig. 1. Due to economic and practical constraints, small-size cylindrical battery cells with the capacity of 2.5 Ah were chosen. Moreover, due to the aforementioned reasons, three LFP/C battery cells were used for each performed test. Furthermore, for each of the accelerated cycling lifetime tests, the corresponding cells were connected in series in order to ensure that they are subjected to the same amount of Ah-throughput.
RESULT AND ANALYSIS

Simulation model

The results presented in Fig. 2 and Fig. 3 - Fig. 4 were considered as a baseline for the development of the lifetime model, which calculates the incremental capacity and discharge PPC fade and updates the values of the battery capacity and PPC correction factors. The final structure of the lifetime model is presented. For a given driving profile, the model extracts the cycles and their depths and provides this information to the capacity and power fade cycling models. Similarly, for the calendar ageing, time on rest and SOC levels are provided to the capacity and power fade calendar models. All four capacity and power fade models provide the capacity and PPC correction factors to the incremental ageing calculation block, where the actual values of power and capacity are updated. The new values of the capacity and PPC were updated at the end of each month of simulation; this value was chosen as a compromise between lifetime estimation accuracy and simulation speed.

Table 1. Battery Cell Under Tests and its Characteristics

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cathode</td>
<td>LiFePO4</td>
</tr>
<tr>
<td>Anode</td>
<td>Graphite</td>
</tr>
<tr>
<td>Electrode</td>
<td>LiPF6 (solvent unknown)</td>
</tr>
<tr>
<td>Shape</td>
<td>cylindrical</td>
</tr>
<tr>
<td>Cell weight [g]</td>
<td>76</td>
</tr>
<tr>
<td>Cell dimensions [mm]</td>
<td>0.26 x 65</td>
</tr>
<tr>
<td>Nominal capacity [Ah]</td>
<td>2.5</td>
</tr>
<tr>
<td>Nominal voltage [V]</td>
<td>3.3</td>
</tr>
<tr>
<td>Max. charging voltage [V]</td>
<td>3.6</td>
</tr>
<tr>
<td>Minimum voltage [V]</td>
<td>2.0</td>
</tr>
<tr>
<td>Max. continuous charge current [A]</td>
<td>10</td>
</tr>
<tr>
<td>Max. continuous discharge current [A]</td>
<td>50</td>
</tr>
<tr>
<td>Energy [Wh]</td>
<td>8.25</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-30°C to +55°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-40°C to +60°C</td>
</tr>
</tbody>
</table>

The simulation runs for a number of months until the EOL criterion is reached; the time accumulated until the month when the simulation is stopped (i.e., EOL criterion reached) is considered as the lifetime of the LiFePO4/C battery for a given mission profile (driving profile). Because a battery thermal model was not considered in this work, all simulations were performed for a battery temperature of 25°C, which was chosen arbitrarily.
Driving profile

The investigated scenarios are based on the New European Driving Cycle (NEDC) profile, which is presented. This driving profile is commonly used for the representation of the urban driving cycle.

Two different scenarios were investigated.

1) Scenario 1: In the first scenario, it is assumed that the EV user is recharging his battery each time after usage. His daily driving profile can be characterized in the following manner: 20 minutes of driving to work with NEDC (cycle ageing) - battery recharging to 100% SOC - 8 hours of parking (calendar ageing) - 20 minutes of driving home with NEDC (cycle ageing) - battery recharging to 100% SOC - parking (calendar ageing). A three days profile for power and SOC, of the investigated LiFePO4/C battery cell. The same profile was used for the non-working days driving.

2) Scenario 2: In the second scenario, the EV user is using the EV battery for three consecutive days until the battery SOC is low and only after that recharges it. This scenario is presented and can be described in the following manner: 20 minutes of driving to work with NEDC (cycle ageing) - 8 hours of parking (calendar ageing) - 20 minutes of driving home with NEDC (cycle ageing) - parking (calendar ageing) - same procedure for the next two days - recharging to 100% SOC. The aforementioned profile is used as well for the non-working days driving.

CONCLUSION

There is a wide range of Li-ion battery chemistries available and each of them has its specific characteristics. Therefore, it is difficult to clearly determine the preferred chemistry for future EVs because none of them is currently leading the race and outmatches the other chemistries. Moreover, there is currently ongoing research on new chemistries like lithium sulphur and lithium air batteries, which have the potential to dominate the battery market for EVs in the future. Moreover, it is very difficult to select the best candidates from the Li-ion battery family for a specific application due to the need of a multidimensional comparison, which involves power and energy density, efficiency, safety, maturity level, calendar and cycle lifetime. Some of these characteristics can be easily determined while others like lifetime degradation of the Li-ion batteries is a very complex phenomenon and requires extensive laboratory testing.

The focus of this paper was to study the lifetime of nanophosphate cathode based lithium ion batteries when they are used in fully electric vehicles. Chemistry specific intrinsic safety, relatively low price, and long calendar and cycle lifetimes make them good candidates for propelling future EVs. Based on accelerated lifetime testing of the LiFePO4/C batteries, a semi-empirical lifetime model was developed, which was further used for studying the capacity and power capability degradation of the considered Li-ion battery.

The results of studies demonstrate long calendar lifetime of this chemistry, which was strongly dependent on the storage temperature and SOC. Moreover, this chemistry offers long cycle lifetime of nearly 8000 full cycles at 25°C. The developed lifetime model can be used for studying different driving profiles and EV operational scenarios. Based on the developed lifetime model, two EV operational scenarios were investigated. The obtained results show that power capability degradation of this chemistry is very low and rather loss of capacity, and consequently the EV range, would be the main driver to replace the batteries used in this application.

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REFERENCES


Optic Disc and Optic Cup Segmentation based on Fuzzy C Means Technique

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ABSTRACT

Glaucoma is the major cause of ocular damage and vision loss in which increased Intraocular Pressure (IOP) of the eye progressively damages the optic nerve. In this proposed study, an automatic system is developed for glaucoma detection by extracting vertical Cup to Disc Ratio (CDR) using Fuzzy C Means (FCM) clustering method. CDR is the ratio of optic cup area to the optic disc area, which provides basis for the diagnosis of glaucoma. Region of interest (ROI) extraction through intensity weighted centroid method which is followed by pre-processing and recursively applied FCM for the detection of Optic cup (OC) and Optic disc (OD).

Keywords: Glaucoma detection, FCM, CDR.

INTRODUCTION

CDR and Inferior Superior Nasal Temporal (ISNT) based glaucoma screening using Support Vector Machine (SVM) classifier is discussed⁶. ISNT and CDR are used for screening system as indicators. Using rim width, OD and OC, segmentation process is performed. Then features are calculated by this information and classified using SVM classifier. Glaucoma diagnosis based on OD and OC detection is described⁵. Rim to disc area ratio, cup to disc area ratio, vertical CDR and horizontal to vertical CDR are the features used for glaucoma detection. Geodesic active contour model is used for OD segmentation and for cup detection, CMY colour space is used. Finally these features are classified using SVM, Naïve Bayes (NB) and K-Nearest Neighbor (k-NN).

OD and OC detection based diagnosis of glaucoma using retinal images is presented⁵. Hybrid level-set methodology and morphological operations is used for OD segmentation. Segmentation of OC is done by blood vessel detecting using SVM classifier. Texture and Higher Order Spectra (HOS) features based glaucoma detection is explained⁴. Features are extracted using texture and HOS features after z-score normalization then feature selection is done SVM, NB, sequential minimal optimization and random forest classifiers is used for classification.

OC features based glaucoma diagnosis in colour fundus images is described⁶. Anatomical characteristics are used by this algorithm such as vessels position and cup in the curve. Analysing the various optic nerve characteristics using a number of colour spaces and the stochastic watershed transformation to classify the fundus image is existed.

Glaucoma assessment using OD and OC segmentation from monocular colour retinal images is discussed⁶. Information of local image around every point of interest in multidimensional featurespace is integrated to give robustness against variations in OD segmentation. Anatomical proof based cup segmentation such as vessel bends at the cup boundary. Cross validation algorithm based glaucoma detection is presented in⁷. Glaucoma detection is achieved by different data mining techniques such as classification, association, fuzzy detection and clustering etc. Sequential cultivation of human epidermal keratinocytes and dermal mesenchymal like stromal cells in vitro is explained⁸. Spectral analysis of photonic crystal based bio-sensor using AdaBoost algorithm is discussed⁹. Synthesis of hydrazine based novel HMG coA inhibitor and its docking studies is discussed¹⁰.
PROPOSED METHOD

The proposed system uses the FCM technique. It is a technique of data clustering technique in which a dataset is grouped into n clusters with every data point in the dataset belonging to each cluster to a definite degree. It is used to detect the optic cup and optic disc. Finally the ratio of optic cup and optic disc is determined.

In this proposed study, an automatic system is developed for glaucoma detection by extracting vertical CDR using FCM clustering method. CDR is the ratio of OC area to the OD area, which provides basis for the diagnosis of glaucoma. Region of interest extraction through intensity weighted centroid method which is followed by preprocessing and recursively applied FCM for the detection of OC and OD. Block diagram of the proposed glaucoma segmentation is shown in the below figure.

RESULTS & DISCUSSIONS

The performance of the proposed method for detection of glaucoma using FCM segmentation from the self database was done. Optic Disc and Optic Cup are segmented using this algorithm. Then, CDR was calculated for every user selected image. If the CDR value is greater than 0.4 then it is defined as Glaucoma Detected else Normal eye. So, finally classification is done by using this CDR value.

CONCLUSION

In this paper, FCM logic has been proposed to detect the glaucoma of an eye. Fig.2 shows the CDR value for one of the selected image and classification of the detection of glaucoma also performed. The results indicate that this performs better than the other distributions. In future work, we decide to implement advanced type of segmentation method for glaucoma detection.

REFERENCES


Issues and Future Trends in Teaching Physical Education: a Preliminary Think About

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ABSTRACT

This review examines the issues and future patterns of showing physical training subject. The information is inspired from a meeting directed with four master educators. Four issues were recognized in the wake of leading an examination of the meeting transcript. The issues are time, showing strategy, observation toward physical instruction and future patterns in educating and learning physical training. Physical training is vital for a tyke’s advancement from the intellectual, social and physical wellbeing angle. Physical instruction is not underlined in school. In view of the information got, another showing technique must be contrived to keep the absence of enthusiasm for learning physical training in the classroom.

Keywords: Thematic Analysis; Physical Education; Time; Teaching Method; Perception; Future Trends

INTRODUCTION

Physical instruction is crucial in the improvement of a tyke. Physical training is vital to kids as support’s them inherently and outwardly in their intelligent person, otherworldly, enthusiastic and physical area and furthermore in their scholastic execution. Bailey underpins this thought physical instruction empowers to improve understudies’ self-assured, self-esteem, social ability, subjective advancement and scholastic accomplishment. Other research discoveries place that physical action can enhance youngsters’ physical wellbeing amid preadolescent years. Hairdresser, Eccles, and Stone assert that understudies who are dynamic in game have more prominent accomplishment in scholastic execution contrasted with understudies who are not dynamic in games. This announcement is upheld by Shephard who expresses that physical movement gives constructive effect to understudies’ consideration in classroom, identity, practices and scholarly execution amid the physical instruction class. In this manner, it can be found that there is a cozy connection between scholastic accomplishment, kids’ conduct and physical instruction. Human Personal Attribute towards Industrial Social Contribution.

Foundation OF PROBLEM

Physical instruction is a subject that includes physical action and the learning of attention to medical problems. There are numerous subjects that should be instructed by the educator in physical training class. The themes are classified into two section; physical training and wellbeing instruction. As per the syllabus in the physical training class, the educator instructs the doled out themes in classroom and in addition directing physical exercises outside the classroom. In the Malaysian training situation, instructors still utilize the course reading to educate in class which is the customary showing technique.

RESULT AND FINDING

The meeting was examined utilizing topical examination. Topical investigation is a free subjective expressive approach and can be characterized as a strategy utilized for recognizing, breaking down and detailing designs in light of a topic inside the information. Topical examination is broadly used to translate a subjective information in view of the topic and in view of the topic can get the imperative information that ready to bolster the exploration think.
about. This exploration utilized topical investigation to broke down the meeting transcript and recognize the issue experienced by the physical instruction educator. A. Time The main issue that is distinguished from the meeting transcript is time or term of physical training class. In view of the finding, the length of physical training class is just 70 minutes once every week which is two time of each class.

Educating Method

In view of the meeting, the second issue that is recognized is instructing technique. At the point when the respondents were asked about their showing technique, 3 out of 4 respondents utilizes customary strategy that uses the course reading in the instructing of physical training. A portion of the respondents does not frequently utilize the course reading in their class but rather utilizes other showing helps as well. Be that as it may, one respondent uses course reading and PowerPoint as it were. The react are as beneath. Scientist “How would you instruct physical training in your class? Do you utilize any material to help you in instructing?”

Respondent 1

“In my school, I am furnished with a reference book so I can discover additional note for my understudies and I likewise allude the cases of activities in that reference book for my understudies.”

Respondent 2

“I frequently don’t utilize the reading material and I utilize the course book just as a kind of perspective since I will discover other reference which is past the reading material to instruct the understudies. This will draw in the understudies and the understudies can get more “shocks” when they are taking in certain point.”

Understudies’ Reaction

Amid Physical Education Class Next from the meeting information, the analyst found that the educators are as yet utilizing conventional technique to instruct the physical training subject. Educators are the best individual to watch each response in class while the class is continuous. One of the inquiry question is “What are the understudies’ response when you are instructing in physical training class?” Basically, every one of the respondents gave a similar answer, whereby the greater part of their understudies are exhausted and feel uninterested to take in the subject when educated in the classroom. One of the respondents said that generally the understudies dislikes to convey physical training course reading to class and this activity depicted the understudies’ absence of enthusiasm for the subject. In any case, when the instructors educate the point by utilizing a few understudies are engaged and demonstrate enthusiasm for the theme being educated. The inquiry address and the react from respondents are show as underneath.

CONCLUSION

This paper represents the topical examination of meeting information which was led by the analyst with four respondents. A few inquiries were asked to the respondents. In light of the meeting information got, the analyst broke down the transcript and distinguished four issues which are time oblige, showing strategy, understudies’ discernment toward physical instruction and future pattern in physical training. There is restricted time for instructors to show all the required subjects amid the physical training lesson and educator needs to utilize the right instructing strategy to instruct the understudies in the dispensed time. Tragically, the instructors still utilize the customary technique and a great deal of time is utilized as a part of scattering of learning. Henceforth, the understudies demonstrate less intrigue and does not center amid progressing lesson in the classroom as a few subjects is very confused to see, for example, cardiovascular framework or strong framework. Other than that, it was noticed that the understudies deliberately don’t convey the physical training course book to class. To conquer this issue, new showing technique must be connected to change the classroom condition amid physical instruction lesson. As of now, portable learning is a pattern and past reviews demonstrate that versatile learning empowers to change the classroom condition. Albeit portable learning demonstrates a positive effect in the educating and learning process, the learning module likewise has an imperative part. The analyst proposes that a computerized application ought to be created to supplant the substantial course reading. The advanced reading material that created later on ought to
incorporate the mixed media component that can draw in and urge understudies’ enthusiasm to further review in this subject.

**Ethical Clearance:** AMET University

**Source of Funding:** Self

**Conflict of Interest:** NA

**REFERENCES**

Analysis of the Students Self Confidence and Mental Health

N R Ram Kumar
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ABSTRACT

In this paper, the information was gathered from male undergraduates in Nagpur University. The factual result was attempted from undergraduates of Nagpur University. The information gathered from the subjects has been accurately examined and has been appeared in remote tables agreed upside. The information relating to emotional information was gathered through a Questionnaire "Manual of Emotional Insight Scale" comprises of 40 things.

Keywords: Health, Information, Remote tables.

INTRODUCTION

Training is a procedure of living. Instruction might be contrasted with Kalpavriksha as it satisfies human goals. Instruction implies the composition of man’s entire identity. Training has been characterized by various individuals in various ways. The significance of instruction has been changing as indicated by individuals, places and times. Numerous teachers in the past clarified the term Education ‘as the specialty of Leading out’. Their clarification was demonstrated by the term Education implies out of and due means I lead’. In past postings I have exhibited proof in actuality. Specifically, in my August 13 posting, I portrayed the Sudbury Valley School, where for a long time youngsters have been teaching themselves in a setting that works on suspicions that are inverse to those of customary tutoring. It hones the knowledge of a man. It empowers the brain to discover a definitive truth which frees, humankind from the servitude of transgression and gives riches, not of things but rather of internal light, not of influence but rather adore, considering reality as reality and offering expression to it. Tutoring, as it exists today, just bodes well on the off chance that we see it from a verifiable point of view. Thus as an initial move toward clarifying why schools are what they are, I exhibit here, basically, a diagram of the historical backdrop of training, from the earliest starting point of mankind up to this point. Most researchers of instructive history would utilize distinctive terms than I use here, however I question that they would prevent the general exactness from securing the draw. Truth be told, I have utilized the works of such researchers to enable me to build up the outline.

Investigations of the school and its graduates demonstrate that typical, normal youngsters wind up plainly instructed through their own play and investigation, without grown-up bearing or nudging, and go ahead to be satisfied, viable grown-ups in the bigger culture. Rather than giving guidance and pushing, the school gives a rich setting inside which to play, investigate, and encounter majority rule government direct and it does that at lower cost and with less inconvenience for all required than is required to work standard schools. So why aren’t most schools like that? If we need to comprehend why standard schools are what they are, we need to relinquish they are results of intelligent need or logical understanding. They are, rather, results of history.

This paper is audited from the following articles, Analyzing women empowerment in working conditions: A study on women employees: (With special reference to Public Sector Banks). An outcome of periodized small side games with and without mental imagery on playing ability among intercollegiate level soccer players. Human personal attribute towards industrial social contribution. Culture Shock on Learning of International Students in India.
METHODOLOGY

As each examination requests a methodical technique and system in like manner this section embraces the accompanying strategies including data with respect to research configuration, wellspring of information, testing strategy, determination of subjects, gathering of information, paradigm Measures and so on. An examination end up plainly effective joined and upheld by some dependable and true information. The measurable investigation of the assembled information gives a well-sew photo of a total and fruitful speculation as pre-chosen by the specialist. The section had been isolated into the accompanying headings:

- Wellspring of information.
- Choice of Subjects.
- Testing strategies.
- Types of gear utilized for gathering of information.
- Organization of survey.

Source of Information

For the Present investigation of Subjects was chosen from the physical instruction schools which are associated to Nagpur University.

Selection of Subjects

For the present review 40 male understudies were chosen.

SAMPLING METHOD

The subjects were chosen by utilizing accessible testing strategy.

Equipments utilized for gathering of information

The information relating to passionate insight was gathered through standard poll arranged by Dr. Sheetla Prasad, “Enthusiastic Intelligence Test”. The Emotional Intelligence (EI) scale is the arrangement of 40 questions and each question has five reactions viz. self-assured, dependable, inventive, upright, and balanced.

Criterion Measures

Taking after are the rule measures which were in charge of accumulation of information, to testing the theory.

Emotional knowledge

Standard poll specifically “Manual of Emotional knowledge scale (EIS) survey arranged by Dr. Sheetla Prasad” was utilized to know enthusiastic knowledge of understudies. The poll of “Passionate insight scale” following are 40 explanation. Each has five likely answers and each is pretty much critical for you or some other individual. Every announcement of this poll was with five choices or reactions and these reactions were (1) Self-sure (2) Trustworthy (3) Innovative (4) Conscientious (5) Adjusted. 1 score has been apportioned to the every reaction. Subsequently the aggregate imprints will be equivalent to the quantity of things. The total of the imprints ought not be not as much as the aggregate number of the thing in the scale.

DETERMINATIONS

The final analysis of the data collected from the students are tabulated below,

<table>
<thead>
<tr>
<th>Descriptions</th>
<th>Marks</th>
<th>No of Candidates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>&lt; 100</td>
<td>12</td>
</tr>
<tr>
<td>Average</td>
<td>100 - 115</td>
<td>16</td>
</tr>
<tr>
<td>High</td>
<td>&gt;115</td>
<td>24</td>
</tr>
</tbody>
</table>

CONCLUSION

In this paper, the intelligence report of the various students in the particular university. The analyses are evaluated by the students’ activities as well the marks should be one of the main considerations. The mental health and self confidence of the students are analyzed and tabulated for the comparisons.
Ethical Clearance: Taken from AMET University

Source of Funding: Self

Conflict of Interest: Nil

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In Air Duty Cycle and the Light Extraction Enhancement of InGaN-Based on LED Using Two-Dimensional Photonic Crystals

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ABSTRACT

This paper shows that the ideal light extraction upgrade of the 2-D photonic precious stones (PhCs) light-emitting diodes (LEDs) among various air obligation cycles (ADCs) is autonomous of the geometry and the state of the 2-D PhCs. Additionally, it likewise examines that the side-directional outflow property of the 2-D PhCs LEDs in hexagonal cross section plan (HLA) is superior to that in square grid course of action (SLA). At long last, the light yield energy of the 2-D PhCs LEDs in SLA and in HLA with the ADC of 51% are fundamentally enhanced by 60.4% and 81.9%, individually, as contrasted and the reference LED at an infusion current of 350 mA.

Keywords: Light-emitting diodes (LEDs), photonic crystals (PhCs), light extraction enhancement (LEE).

INTRODUCTION

In recent decades, InGaN-based light-producing diodes (LEDs) with high brilliance have as of now attracted much consideration because of its assortment of applications in backdrop illumination of level board shows, movement flag light, uncommon lightings and general enlightenment [1], [2]. In any case, it is outstanding that the light extraction upgrade (LEE) of the InGaN-based LEDs is seriously confined because of the aggregate inside reflection at the GaN/air interface [3]. A few techniques have been proposed to enhance the LEE of LEDs, for example, surface roughening [4], nano-designed sapphire substrates [5], consolidating photonic gems (PhCs), coupling to surface plasmon modes, n-side-up vertical LEDs et cetera. Notwithstanding, PhCs is an especially alluring procedure because of the noteworthy change of the LEE [6]. Moreover, late takes a shot at inserted PhCs had likewise brought about enhanced directionality of the light extraction in GaN-based LEDs. About creation procedure of the PhCs, the self-gathered and minimal effort strategies had been utilized for proficient light extraction in LEDs by utilizing self-amassed colloidal microlens exhibits, colloidal engraving microstructures, and self-composed p-GaN designing strategy. In actualizing 2-D PhCs on top p-GaN layer of the InGaN-based LEDs ought to take the air obligation cycle into thought painstakingly. There have been few reports on researching the relationship between’s the ADC and the LEE of the InGaN-based LEDs up until now. just revealed reenactment comes about the relationship between’s the filling proportion and the LEE of the InGaN-based LEDs.

The application of multifrequency airborne electromagnetics to iron ore exploration [7] described the explorations of the multi frequency. All things considered, the test examine for understanding the connection between’s the ADC and the LEE of the InGaN-based LEDs is seldom detailed in writings. Modelling the airborne electromagnetic response of a vertical contact [8] described the simulations of the air bone system. As of late, we have shown the preparatory review on the LEE of the InGaN-based LEDs by consolidating 2-D PhCs on top p-GaN layer and need to see more in detail. In this paper, the relationship between’s the ADC and the LEE of the 2-D PhCsInGaN-based LEDs in square grid game plan (SLA) and in hexagonal cross section course of action (HLA) are researched in detail through optical and electrical estimations.
**EXPERIMENTAL DETAILS**

For getting the exact optical trademark investigations, the 2-in c-plane twofold cleaned sapphire substrates (DPSSs) were picked in this work. Current channelling in time-domain airborne electromagnetic data [9] presented the challenges of the air bone data. Preceding the development, the substrates were thermally prepared at 1100 C in hydrogen gas to evacuate surface tainting. The InGaN-based LED structures, which comprise of a 2.5-m-thick undoped GaN support layer, and a 2-m-thick n-GaN layer, utilizing SiH4 as the n-sort dopant, were initially developed on the DPSSs with Taiyo Nippon Sanso SR2000 barometrical weight metal natural concoction vapor statement (AP-MOCVD) under three-stream gas infusion. At that point, five sets of InGaN/GaN MQWs having a 2-nm-thick InGaN well and a 12-nm-thick GaN hindrance (developed at 800 C and 850 C, individually) were saved, trailed by a 20-nm-thick p-AlGaN electron blocking layer, and a 300-nm-thick p-GaN layer at the top, utilizing Cp2Mg as p-sort dopant. After the epitaxial development, to accomplish the correct measurements, the 2-D PhCs were manufactured on the highest point of the p-GaN layer by utilizing ELS-7500 electron-shaft lithography arrangement of ELIONIX organization and inductively coupled plasma responsive particle drawing (ICP-RIE) procedure. Fig. 1(a) and (b) portray the schematic graphs of the 2-D PhCsInGaN-based LEDs in SLA and in HLA, individually.

**MEASUREMENT RESULTS AND DISCUSSION**

Figure 2 (an) exclusive demonstrates the ghostly brilliant flux measured from the IS for the RP-PhCs LEDs in SLA and in HLA with various ADCs. The inset demonstrates the schematic chart of the IS framework. It shows that the unearthly brilliant flux measured from the IS for the RP-PhCs LEDs in SLA and in HLA achieves the most extreme incentive with the ADC of 51%, and the pinnacle discharge wavelength for every one of the LEDs is around 450 nm. Figure 2 (b) speaks to the relative pinnacle power measured from the IS and the - PL for the RPPhCs LEDs in SLA and in HLA as a component of various ADCs.

Figure 2. (a) The spectral radiant flux of the RP-PhCs LEDs in SLA and in HLA with different ADCs. The inset shows the schematic diagram of the integrating sphere system. (b) The relative spectral radiant peak flux and the relative PL peak intensity of the RP-PhCs LEDs in SLA and in HLA as a function of different ADCs.

The figure contains several distinct features. Initially, it uncovers that the relative pinnacle power of the RP-PhCs LEDs measured from the IS and the - PL in SLA and in HLA with ADC of 51% are 1.82, 2.8, 2.55, and 3.22 times higher contrasted and the reference LED, separately, all achieve the most extreme incentive among various ADCs. Second, the LEE of the RP-PhCs LEDs in SLA and in HLA shows comparative ADC subordinate trademark plainly; at the end of the day, the connection between’s the ADC and the LEE of the RP-PhCs LEDs is not influenced by the geometry of the PhCs. Third, the LEE of the RP-PhCs LEDs in HLA is higher than that in SLA. Fourth, the distinction of the LEE measured by the - PL and the IS arrangement of the RP-PhCs LEDs in SLA is bigger than that in HLA.

Give us a chance to attempt to make sense of the previously mentioned optical properties. At the point when the ADC is moving toward two extraordinary cutoff points, for example, zero or one, the light extraction conduct almost equivalents to that of a level surface of the p-GaN layer because of the vanishment of the PhCs.

Subsequently, the light can’t be viably separated to the air, along these lines the comparative ADC subordinate trademark for the RP-PhCs LEDs in SLA
and in HLA can be watched. Moreover, considering the viable refractive record of the RP-PhCs layer with various ADCs, the RP-PhCs layer with the center ADC of 51% is near the refractive file of traditional LED exemplifies $n = 1.4 \pm 1.6$, consequently the greater part of the light extricated out the RP-PhCs will be coupled into the LED typify. As another perspective, the most grounded relative pinnacle force marvel could likewise be clarified by the greatest covering of the light and the RP-PhCs designed in that setup, bringing about the best diffraction effectiveness.

**CONCLUSION**

In conclusions, this paper experimentally demonstrates that the LEE of the 2-D RP-PhCs LEDs in SLA and in HLA has comparative ADC reliance trademark. From the optical trademark estimation comes about, the LEE of the 2-D RP-PhCs LEDs in SLA and in HLA achieves most extreme incentive with the ADC of 51%. The better side-directional discharge property of the 2-D PhCs LEDs in HLA than that in SLA has likewise been accounted for. Besides, from the electrical trademark estimation, the LOP of the 2-D RP-PhCs LEDs in SLA and in HLA with the ADC of 51% are altogether enhanced by 60.4% and 81.9%, separately, as contrasted and the reference LED at an infusion current of 350 mA. The far field radiation example of the 2-D RP-PhCs LED in HLA demonstrates the side-directional property, which is well predictable with what we have seen from the PL and the IS estimation comes about. Furthermore, the relationship between’s the ADC and the LEE of the 2-D PhCs LEDs is free of the geometry and the state of the 2-D PhCs.

**Ethical Clearance:** Taken from AMET University

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The Purpose of Practical Reality Technology in Physical Educating and Guiding

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ABSTRACT

This paper discusses the features of Virtual Reality technology and the roles of VR technology in physical education teaching and training. Based on the nature of PE teaching and training, the application model of VR technology in this field is constructed. For the features of VR technology are including perception, presence, interactivity, autonomy, etc., it will be widely applied in PE teaching and training and play a significant role.

Keywords: Teaching and Training; Application Model

INTRODUCTION

With the quick improvement of data innovation and the advancement of instruction idea, the cutting edge science and innovation is significantly impacting all parts of games, particularly in physical instruction (hereinafter alluded to as PE) teaching and preparing. After the use of customary visual-sound media and interactive media in PE educating and preparing, another sort of data innovation, Virtual Reality innovation (hereinafter alluded to as VR), is acquainted with PE instructing and preparing. VR, as another methods for PE instructing, not just enhances the nature of PE educating and preparing, additionally enables the learners to increase immersive emotions and encounters. Along these lines, the broadly utilization of VR innovation is valuable to enhancing the nature of PE educating and preparing by helping the understudies to have a superior information of the games learning and abilities, and advancing the understudies' physical and mental improvement.

This article explored from the following papers, An outcome of periodized small side games with and without mental imagery on playing ability among intercollegiate level soccer players [5]. Human Personal Attribute towards Industrial Social Contribution [6]. Culture Shock on Learning of International Students in India [7]. Study on the ideal ways of enhancing the quality of maritime education, training and research [8].

VR Technology

VR innovation is a PC reenactment framework, which gives clients an opportunity to experience PC reproduced reality. By exploiting elite PC innovation and making utilization of related science and innovation, an advanced domain is produced, in which the clients can see, hear and touch, and so on., and roughly encounter the faculties as they do as a general rule. With the essential hardware the client can cooperate with the items in the computerized condition and experience things through the computer [9]. Virtual the truth is a reenactment of this present reality, showing a noteworthy improvement bearing of this innovation. It is a coordination of recreation innovation and PC designs, manmachine interface innovation, sight and sound innovation, sensor innovation and system innovation, and so on., which is a testing cross technology [10]. The components of VR innovation incorporate recognition, nearness, intuitiveness, self-sufficiency, and so forth. Other than the regular visual impression of PC framework, it additionally creates persuading sound-related, material, movement discernment, and even passes on different faculties, for example, taste, notice, feeling and so forth. The perfect advanced condition made by VR innovation enables clients to see everything as valid as actually. The articles in the computerized condition are
accessible to the client as per the law of movement and the client can take an interest in the virtual condition to experience genuine discernments. In a perfect reenactment condition, the client can’t let it know from the truth and encounters practically an indistinguishable emotions from as a general rule. As of late, the VR innovation has been generally connected in many fields, for example, urban arranging, inside plan, mechanical reenactment, landmarks reclamation, extension and street outline, instruction and educating, and so on.

Examination of the Role of VR Technology in Pe Instructing and Training

Nowadays, with the advancement of data innovation, the conventional method of PE educating and preparing mode can at no time in the future fulfill the requirements of understudies, and force limitations on imaginative considering understudies to some degree. The understudies can just think in an indistinguishable route from their instructors do and they are all learning in a similar example, bringing about the loss of the understudies’ own particular activity. Applying VR innovation in PE educating and preparing can help take care of the issues by assuming a critical part in the accompanying perspectives.

Change customary PE instructing and preparing mode

In the customary PE educating and preparing mode, it is regular that the educators give addresses and show nearby and the understudies do work on taking after directions given by instructors, which is instructor focused as opposed to studentcentered. The utilization of VR innovation will help create a sheltered, financially savvy, dynamic and clear computerized instructing and preparing condition in which the understudies can hone intuitively. In this mode, the understudies can encounter diverse propelled showing techniques, procedures and strategies of the contradicting players, and practice with determined purposes and methodologies. This sort of instructing is distinctive and exact and can deliver solid visual sense, phonoreception, physicality, and even solid notice, which enables the understudies to get a reasonable idea, develop their subjective capacities and ace an assortment of aptitudes quick with exactness.

Increment interest of games to understudies

Utilization of VR innovation conveys the understudies to a virtual world, in which they see, hear and touch because of the adjustments in the computerized environment. With area trackers and information criticism gadgets or other manual information hardware and sound gadgets, and so forth., the understudies are drenched in the virtual world, in this manner accomplishing an early impeccable, incomprehensible impact. The VR innovation will advance the improvement of commonsense abilities preparing. To the college understudies’ living in Internet + period, this computerized condition is engaging and more understudies are pulled in to take part in games.

Decrease the impact of the outer condition to educating and preparing

The gear and offices, the measure of the setting, atmosphere and other ecological variables impact the nature of customary PE educating and preparing. In the virtual condition delivered by VR innovation, a wide range of games offices are imaginary and are not be influenced by genuine condition or atmosphere. Hence, it can powerfully create new gear, offices and condition as indicated by the need of instructing and preparing and the educating and preparing substance can always refresh.

Lessen the rate of harm

In like manner instructional courses, many games are serious, for example, ball, football, volleyball, tennis and different games. Subsequently, in functional preparing forms, the shot of harm is very high. The top need for understudies is day by day scholarly learning and the wounds bringing about in games may apply negative effect on them. In the event that the understudies have a chance to partake in games in virtual condition, there will be no more wounds. Also, it is ok for the understudies to do a wide range of troublesome developments, which may help develop the understudies’ certainty. In the mean time, the virtual framework can assess the developments of the understudies and rundown the lacks that should be enhanced, in this way enhancing preparing quality and helping the understudies improve arrangement for genuine ground exercises.
Enhance the nature of PE instructing and preparing

Understudies’ wellness In the conventional method of PE educating and preparing, as a result of the lacking gear, space, and funds, it is hard to furnish understudies with prominent games exercises, for example, shooting, shake climbing, trampoline, field survival et cetera. The utilization of VR innovation encourages those exercises to be completed in virtual condition for practice and the understudies can get correct emotions as they do in all actuality, hence accomplishing the motivation behind preparing, pulling in more understudies to partake in games, broadening the exercises and in the long run enhancing the nature of PE instructing and preparing and the understudies’ general wellness.

Advance correspondence between PE educators

To PE educators, making utilization of VR innovation is a brandnew instructing background. In the customary showing process, the educators can just watch the understudies from one viewpoint and can’t observe nearly the quick developments of the understudies with accuracy, along these lines they neglect to give specific guide. In any case, with the assistance of VR innovation, those issues can all be tackled and the instructors in various regions can share writings, pictures, recordings and different sight and sound data. They can have a superior trade of their thoughts by making utilization of the intuitive and dynamic 3D pictured articles.

Examination of the Application Model of VR Echnology in Pe Teaching and Training

The PE instructing and preparing framework with VR innovation is made out of the accompanying 5 sections: (1) programming application framework; (2) sports database framework; (3) development information accumulation and yield gadgets; (4) superior PC picture handling framework; (5) the VR innovation improvement stage.

Sports database framework

Sports database framework is predominantly used to store all the data identified with the question models in the virtual condition and different information required by the framework, for example, preparing information, situation models, a wide range of games hardware and offices and model condition, and so forth. In a virtual domain, ongoing rendering is required and an expansive number of virtual items should be spared, called and refreshed. So the question models must be characterized and overseen as needs be.

CONCLUSION

As is known to all, teaching process has a development history, from the earliest single dull preaching and teaching, then into the audio-visual media, and later the development of composite media after the popularization application of computers in education, but every teaching process trial fails to break through the boundary of two-dimensional images. The emergence of VR technology has changed the traditional two-dimensional plane of the world. It builds the virtual digital three-dimensional environment, and can change to extend or compress time and space according to the actual need, so VR technology can offer people visual display, rather than the abstract and conceptual cognition.

Ethical clearance - AMET University
Source of funding - Self
Conflict of Interest - NA
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Intelligence Report for Female Players & Non Players

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ABSTRACT

The point of the appraisal was to break down the impact of financial status and cooperation in games on enthusiastic insight of female players and non players. The review was led on 200 female in which 100 players and 100 non players were chosen as a specimen. All the chose female players spoken to in at any rate intervarsity level competition. The age of the example extended from 18-25 years and every one of the specimens chosen from irregular premise. Financial status was surveyed by Agashe and Helode (2003) was utilized, while passionate knowledge of the subjects was evaluated by enthusiastic insight stock arranged by S.K. Mangal and ShubhraMangal (1995) was embraced. To discover the impact of the Socio-financial status and games interest on passionate insight 2x2 ANOVA strategies was utilized. Comes about found that financial status demonstrated that their fundamental impact upon enthusiastic insight of chose subjects. The joint impact of financial and cooperation in games on enthusiastic knowledge was observed to be measurably irrelevant.

Keywords: Players Review, Intervarsity, Knowledge.

INTRODUCTION

The EI display presented by Daniel Goleman, concentrates on EI as a wide cluster of abilities and aptitudes that drive administrative execution, measured by multi-rater evaluation and self-appraisal [1]. In Working with Emotional Intelligence, Goleman investigated the capacity of EI at work, and asserted EI to be the most grounded indicator of accomplishment in the working environment, with later affirmation of these discoveries on an overall specimen seen in Bradberry and Greaves, “The Emotional Intelligence Quick Book” [2-4] Goleman’s model blueprints four primary EI develops: Mindfulness - the capacity to peruse one’s feelings and perceive their effect while utilizing premonitions to guide choices. Self-administration - includes controlling one’s feelings and motivations and adjusting to evolving conditions. Social mindfulness - the capacity to detect, comprehend, and respond to other’s feelings while fathoming informal organizations. Relationship administration - the capacity to rouse, impact, and create others while overseeing struggle. Goleman [3] incorporates an arrangement of enthusiastic abilities inside each build of EI. Enthusiastic abilities are not natural gifts, but instead educated capacities that must be dealt with and created to accomplish exceptional execution. Goleman places that people are conceived with a general enthusiastic insight that decides their potential for learning passionate capabilities. Estimation of the Emotional Competencies (Goleman) demonstrate. Estimation apparatuses in light of Goleman’s model of passionate insight incorporate the Emotional Competency Inventory (ECI) and the Emotional Intelligence Appraisal, which can be taken as a self-report or 360-degree evaluation [6].

This paper also referred, An outcome of periodized small side games with and without mental imagery on playing ability among intercollegiate level soccer players [7]. Culture Shock on Learning of International Students in India [8]. Human Personal Attribute towards Industrial Social Contribution [9].

METHODOLOGY

The players were chosen from various universities of Himachal Pradesh. The chose female players in any event spoke to intervarsity level competitions, while
the non-players had not played any recreations. The normal age of the chose test was 21.5 years. To quantify financial status of chose subjects, financial status stock was set up by Agashe and Helode (2003) was utilized, scoring was finished by standards set around the creators. Subsequent to scoring, acquired information was organized. To survey passionate insight of chose subject’s, enthusiastic knowledge stock arranged by S.K. Mangal and Shubhra Mangal (1995) was utilized. This stock is exceedingly solid and substantial. To discover the impact financial status of and support in games on passionate insight of female players and non-player’s 2x2 ANOVA systems was utilized.

RESULTS ANALYSIS

Table 1: Sports Participations

<table>
<thead>
<tr>
<th>Description</th>
<th>Players in the Female Category</th>
<th>Non-Players in the Female Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>M=62.25 N=33</td>
<td>M=60.05 N=36</td>
</tr>
<tr>
<td>Low</td>
<td>M=62.01 N=34</td>
<td>M=57.21 N=32</td>
</tr>
<tr>
<td>Medium</td>
<td>62.35</td>
<td>59.25</td>
</tr>
</tbody>
</table>

It is clear from the “F” detailed in table no.1 that the primary impact of SES upon passionate insight is factually inconsequential. It in this manner shows that SES as an autonomous variable not able to affected passionate knowledge of female subjects. The “F” of 4.33 for support in games is observed to be factually noteworthy past .05 levels. Thus one might say that investment in games as free factors ready to impacted enthusiastic insight of female subjects. Female players have displayed more passionate insight (m= 63.37) than the female non players (m= 59.09). The “F” of 0.75 the cooperation impact of SES X support in games is factually inconsequential. It in this manner demonstrates that SES and support in games as an autonomous factors did not demonstrate their impact upon enthusiastic insight of female subjects mutually.

CONCLUSION

The primary impact of SES upon enthusiastic insight of female players and non-players was seen to be immaterial. The primary impact of support in games upon passionate insight of female subjects is measurably noteworthy. Consequently one might say that with more prominent certainty that female players showed fundamentally better passionate insight contrasted with female non players. The joint impact of SES and cooperation in games on enthusiastic insight was observed to be measurably immaterial.

Ethical Clearance: AMET University

Source of Funding: Self

Conflict of Interest: NA

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Validity And Reliability of Korean Version Questionnaire for Student Perception of Safety and Quality Knowledge, Skills, and Attitudes

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ABSTRACT

Background/Objectives: To validate the reliability of Korean version questionnaire for the Student Perception of Safety and Quality Knowledge, Skills, Attitudes (SP-SQKSA) was assessed to apply to nursing students.

Method/Statistical Analysis: Cross-cultural adaptation was performed according to international guideline: Forward and backward translation. Survey data were collected from 379 fourth year nursing students who enrolled in one of six universities across the country. Data were evaluated using item analysis, content validity, exploratory factor analysis, confirmatory factor analysis and Cronbach’s alpha.

Findings: One item was eliminated since item-total correlations were less than .3, resulting in 9 items on the final Korean SP-SQKSA. Exploratory factor analysis revealed that items on the Korean SP-SQKSA were loaded with two factors, accounting for 57.1%. The model fit index was acceptable (χ²/df = 4.22, GFI = .94, NFI = .89, CFI = .91 and RMSEA = .09). Its internal consistency was as reliable as Cronbach’s alpha .70.

Improvement/Applications: Findings of this study, measuring Korean nursing students’ perception of safety and quality knowledge, skills and attitudes, demonstrated the reliability of Korean version of SP-SQKSA.

Keywords: Attitudes Questionnaire, Quality, Reliability, Safety, Validity

INTRODUCTION

According to the publication of the Institute of Medicine (IOM) report (To err is human: building a safer health system), the top agenda among the worldwide healthcare policy is the extent of harm, resulting from healthcare, quality and safety ¹³. Redesigning basic educational competencies of all health care providers for health system improvements is essential for bridging the quality gap ¹. The 2003 Institute of Medicine (IOM)’s report signaled the need to resolve quality and safety issues into health profession’s curricula ¹. To take care of patients more safely, a national project (Quality and Safety Education for Nurses, QSEN) was initiated². Its main purpose was to boost strategy development and implementation for nursing education, and to support incorporation of the IOM competencies. Sets of knowledge, skills, and attitudes for each competence were developed and used in nursing pre-licensure programs³. Learning collaborative method from the Institute for Healthcare Improvement (IHI) was harnessed for teaching strategy development and dissemination using a pilot lot of 15 nursing schools in Phase 2 (2007-2009)⁴. In Phase 3 (2009-2012), the Robert Wood Johnson
Foundation (RWJF) awarded a grant to the American Association of Colleges of Nursing (AACN) to offer eight train-the-trainer QSEN Institutes faculty in prelicensure programs across the United States. The intent of the grant was to provide faculty with a resource base of tools and strategies for use to integrate the quality and safety content into curricula and enable students to achieve the six QSEN competencies. To aid in this nationwide effort, they made the Institute of Medicine report and the QSEN competencies as a component of The Essential of the Baccalaureate Education for Professional Nurses.

In a way to increase quality and safety in nursing education, nursing students’ perspectives of their own quality and safety competencies are need to be addressed. Several other survey tools have been available over the last 3-5 years to assess students’ attitudes, skills, and knowledge about QSEN competencies, but in most cases they are used to measure one of six competencies. One tool developed for nursing students’ perception of safety and quality knowledge, skill, and attitudes was found. The tool is based on the QSEN competencies. Miller and LaFramboise assured the internal consistency through Cronbach’s α analysis. Construct validity was not reported by the original authors.

When a tool is translated into another language, the translated version has to be validated in another cultural context. Cross-cultural adaptation starts with translation of an original assessment tool, then, items should reflect particular culture and validate the reliability of the translated version. Therefore, the goal of this study was to validate the reliability of Korean version questionnaire for the Student Perception of Safety and Quality Knowledge, Skills, Attitudes (SP-SQKSA) to assess applicability for nursing students.

**MATERIALS AND METHOD**

**Study Design**

This was a methodological approach to validate the reliability of translated Korean version of the SP-SQKSA using a self - questionnaire survey.

**Instruments**

Demographic data including age, gender, religion, grade point average score (GPA) and previous education experience quality were collected.

Instruments for SP-SQKSA were 10 items developed for the student perception of safety and quality knowledge, skills, attitudes. Items on the SP-SQKSA were scored on a 7-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = neutral, 5 = somewhat agree, 6 = agree, 7 = strongly agree). Item 6 and 9 were reversely counted for analysis. Total score could range from 10 to 70 with higher scores indicating stronger competencies on safety and quality. In the results of Miller and LaFramboise’s study, Cronbach’s alpha was found to be .65.

**Translation and Content Validity**

We obtained permission for the use of the SP-SQKSA from the original author, Miller. Scales were translated following the forward and backward translation method. It was first translated from English into Korean by a bilingual medical professional.

Content validity of this tool was assessed by 5 experts (including 3 nursing professors & 2 medical professors) using a content validity index (CVI). They rated each item of the SP-SQKSA for relevance and clarity as 1 (not relevant), 2 (somewhat relevant), 3 (relevant), or 4 (very relevant). Content validity was determined by an expert panel, who calculated content validity by considering the ratio of three or four points of all items; if the ratio was more than .8, then it was interpreted as indicative of a high content validity.

**Participants & Data Collection**

The participants in this study included 400 fourth year nursing students, recruited from six Universities across South Korea. Excluding questionnaires with missing data, a total of 371 (94.8%) questionnaires were completed. The data were collected during the spring in 2014. All the respondents were aware of objectives of the study and consented to participation.
keep confidentiality, students were told not to write their names on the questionnaire. The average completion time was 10 minute; each participant received a highlighter as a reward for participating in the study.

**DATA ANALYSIS**

SPSS windows version 19.0 and AMOS 22.0 were harnessed for data analysis. Descriptive statistics were used to characterize samples. Item analysis of the corrected item total correlation was performed for item selection. Content and construct validity were evaluated using content validity Index (CVI), exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). Eigenvalues greater than 1 were used to determine the factors. 0.40 or higher values on factor loadings were considered as significant criteria to designate items to factors. CFA is the next step after EFA to determine whether data fitted a hypothesized measurement model. The model verification was conducted on the basis of the chi-square test, goodness of fit index (GFI), adjusted goodness of fit index (AGFI), normal fit index (NFI), comparative fit index (CFI), and root-mean-square error of approximation (RMSEA). Reliability as internal consistency was tested calculating the Cronbach’s alpha.

**RESULTS**

**Participant characteristics**

The demographic information and educational characteristics of the sample wereshown in table 1. The mean students age were 22.16 years (SD=2.10). There were 363 (95.8%) female and 16 (4.2%) male students. The students largely reported a prerequisite GPA of 3.51~3.99 or higher (45.1%).

**Table 1: General and Educational Characteristics of Participants**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Categories</th>
<th>(N=379)</th>
<th>n(%) or M±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age(yr)</td>
<td></td>
<td></td>
<td>22.16±2.10</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td></td>
<td>16(4.2)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td></td>
<td>363(95.8)</td>
</tr>
</tbody>
</table>

**Table 1: General and Educational Characteristics of Participants (Contd.)**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Categories</th>
<th>(N=379)</th>
<th>n(%) or M±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Region</td>
<td>G city</td>
<td>158(41.7)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N city</td>
<td>148(39.1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>D city</td>
<td>50(13.2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S city</td>
<td>23(6.1)</td>
<td></td>
</tr>
<tr>
<td>Grade Point Average score</td>
<td>4.00~4.50</td>
<td>73(19.3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.51~3.99</td>
<td>171(45.1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.00~3.50</td>
<td>114(30.1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.51~2.99</td>
<td>21(5.5)</td>
<td></td>
</tr>
<tr>
<td>Knowledge about safety</td>
<td>≤A little knowledgeable</td>
<td>25(6.6)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Somewhat knowledgeable</td>
<td>117(30.9)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Knowledgeable</td>
<td>190(50.1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Very knowledgeable</td>
<td>47(12.4)</td>
<td></td>
</tr>
<tr>
<td>Experience in safety education</td>
<td>Yes</td>
<td>199(52.5)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>180(47.5)</td>
<td></td>
</tr>
<tr>
<td>Educational content *(n=199)</td>
<td>Fall</td>
<td>141(37.2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medication</td>
<td>57(15.0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Infection</td>
<td>30(7.9)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pressure ulcer</td>
<td>25(6.6)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Patient identification</td>
<td>12(3.2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Etc.</td>
<td>21(5.5)</td>
<td></td>
</tr>
</tbody>
</table>

*Open question

**Item Analysis**

Item 9 (“As a staff nurse, my only required response to a medical error is to file an incident report”) was excluded because item – total correlation was below .30. The remaining 9 items were included in the subsequent tests.

**Content Validity**

The content of SP-SQKSA was validated by measuring relevance and clarity of the measure. The average CVI was .92 and confirmed adequate content validity.

**Exploratory Factor Analysis**

We determined sampling adequacy for factor analysis using Bartlett’s Test of Sphericity ($\chi^2=976.66$, p < .001), and Kaiser-Meyer-Olkin measure (.77) and found it acceptable. After the initial EFA for the 9 items, 2 factors were retrieved with eigenvalues greater than 1.0. All 9 items met acriterion of a factor loading of .40 or above and consisted of 57.1% of the total variance. Factor 1, was labeled ‘patient safety’. Factor 2, labeled ‘teamwork and patient centered care’ were as shown in table 2.
Table 2: Summary of Confirmatory Factor Analysis of Perceptions Items

<table>
<thead>
<tr>
<th>Items</th>
<th>Factor loading</th>
<th>Eigen Values</th>
<th>Accumulative Variance(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Factor1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 I have adequate understanding of scopes of practice and roles of health care team members</td>
<td>.85</td>
<td>.02</td>
<td>2.65</td>
</tr>
<tr>
<td>10 I have a basic understanding of national patient safety resources, initiatives, and regulations.</td>
<td>.81</td>
<td>.10</td>
<td></td>
</tr>
<tr>
<td>4 I can assist patient in overcoming barriers to their active involvement in their own care</td>
<td>.80</td>
<td>.18</td>
<td></td>
</tr>
<tr>
<td>3 I can identify multiple barriers to patients’ involvement in their care</td>
<td>.74</td>
<td>.10</td>
<td></td>
</tr>
<tr>
<td>Factor2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Patients would ultimately benefit if health care professionals worked together to solve patient problems</td>
<td>.12</td>
<td>.77</td>
<td>2.49</td>
</tr>
<tr>
<td>5 Effective communication with other health care professions is equally important as effective communication with patients</td>
<td>.04</td>
<td>.75</td>
<td></td>
</tr>
<tr>
<td>2 Providing patient centered care includes comfort measures and easing pain, particularly in end-of-life care</td>
<td>.07</td>
<td>.72</td>
<td></td>
</tr>
<tr>
<td>7 Team-working skills are essential for all health care students to learn</td>
<td>.11</td>
<td>.62</td>
<td></td>
</tr>
<tr>
<td>6 Functioning of health care teams has little overall effect on safety and quality of care</td>
<td>-.23</td>
<td>.62</td>
<td></td>
</tr>
</tbody>
</table>

Confirmatory Factor Analysis

The multiple indices of CFA proved goodness of fit of the two-factor structure extracted from EFA. The model verification of the comparative fit index (CFI) was conducted on the basis of the chi-square test, degree of freedom, root mean square error of approximation (RMSEA, normal value < .05; acceptable value < .08), goodness of fit index (GFI, normal value > .95; acceptable values > .90), CFI (normal value > .95; acceptable value > .90), and normal fit index (NFI, normal value > .95; acceptable value > .90) 17,18. This demonstrated that the model fit indexes between the theoretical model and the data were acceptable ($\chi^2/df = 4.22$, GFI = .94, NFI = .89, CFI = .91, and RMSEA =.09) in table 3.

Table 3: Model Fit indices for Perception subscales from Confirmatory Factor Analysis

<table>
<thead>
<tr>
<th>Goodness of fit indices</th>
<th>$\chi^2/df(p)$</th>
<th>GFI</th>
<th>NFI</th>
<th>CFI</th>
<th>RMSEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Criteria</td>
<td>$P &gt; .05$</td>
<td>&gt; .90</td>
<td>&gt; .90</td>
<td>&gt; .90</td>
<td>&lt; .08</td>
</tr>
<tr>
<td>SPSQ-KSA model</td>
<td>109.74/4.22(.&lt;.001)</td>
<td>.94</td>
<td>.89</td>
<td>.91</td>
<td>.09</td>
</tr>
</tbody>
</table>

Reliability

Cronbach’s alpha for the factor scales were patient safety (four items), $\alpha=0.81$, and teamwork and patient centered care (five items), $\alpha=0.72$. For the total Korean version of SP-SQKSA Cronbach’s alpha was 0.70 in table 4.

Table 4: Internal Consistency of Factors

<table>
<thead>
<tr>
<th>Categories</th>
<th>Number of items</th>
<th>Cronbach’s alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall scale</td>
<td>9</td>
<td>.70</td>
</tr>
<tr>
<td>F1(Patient safety)</td>
<td>4</td>
<td>.81</td>
</tr>
<tr>
<td>F2(Teamwork and Patient centered care)</td>
<td>5</td>
<td>.72</td>
</tr>
</tbody>
</table>
DISCUSSION

Current healthcare system is complicated and results in negative outcomes and ruins patients. Education about quality and safety has never been considered significant than now to avoid disadvantages of today’s system. Nurses, the largest group among healthcare providers, have to meet changes of their practices required by IOM. Because of their roles in assessment, planning, implementation and evaluation of patient care, they should take part of patient safety and quality care. Nursing education must respond effectively to create a culture of safety for the coming generation of nursing professionals, thereby bridging a gap between education and clinical practice.

Because sociocultural contextual environments have an influence on how individuals formulate cognitive perceptions, putting their sociocultural backgrounds into consideration has a central role in confirming validation of a translated measurement. For this reason the original SP-SQKSA scale was adopted bearing cross-cultural importance in consideration. Items with redundancy or low discrimination function were removed through item analysis to develop a simple and reliable scale. A negatively worded item was deleted in this step. Although this item was analyzed after inverse coding, the corrected item-to-total correlations were below .30.

We tested construct validity of the K-SP-SQKSA using EFA. The PCA of items resulted in a two-factor, nine-item solution that explained a total of 57.1%. Two factors, defined as Patient safety (Factor 1) and teamwork and patient centered care (Factor 2) were calculated with use of EFA, and the satisfactory fit level of the two-factor structure of K-SP-SQKSA was confirmed by means of CFA. This was because of the suitability of CFA in determining construct validity, coupled with the fact that this approach seemed to less influence the final factor structure due to chance characteristics of the data. This study found that the Korean version of the SP-SQKSA showed acceptable construct validity ($\chi^2/df = 4.22$, GFI = .94, NFI = .89, CFI = .91, and RMSEA = .09) when used on Korean nursing students.

CONCLUSION

Our study findings demonstrated that the Korean version SP-SQKSA showed satisfactory validity and reliability, which could be applied to estimate Korean nursing students’ perception of safety and quality knowledge, skills, and attitudes.

ACKNOWLEDGMENT

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Ethical Clearance: Taken from Gwangju University

Source of Funding: Gwangju University

Conflict of Interest: Nil

REFERENCES


Fire Risk Reduction for Folk Villages at Disaster Management in South Korea

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ABSTRACT

Background/Objectives: The object of this paper is to discuss the unique fire risk mitigation challenges facing folk villages in South Korea.

Method/Statistical analysis: We implemented an on-field investigation of fire disaster management systems in Korean folk villages. Also, we conducted face-to-face interviews which were given to a random sample of a total of 140 people in 7 folk villages. These investigations and surveys were analyzed based on the categories of; equipment, disaster education, and trust which are all components of risk communication.

Findings: We conclude that I) the Korean government is only concentrating on expanding disaster prevention equipment supplies, rather than also focusing on enhancing essential disaster training programs, II) current disaster education is insufficient because it focuses only on basic fire safety and occurs just once annually, III) there exists a high level of mistrust among related stakeholders. As a result, we found that folk villages need; I) construction of fire prevention and fire protection systems, II) improvement of the ability to quickly respond to a fire, and III) trust and confidence-building between all stakeholders to preserve folklore cultural properties.

Improvements/Applications: Findings from this research could help in developing strategies and methodologies for reducing and preventing fire risks in folk villages. Findings could also be helpful in mitigating risks from other types of disasters by effectively applying components of risk communication; equipment, safety education, and trust.

Keywords: Korean folk village, Risk communication, Cultural heritage disaster prevention, Fire risk, Disaster management

INTRODUCTION

Folk villages are highly worthy of preserving. As of January 2017, seven folk villages are designated as important folklore cultural properties in the Republic of Korea. They are managed by the

Korean government. This geographical layout structure is called a Feung-shui. Feung-shui was originated from Chinese geographical system of harmonizing everyone with the surrounding environment. It has the layout structure of sitting-mountain and facing-water positions. Also, these villages are recently taking center stage as dynamic tourist spots.¹²

Furthermore, folk villages are situated in places that might be difficult for fire trucks to access quickly. Also it might be difficult to react promptly because most residents are elderly. Therefore, folk villages are at very high risk when a fire occurs.³⁴

Since 2007, the Korean government has been conducting a project of disaster prevention system for wooden architecture and heritage sites to reduce the risk of fire to these heritage assets. This project is
providing disaster management equipment such as extinguishing, alarming, and security tools. However, reducing the risk of a fire is a difficult situation despite the expansion of disaster prevention equipment. This is because most residents are weak and elderly as well have insufficient experience and knowledge of disaster management.

BACKGROUND

Status of folk villages in Korea

Korean cultural heritages are classified as state-designated heritage, city/provincial-designated heritage, and registered cultural heritage. Some folk villages have state-designated heritages and city/provincial-designated heritages, as shown in table 1. There are 23 and 22 cultural assets including national and cultural treasures in Yangdong village and Hahoe village. Also there are 10, 11, 4, 23 and 2 cultural properties in Museom village, Hangae village, Oeam village, Seongeup folk village, and Wanggok Village respectively.

Table 1: Status of folk villages and retained cultural assets

<table>
<thead>
<tr>
<th>Name</th>
<th>Yangdong village</th>
<th>Hahoe village</th>
<th>Museom village</th>
<th>Hangae village</th>
<th>Oeam village</th>
<th>Seongeup folk village</th>
<th>Wanggok village</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>important folklore cultural heritages</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appointed number</td>
<td>No. 189</td>
<td>No. 122</td>
<td>No. 278</td>
<td>No. 255</td>
<td>No. 226</td>
<td>No. 188</td>
<td>No. 235</td>
</tr>
<tr>
<td>Total retained cultural assets</td>
<td>23</td>
<td>22</td>
<td>10</td>
<td>11</td>
<td>4</td>
<td>24</td>
<td>2</td>
</tr>
</tbody>
</table>

(Source: Cultural heritage Administration, 2016)

Seven folk villages have the following features, as shown in table 2. Seongeup folk village has the most traditional houses with 675 and Museom village has the lowest number with 116. Hahoe village is the widest area with an average of 15,721.97m² per house and Oeam village is the narrowest with an average of 839.81m² per home. If a fire breaks out in the Oeam village, we can anticipate that the fire has a high chance of spreading to the next houses than would be the case in other villages which have houses less close to each other.

Table 2: Houses and population of folk villages

<table>
<thead>
<tr>
<th>Name</th>
<th>Yangdong village</th>
<th>Hahoe village</th>
<th>Museom village</th>
<th>Hangae village</th>
<th>Oeam village</th>
<th>Seongeup folk village</th>
<th>Wanggok village</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current state of houses</td>
<td>476</td>
<td>458</td>
<td>116</td>
<td>226</td>
<td>236</td>
<td>675</td>
<td>147</td>
</tr>
<tr>
<td>Area of house(m²)</td>
<td>2027.44</td>
<td>15,721.97</td>
<td>5,768.91</td>
<td>892.20</td>
<td>839.81</td>
<td>1176.61</td>
<td>1229.54</td>
</tr>
<tr>
<td>Population</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>7,763</td>
<td>4,311</td>
<td>2,214</td>
<td>3,760</td>
<td>3,941</td>
<td>3,785</td>
<td>11,121</td>
</tr>
<tr>
<td>65 years old or older</td>
<td>(22.84%)</td>
<td>(34.26%)</td>
<td>(33.83%)</td>
<td>(26.52%)</td>
<td>(15.64%)</td>
<td>(18.07%)</td>
<td>(20.07%)</td>
</tr>
</tbody>
</table>

(Source: Korean statistical information service, 2016)

Wanggok village has an aging (65 years old or older) making up 18.07% of the total population in their administrative areas. Hahoe village comes second with its elderly comprising 34.26% of its total population. Seongeup folk village has the most elderly population percentage with the elderly making up 34.95% of the total populace. As a result of their high elderly population percentages, folk villages are vulnerable to the effects of an aging population and urbanization which has made younger individuals to move larger cities.

Fire risk of wooden buildings

Most buildings are wooden architecture in folk villages and materials used for construction are very often of a weak composition such as is with roof tiles, rice straw, and the like, as shown in figure 1 and figure 2. The main components of these wooden structures are extremely vulnerable to fire and they are easily ignited. Moreover, flashover times are within 3~5 minutes which is faster than with non-wooden buildings.3,4 When fires occur in folk villages,
there is a higher probability of it developing into a larger-scale because wooden buildings are easily combustible. In the fire cases of wooden cultural properties, the arrival time of fire fighters is within 10-22 minutes after the fire occurred. Statistical research indicates that when fire fighters arrive on the scene, most fired buildings have already reached flashover.7

This is because existing measures are focused on fire prevention management for general cultural assets such as historic temples, palaces, and statues.10

Relationship between folk village residents and major government stakeholders

After being appointed as important cultural properties, it caused exposure of resident’s personal lives and affected their privacy and sense of security.2 This creates a high level of distrust among residents of folk villages, the government, and related agencies as well as creates a constraint for maximizing the benefits of these cultural assets for all stakeholders. These issues lead to many problems in maintaining organic cooperation systems to reduce fire risk.10

INVESTIGATION METHOD

We studied and analyzed about risk communication, equipment, education, and trust, of 7 folk villages, as shown in figure 3. These are key points of risk communication to be connected and communicated intimately between the all stakeholders of disaster management.11, 12, 13

Disaster prevention for cultural assets

Cultural properties-related laws for disaster prevention are (I) Cultural Heritage Protection Act (article 14, Prevention of Fire, Disasters, etc.) and (II) Act on Fire Prevention and Installation, Maintenance, and Safety Control of Fire-fighting Systems.8, 9 Both legislations dictate standards for the installation of disaster prevention system for national treasures, and areas designated as cultural heritages. Major categories are fire-fighting systems including but not limited to, fire-fighting equipment, alarming equipment, fire-fighting water equipment.8 These criteria are for general wooden cultural assets without inhabitations as well as those being managed directly by local administration agencies.

RESULT

Equipment

Fire extinguisher

Fire extinguishers used in folk village homes come in 3 types; the dry chemical, the halogenated agent,
and the clean agent. In folk villages, as shown in table 3, the dry chemical accounted for about 95%, the halogenated and clean agents accounted for about a combined 5% of all fire extinguishers. Yangdong village has the most fire extinguishers at 472, and Museum village has the least of them at 11, as shown in figure 4. Automatic fire extinguisher systems are typically installed in the kitchen or places which are equipped with a furnace, as shown in figure 5. Especially, Oeam and Wanggok villages retain the most automatic fire extinguisher systems than the other villages.

Table 3: Fire extinguisher in folk villages

<table>
<thead>
<tr>
<th>Name</th>
<th>Yangdong village</th>
<th>Hahoe village</th>
<th>Museom village</th>
<th>Hangae village</th>
<th>Oeam village</th>
<th>Seongeup folk village</th>
<th>Wanggok village</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire extinguisher</td>
<td>472</td>
<td>254</td>
<td>11</td>
<td>182</td>
<td>203</td>
<td>96</td>
<td>121</td>
</tr>
<tr>
<td>Automatic fire extinguisher system</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>32</td>
<td>-</td>
<td>33</td>
</tr>
</tbody>
</table>

Fire equipment

Table 4 shows the installation status of surveyed fire hydrant systems in all folk villages. Recently, fire hydrant systems are being replaced by hose reel hydrant systems, a sample of which is shown in figure 6 and 7. The reason for this change is that hose reel hydrant systems are easier to operate and lighter in weight to carry than existing fire hydrant systems. This is particularly important for most residents in folk villages who happen to be older and weaker.

Table 4: Fire equipment in folk villages

<table>
<thead>
<tr>
<th>Name</th>
<th>Yangdong village</th>
<th>Hahoe village</th>
<th>Museom village</th>
<th>Hangae village</th>
<th>Oeam village</th>
<th>Seongeup folk village</th>
<th>Wanggok village</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire hydrant system</td>
<td>32</td>
<td>4</td>
<td>7</td>
<td>32</td>
<td>22</td>
<td>26</td>
<td>-</td>
</tr>
<tr>
<td>Manual water gun</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Hose reel hydrant system</td>
<td>1</td>
<td>35</td>
<td>-</td>
<td>-</td>
<td>19</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>Fire pump</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Water source</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Fig. 4. Left: Fire extinguisher (clean agent) in Yangdong village / Right: Fire extinguisher (dry chemical) in Museum village

Fig. 5. A straw roofed house in Wanggok village

Fig. 6. Fire hydrant system in Yangdong village

Fig. 7. Hose reel hydrant system in Yangdong village
Security equipment

Table 5 shows the security equipment status in folk villages. For each village security equipment includes such as flame detectors, smoke detectors, heat detectors, multi sensors, and single alarm detectors as shown in figure 8. Among them, single alarm detectors are equipped in most houses. However, some residents removed it arbitrarily due to frequent breakdown and malfunction, as shown in figure 9. In Museom village, although it was designated as an important folklore cultural property in 2013, disaster prevention and security systems were not in place until 2016 on account of administrative problems.

<table>
<thead>
<tr>
<th>Name</th>
<th>Yangdong village</th>
<th>Hahoe village</th>
<th>Museom village</th>
<th>Hangae village</th>
<th>Oeam village</th>
<th>Seongeup folk village</th>
<th>Wanggok village</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flame detector</td>
<td>61</td>
<td>-</td>
<td>-</td>
<td>26</td>
<td>57</td>
<td>-</td>
<td>51</td>
</tr>
<tr>
<td>Smokedetector</td>
<td>-</td>
<td>12</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Heat detector</td>
<td>3</td>
<td>59</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Multi sensor</td>
<td>38</td>
<td>68</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>97</td>
</tr>
<tr>
<td>Automatic fire alarm system</td>
<td>3</td>
<td>2</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Fire alarm control panel</td>
<td>3</td>
<td>4</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Single alarm detector</td>
<td>2</td>
<td>13</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>110</td>
</tr>
</tbody>
</table>

Fig. 8. Flame detector in Yangdong village

Fig. 9. Detached single alarm detector in Wanggok village

Education

In Korea, Yangdong village is the only folk village that has a disaster prevention center. An image of the center is shown in table 6 and figure 10. This disaster prevention center is equipped with cameras and security detective systems. This enables local administrative authorities and the fire department to monitor the village at all times. In addition, the center conducts safety education for residents.

<table>
<thead>
<tr>
<th>Name</th>
<th>Yangdong village</th>
<th>Hahoe village</th>
<th>Museom village</th>
<th>Hangae village</th>
<th>Oeam village</th>
<th>Seongeup folk village</th>
<th>Wanggok village</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disaster prevention center or not</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Manager</td>
<td>head of a village</td>
<td>head of a village</td>
<td>head of a village</td>
<td>head of a village</td>
<td>head of a village</td>
<td>head of a village</td>
<td>head of a village</td>
</tr>
<tr>
<td>Education implementation</td>
<td>once a year</td>
<td>once a year</td>
<td>once a year</td>
<td>once a year</td>
<td>once a year</td>
<td>once a year</td>
<td>once a year</td>
</tr>
</tbody>
</table>
Particularly, in Yangdong village, since it was appointed as a UNESCO world heritage, its jurisdictional fire station dispatched 1 fire truck and 2 fire fighters to the village for protecting it from fire or disaster, as shown in figure 11.

**Interview survey**

We conducted face-to-face interviews to figure out how residents think of disaster management and cultural heritage designations. Interviews were given to a random sample of 20 residents in each folk village, for a total of 140 people.

**DISCUSSIONS**

To preserve folk villages as a cultural heritage, folk villages should have early fire response and disaster prevention systems for emergency situations. To do this, disaster prevention systems and disaster education must be developed based on trust among stakeholders; the Korean government, the relevant agencies, and the village residents, as shown in figure 12.

**Improvement of fire and disaster management system for folk villages**

It is important to detect and respond to fire rapidly in folk villages due to the easily combustible nature of wood. In this context, automatic fire extinguishing systems are suitable for folk villages. Nonetheless, folk villages have many restraints in structural and conservative respects. Houses in folk villages are easily destroyed due to being old wooden structures.

**Activation of disaster education for improvement of disaster management ability**

Disaster education is needed for minimizing damages through early fire and disaster prevention/response. Education offers information about disaster and fire, and it can help reduce vulnerability of folk villages. The Korean government has educational institutions for disaster management; mitigation, preparedness, response, and recovery. However, it is hard to apply and activate disaster education due to lifestyle, aging, and educational environments in folk villages. Moreover, most of the disaster education provided focuses on basic fire safety education. Also, these educational programs are insufficient because they often occur just once annually.

To solve these problems, robust disaster education and training programs are needed for folk villages. These programs must include; methods to communicate interrelation among stakeholders, designation of roles for each stakeholder in disaster management, and training for the use of fire equipment. Also, it is important for all stakeholders to participate in disaster education and training programs.

**CONCLUSION**

The object of this study is to come up with measures to reduce fire risk through field investigations on
disaster prevention systems in folk villages as cultural assets. We investigated 7 folk villages. We also classified the result of the investigation into equipment, education, and trust which are the main components of risk communication.

Equipment should be managed and designated in places of risk. Education and training are basic countermeasures to mitigate damages from fire and disaster. Trust is needed for cooperation between all stakeholders for disaster management on the basis of self-help, mutual assistance, and national assistance. In addition, all stakeholders should share accurate information about cultural heritage management and disaster management based on trustworthy relationships.

**Ethical Clearance:** Taken from Inje University

**Source of Funding:** Sel.

**Conflict of Interest:** Nil

**REFERENCES**

8. (http://www.koreascience.or.kr/article/ArticleFullRecord.jsp?cn=HJSBCY_2012_v26n4_10)
Effects of Consultants' Job Commitment, Perceived Risk and Penalty Risk on Unethical Consulting Intention and Completion of Consulting - Focused on Government-Subsidized Consulting for SMBs

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³Professor, Dept. of Industrial & Management Engineering, Hansung University, Seoul, Korea

ABSTRACT

Background/Objectives: This study explored the effects of consultants' job commitment, perceived risk and penalty risk on their intention of unethical practices and completion of consulting in government-subsidized consulting projects for SMBs.

Method/Statistical Analysis: Consultants engaged in government-subsidized consulting projects for SMBs were surveyed. The factor analysis was done with SPSS21 to test the construct validity. The structural equation modeling with AMOS21 was used to verify the effects between variables and to test the hypotheses concerning the links between variables.

Findings: The present findings on government-subsidized consulting projects for SMBs and small business owners shed light on the following. First, the job commitment of consultants surveyed here had negative effects on their intention to engage in unethical consulting practices. Second, the perceived risk involving financial and time risk as well as the uncertainties in relation to the quality assurance of consulting service increased consultants' intention to engage in unethical consulting practices. Third, the penalty risk involving government-imposed controls and regulations did not exert statistically significant effects on consultants' intention to engage in unethical consulting practices. Fourth, the intention to engage in unethical consulting practices had negative effects on the completion of consulting performed by consultants.

Improvements/Applications: The study suggests it is necessary to improve the completion of consulting by reinforcing the job commitment of consultants, supporting consulting business environment instead of toughening further regulations and punishment.

Keywords: Job Commitment, Perceived Risk, Penalty Risk, Unethical Consulting Intention, Completion of Consulting, Consulting for SMEs.

INTRODUCTION

Faced with increasing uncertainties of management environment in tandem with the unprecedentedly rapid change of industries and technologies as well as the ever more diverse customer needs, businesses should understand what customers need and want, keep abreast of the latest trend and environment, develop the most appropriate and viable strategies and action plans and implement those plans in order to survive the tough competition and continue to grow.

LITERATURE REVIEW

Korean government’s SMB consulting support policy

According the data published by the Office of Legislation’s National Law Information Center, SMBs
in Korea accounted for 99.4% and 77.4% of all businesses in terms of the number of firms and their employees, respectively, in 2014. In that SMBs outnumber large enterprises and substantially contribute to the country’s economy, the government, particularly the SMB Administration, has taken the initiative to dole out KRW 11.5 billion in 2016 and KRW 6.148 billion in 2017 for business management consulting, specialized consulting and one-stop startup support consulting as part of its SMB-specific customized consulting scheme, to ensure the sustained growth of SMBs that are either entering a growth phase or in slump by virtue of the improvement of their fundamental structure and global competitiveness.

**Job commitment**

Job commitment refers to one’s cognitive and emotional attitude of regarding his/her job as an important matter of interest in life, showing psychological attachment to it, and exerted positive effects on the interplay between consultants and clients.

**Perceived risk**

Perceived risk results from the uncertainty and unpredictability in decision making and affects one’s behavior only when the person subjectively perceives the risk regardless of its objective or statistic presence. Also, perceived risk may be defined as the likelihood of a loss when one pursues desirable outcomes. Well and Prensky (1996) defined the perceived risk as the perception of the likelihood of a product or service failing to meet the value consumers anticipate.

**Penalty risk**

Penalty risk was reported to influence the intention to use illegitimate and unauthorized copies of software, while consumers’ perceived risk, monetary penalties and social risk influenced their intention to purchase pirated software.

**Unethical consulting intention**

Behavioral intention refers to one’s will power and belief that make the person act out a certain attitude, which has been formed toward a certain target, later on, or a future plan to achieve certain goals. Unethical acts refer to taking profits from illegitimate or dubious acts that the cost of others in pursuit of self-interest and ethically unjustifiable acts going against norms. In consulting, a consultant’s unethical acts may involve his/her failure to provide clients with correct information or to comply with the confidentiality for self-interest in the course of consulting projects.

**Completion of consulting**

The completion of consulting may be defined as the extent to which a consulting process is fulfilled to deliver the desired quality that matches its goals and meets the requirements of a client within the given budget and on-time delivery. Nidumolu (1996) divided the project performance into the process performance and the project output performance and defined it as achieving the goals of a contract within the budget and time period agreed upon. Simon & Kumar (2001) proposed the achievement of planned goals, just-in-time service provision, customer satisfaction, implementation of clients’ requests and financial performance as the components of the completion of consulting. Moreover, Bae & Ahn (2013) divided the consulting performance into two variables, process improvement and enhanced problem-solving competency as the measures of effectiveness.

**PROPOSED WORK**

**Research model**

The present study proposed the research model based on previous research as shown in Figure 1 to verify the effects of job commitment, perceived risk, and penalty risk on consultants’ intention to engage in unethical consulting practices and the completion of consulting in government-subsidized consulting projects for SMBs.

![Fig. 1. Research Model](image-url)
HYPOTHESES

Links between job commitment, perceived risk and penalty risk and unethical consulting intention

It was reported that the active involvement of persons in charge and interactions with consultants for problem solving in the course of consulting projects were highly important, where the job commitment increased the involvement and interaction\(^2\). Also, according to Shaub et al. (1993), professionals’ ethical sensitivity varied with their job commitment\(^2\). Pavlou (2001) described that the perceived risk was an antecedent exerting direct effects on the behavioral intention, and a mediator between trust and behavioral intention\(^2\). Regarding the penalty risk, Song et al. (2011) stated that increasing penalty risk in consulting would influence consultants’ ease of act and lessen their unethical practices\(^2\).

Links between unethical consulting intention and completion of consulting

Likewise, research on computerized accounting instruction reported the intention to learn influenced the performance of learning\(^2\). Oh and Yoon (2004) reported the behavioral intention to use had positive effects on the behavioral performance\(^2\).

METHOD

Operational definition of variables and measures

To measure the job commitment, we composed the question items concerning pride, achievement, desire for sustained performance, and acquisition of new knowledge service with reference to the items suggested by Kaplan and White cotton (2001)\(^4\) and Seo (2002)\(^5\). To measure the perceived risk, we defined three key items in the delivery of consulting service, i.e., expense, scope of requirements, and on-time delivery, and derived three relevant question items with reference to Jacoby and Kaplan (1972)\(^10\). To measure the penalty risk with reference to Liao et al. (2009)\(^2\) and Song (2008)\(^2\), we composed 4 question items concerning price, confidentiality, false results and false expense. To measure the intention to engage in unethical practices, we composed five question items with reference to the measures suggested by Liao et al. (2009)\(^2\) and Ko et al. (2005)\(^5\). To measure the completion of consulting, we adapted the measures developed by Pinto & Prescott (1990)\(^2\) to compose four question items concerning the compliance with on-time delivery, budget, responsibilities and quality.

The questionnaire consisted of 20 question items in total. Respondents rated each item on a 5-point Likert scale (1: Strongly disagree, 5: Strongly agree). <Table 1> shows the result of the questionnaire survey.

<table>
<thead>
<tr>
<th>Measurement variables</th>
<th>No of questions</th>
<th>Preceding studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Job commitment</td>
<td>4</td>
<td>Kaplan and White cotton(^4), Seo(^2)</td>
</tr>
<tr>
<td>2. Perceived risk</td>
<td>3</td>
<td>to Jacoby and Kaplan(^10)</td>
</tr>
<tr>
<td>3. Penalty risk</td>
<td>4</td>
<td>Liao et al(^2), Song(^2)</td>
</tr>
<tr>
<td>4. Intention of unethical practices</td>
<td>5</td>
<td>Liao et al(^2), Ko et al(^5)</td>
</tr>
<tr>
<td>5. Completion of consulting</td>
<td>4</td>
<td>Pinto &amp; Prescott (^2)</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>-</td>
</tr>
</tbody>
</table>

Data collection

<Table 2> shows the characteristics of the sample. 80.3% of consultants surveyed had at least 3 years of consulting experience, indicating they were experienced consultants. Respondents were evenly distributed across strategy, personnel management, finance, production, marketing and IT fields. 81.6% of consultants surveyed were engaged in consulting projects supported mostly by the SMB Administration.
Table 2: The Characteristics of Samples

<table>
<thead>
<tr>
<th>Categories</th>
<th>Frequencies</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Company staff level</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 1 year</td>
<td>25</td>
<td>11.2</td>
</tr>
<tr>
<td>1 ~ less than 3 years</td>
<td>19</td>
<td>8.5</td>
</tr>
<tr>
<td>3 ~ less than 5 years</td>
<td>53</td>
<td>23.8</td>
</tr>
<tr>
<td>5 ~ less than 10 years</td>
<td>72</td>
<td>32.3</td>
</tr>
<tr>
<td>10 years or more</td>
<td>54</td>
<td>24.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>223</td>
<td>100</td>
</tr>
<tr>
<td><strong>Consulting field</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strategies</td>
<td>35</td>
<td>15.7</td>
</tr>
<tr>
<td>Human resources</td>
<td>24</td>
<td>10.8</td>
</tr>
<tr>
<td>Finance</td>
<td>23</td>
<td>10.3</td>
</tr>
<tr>
<td>Production</td>
<td>60</td>
<td>26.9</td>
</tr>
<tr>
<td>Marketing</td>
<td>63</td>
<td>28.3</td>
</tr>
<tr>
<td><strong>IT</strong></td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>etc.</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>223</td>
<td>100</td>
</tr>
<tr>
<td><strong>Consulting types</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coupon system of SMA</td>
<td>115</td>
<td>51.6</td>
</tr>
<tr>
<td>Other government supporting</td>
<td>67</td>
<td>30</td>
</tr>
<tr>
<td>Self necessity</td>
<td>38</td>
<td>17</td>
</tr>
<tr>
<td>Others.</td>
<td>3</td>
<td>1.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>223</td>
<td>100</td>
</tr>
</tbody>
</table>

Analyses of validity and reliability

The Cronbach’s \( \alpha \) of 0.871<.976 confirmed the reliability of each variable (Cronbach’s \( \alpha \)>0.7) as shown in <Table 3>.

Table 3: Exploratory Factor Analysis and Reliability Test

<table>
<thead>
<tr>
<th>MV</th>
<th>JC</th>
<th>PNR</th>
<th>PCR</th>
<th>UI</th>
<th>CC</th>
<th>Cα</th>
</tr>
</thead>
<tbody>
<tr>
<td>JC3</td>
<td>0.969</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.968</td>
</tr>
<tr>
<td>JC2</td>
<td>0.967</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>JC4</td>
<td>0.953</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>JC1</td>
<td>0.932</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PNR1</td>
<td>0.949</td>
<td>0.96</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PNR3</td>
<td>0.948</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PNR4</td>
<td>0.946</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PNR2</td>
<td>0.932</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCR3</td>
<td>0.923</td>
<td>0.903</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCR2</td>
<td>0.912</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCR1</td>
<td>0.909</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UI2</td>
<td>0.945</td>
<td>0.976</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UI3</td>
<td>0.931</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UI1</td>
<td>0.906</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UI4</td>
<td>0.875</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UI5</td>
<td>0.818</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CC3</td>
<td>0.873</td>
<td>0.871</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CC2</td>
<td>0.844</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CC4</td>
<td>0.843</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CC1</td>
<td>0.829</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OV</td>
<td>3.738</td>
<td>3.63</td>
<td>2.411</td>
<td>4.228</td>
<td>2.7</td>
<td></td>
</tr>
<tr>
<td>V%</td>
<td>33.98</td>
<td>33</td>
<td>22.19</td>
<td>46.98</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>AV%</td>
<td>33.98</td>
<td>66.98</td>
<td>89.16</td>
<td>46.98</td>
<td>76.98</td>
<td></td>
</tr>
</tbody>
</table>

Note 1) JC : Job Commitment
Note 2) PNR : Penalty Risk
Note 3) PCR : Perceived Risk
Note 4) UI : Unethical practices\( Intention \)
Note 5) CC : Completion of Consulting
Note 6) C: Cronbach’s, Note 7) OV : Original Value
Note 8) V% : Variance %, Note 9) AV% : Accumulation Variance%
Analysis of measurement model

To test the goodness-of-fit of the measurement model and the validity and reliability of the measures, we analyzed the measurement model. Also, CMIN/DF (1.879), GFI (.902), AGFI (.866), CFI (.973), NFI (.944), IFI (.973), TLI (.967), RMR (.048), and RMSEA (.063) substantiated the measurement model was well fitted.

Table 4: Goodness of Fit of Measurement Model

<table>
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<tr>
<th>Measure</th>
<th>FLV</th>
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<th>Tvalue</th>
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<td>.809</td>
<td>.089</td>
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</tbody>
</table>

Goodness of Fit- measurement model

Chi-Square=280.301, df=145, p=.000, CMIN/DF=1.933, GFI=.883, AGFI=.847, CFI=.966, NFI=.932, IFI=.966, TLI=.959, RMR=.007, RMSEA=.066

<Final model>

Chi-Square=210.500, df=112, p=.000, CMIN/DF=1.879, GFI=.902, AGFI=.866, CFI=.973, NFI=.944, IFI=.973, TLI=.967, RMR=.048, RMSEA=.063

Note 1) FLV : Factor Loading Value, Note 2) SLFV : Standardized Loading Factor Values, Note 3) SE : Standard Error, Note 4) SMC : Squared Multiple Correlation

Analysis of research model

To test the research model, the goodness-of-fit of the structural equation model was verified with the items from the final measurement model. [Figure 2=\textit{shows the statistics of the research model.}<Table 5> outlines the goodness-of-fit.

Table 5: Goodness of Fit of Research Model

<table>
<thead>
<tr>
<th>Reference Value</th>
<th>MeasuredValue</th>
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<tr>
<td>Chi-Square</td>
<td>210.5</td>
</tr>
<tr>
<td>df</td>
<td>112</td>
</tr>
<tr>
<td>P</td>
<td>&gt;.05</td>
</tr>
<tr>
<td>CMIN/DF</td>
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</tr>
<tr>
<td>GFI</td>
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</tr>
<tr>
<td>AGFI</td>
<td>&gt;.90</td>
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<tr>
<td>CFI</td>
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<tr>
<td>NFI</td>
<td>&gt;.90</td>
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<tr>
<td>IFI</td>
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<tr>
<td>TLI</td>
<td>&gt;.90</td>
</tr>
<tr>
<td>RMR</td>
<td>&lt;.05</td>
</tr>
<tr>
<td>RMSEA</td>
<td>0.048</td>
</tr>
</tbody>
</table>

Hypothesis testing

With the research model proved to fit well,
The hypotheses were tested with reference to path coefficients as shown in Table 6. In addition, the stronger the unethical consulting intention, the less the consulting completion (standardized coefficients $\beta = -0.148$, $P = .046$).

Table 6: The Structural Path Coefficients of Research Model

<table>
<thead>
<tr>
<th>Structure Path</th>
<th>$\beta$</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>JC $\rightarrow$ MP</td>
<td>-0.155</td>
<td>-2.66</td>
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</tr>
<tr>
<td>PCR $\rightarrow$ MP</td>
<td>0.327</td>
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<td>***</td>
</tr>
<tr>
<td>PNR $\rightarrow$ MP</td>
<td>-0.077</td>
<td>-0.919</td>
<td>0.358</td>
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<tr>
<td>MP $\rightarrow$ CC</td>
<td>-0.074</td>
<td>-1.999</td>
<td>*</td>
</tr>
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</table>

Table 7: The Results of Hypothesis Testing

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Hypothesis To Be Tested</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>Job commitment will have negative effects on the unethical consulting intention.</td>
<td>Accept</td>
</tr>
<tr>
<td>H2</td>
<td>Perceived risk will have positive effects on the unethical consulting intention.</td>
<td>Accept</td>
</tr>
<tr>
<td>H3</td>
<td>Penalty risk will have negative effects on the unethical consulting intention.</td>
<td>Reject</td>
</tr>
<tr>
<td>H4</td>
<td>The unethical consulting intention will have negative effects on consulting performance.</td>
<td>Accept</td>
</tr>
</tbody>
</table>

CONCLUSION

Findings and implications

This study surveyed the consultants engaged in government-subsidized consulting projects for SMBs to establish the effects of job commitment, perceived risk, and penalty risk on the intention to engage in unethical consulting practices and the completion of consulting.

<Table 7> shows the result of hypothesis testing relative to the effects of job commitment, perceived risk, and penalty risk on the intention to engage in unethical consulting practices and the completion of consulting.

ACKNOWLEDGMENT

This study was supported by the Research Program funded by the Hansung University.

Ethical Clearance: Taken from Hansung University

Source of Funding: Self

Conflict of Interest: Nil

REFERENCES

Preparing the Understudies' Games Capacity and Building up their Identity in Physical Training

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ABSTRACT
Physical exercise not exclusively is worthwhile to the understudy solid development, additionally to the understudies' psychological well-being and identity improvement likewise has an exceptionally dynamic part. Physical instruction on understudies' reluctance, aggregate cognizance, self control and different angles have beneficial outcomes; the development of understudies' identity ought to first right ID of the identity of understudies, and afterward to further guide and understudies’ individual advancement, make its solid improvement.

Keywords: Sports Teaching; Cultivation Of Personality; Physical Health

INTRODUCTION
Physical exercise is favorable to the understudy solid development, as well as to the understudies’ emotional well-being and identity advancement likewise has an exceptionally dynamic part. Training the students’ sports ability and developing their personality in physical education described in [1-2] for developing the ability of students. Step by step instructions to give full play to understudies’ identity and games to advance the understudies’ identity improvement part, is not another subject. Nonetheless, the physical teachers investigate has for quite some time been an issue in the act of physical instruction, the viability of the usage is not high, or that the impact is not noteworthy. In this way, we need to think about further what is viewed as deficient, or routine with regards to itself. With the impression of the mindset and advance the showing change of physical training improvement the pressing circumstance, this paper expects to additionally comprehend the impact of understudies' identity and games in view of the system of games instructing, how to develop the understudies’ identity, and games instructing how to upgrade and advance the advancement of understudies’ independence adequacy were new investigation, with period to hone another advancement. Physical education through students’ eyes and in students’ voices described [3-4] for physically challenged peoples.

Sports Teaching Influence Students' Personality Mode
Identity as a mental attributes, there is a sure level of partisan mental qualities total, it is a man's general mental standpoint. Alongside the age development, physiological improvement of develop, grown-up understudies’ mental advancement step by step, over the eyes of educators specialist in the winding down, and different variables impacting part in expanding. As of now, through the games conduct and identity molding capacity, can advance the understudies’ identity wellbeing improvement, bit by bit framed a moderately stable identity. As a rule, games to the understudy distinction impact chiefly has taking after a few ways. In the first place, physical instruction on understudies’ mindfulness of positive impact. Mindfulness is simply the understudies and the target things for themselves and the connection between target learning is created on the premise of cognizant
action. This is a measure of the identity advancement of understudies wellbeing status and identity improvement development level vital image, it has a solidarity of identity of understudies in different parts of the center part. Development in the pre-adult understudies' identity alongside the age development to subjective, and in this vital period, their feeling of self is to advance identity improvement interior inspiration. Physical movement, particularly aggregate games exercises, the understudy can know about itself bears some obligation, they will have the capacity to freely direct state of mind, autonomic control conduct. Through the games ability learning, understudies can dispassionately to self assessment, investigation and recognize their qualities and focal points, and after that uncover the identity of its own conspicuous part. Sports instructing, instructors ought to show understudies how to carry on, learning, wellbeing, collaboration, through physical movement as transporter, make understudies sense of self awareness slowly shaped, advancing the sound advancement of identity of understudies. An outcome of periodized small side games with and without mental imagery on playing described for intercollegiate level soccer players [5]. Second, wears high test on understudy will compel the constructive outcomes. Understudies with “ half ready, half silly “ identity attributes, signs of resolution and self-assurance is not all around controlled, or absence of strength. In the games instructing, instructors make full utilization of games test, spur understudies through rehashed managed self-exertion, go past self, to overcome, to new stature perpetually challenge, to step by step prepare the understudies quiet, rave, dynamic and venturesome soul.

The Method of Cultivating Students’ Identity in Sports Teaching

School physical instruction as a critical methods for building up understudies’ identity, in the games showing procedure ought to make conditions, advances the understudy singularity solid improvement, raise an extensive number of unmistakable identity qualities, can address the issues of social improvement, ability. Thusly, educators must change the past that sort of specialist to stifle the understudies constrained sort showing technique, and ought to as per the understudies’ physical and mental advancement, qualities, receive distinctive showing mode in instructing, to invigorate their enthusiasm for physical preparing, let them locate their most loved activities. Keeping in mind the end goal to accomplish the games educating advances understudy sound identity arrangement and improvement of the showing reason, we have to do the accompanying work: The principal, need to perceive and redress acknowledgment of the identity of understudies. The so called “ the amusement can make kids ‘s nature totally unmasked “, in the school’s games exercises, the understudies will turn their regard for exercises, will actually bring their identity appear. This obliges us to PE instructors in the instructing procedure, to be great at watching the understudies, give careful consideration to understudies, understanding understudies, from the procedure execution in acknowledgment of understudies of various identity. Instructors can as per the understudies’ sexual orientation, abilities, physical contrasts, in the games showing process parcels are some intriguing rivalry, completely stimulate understudies eagerness, make its individual execution list. Students are learning the sports culture from international student [6] for improve the ability. Recognizable proof of understudies’ identity depends on the understudies in the games exercises in the execution, understanding understudies’ individual mental qualities and identity attributes. Obviously, educator perception, understanding the diverse understudy’s independence, to recognize their individual presence as start, such capacity is more exhaustive and target comprehension of the understudy individual, not just the doping of subjective assessment. Through the comprehension of the identity of understudies as per the individual contrasts of understudies, show understudies as per their bent, support the innovative attributes of strange, will upgrade the understudies’ subjective activity, enhance the impact of instructing, to additionally elevate the understudies’ identity to the great bearing. Second, to investigate and to accurately guide understudies’ identity. In light of the uniqueness of the understudies through intriguing contrasts, contrasts in demeanor, identity contrasts and contrasts of capacity and different angles, so educators ought to in various routes by various courses for understudies to take an assortment of approaches to direct. As indicated by the individual
contrasts of understudies, make comparing instructive measures, received in various games exercises in direction of intrigue, develop demeanor, practice limit, and step by step lead understudies identity. Physical instruction educator ought to reinforce the presence of contrary, narrow minded, in reverse and solid identity of understudies to attempt so as to guide, enable them to overcome and revise, so that all understudies are genuinely honorable good, physical and emotional wellness, the exhaustive improvement of excellent faculty. Educators through the sensible association of games exercises, classroom showing content plan, the development of understudies’ reluctance, improve the understudies’ subjective activity. The instructor ought to likewise, during the time spent educating, to furnish understudies with more opportunity, give understudies adequate regard and trust, to empower their self, dynamic interest in the exercises of the activity, to frame a dynamic, glad games environment. By choosing with youthful mental and physiological attributes, content, make both glad and has some minor mental weight movement climate, through the acknowledgment of various understudies of various points of interest, carry on to the understudy to energize, the acclaim is really a directional managing, make understudies shape the right esteem judgment, so that in the games exercises keep on showing a fine identity quality.

Creating Students’ Personality in Sports Instructing

Encounter as a philosophical idea is characterized between the subject and the protest of an uncommon relationship. Brandishes in physical action as the fundamental trademark, in any case, cooperation in physical action is not a procedure of experience. Our games instructing to understudies to ace the method is right for the objective, more to remain in specialized developments bestowed, dons just as a uniform development in the understudy’s brain, in spite of the fact that understudies in physical training are by and by, the particular operation, however has no profound into the internal universe of the understudies, as physical training, to encounter the genuine implication of game. We just enable understudies to encounter the essence of game, to make the game more significant information and comprehension to involvement, from games to bring your own particular bliss. Here, by a showing part as a case, talk about how to give understudies a chance to involvement in games exercises during the time spent advancement of identity.

CONCLUSION

Psychological characteristics of personality and personality dispositional characteristics are interconnected, as education is the essence of objective, physical educationshould focus on training to meet the needs of the community, a distinct personality of talents. Therefore, physical education should attach importance to the students’ personality development and perfection, in the sportsteaching the exploration of students’ personality and students’ independent innovative ability, eventually led to the healthy development of personality of students and improve. PE teachers teaching each practice should take into accountall kinds of needs of students, the personality differencesbetween students to implement the difference teaching, students according to the teacher to provide methods and ideas, and gradually complete the teaching task, in improving the learning effect at the same time to developand perfect the self character. Physical education teachers to students through observation, understanding, combined with the students’ individual differences and physical differences and other actual situation, advance to the students present task index, this index is available through their own efforts and targets, and require students to the target physical exercises. This method can give students more freedom, autonomy learning space, make students from passive into active learning practice, will not only help students to stand on one’s ownability, but also on the personality of its development with great benefits.

Ethical Clearance: Taken from AMET University

Source of Funding: Self

Conflict of Interest: Nil

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An Orderly Survey and Meta-Investigation of Intercessions Intended To Increment Judicious-to-Energetic Physical Education in School Physical Training Lessons

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2Assistant Professor, School of Management, Allagappa University, Karaikudi, Tamil Nadu, India

ABSTRACT

Physical training that enables under-students to take part in judicious-to-energetic physical movement (JEPM) can assume a critical part in wellbeing advancement. Shockingly, JEPM levels in PT lessons are regularly low. In this survey, we planned to decide the viability of intercessions intended to expand the extent of PT lesson time that under-students spend in JEPM. We hunt electronic databases down intercession concentrates that were directed in essential or optional schools and measured the extent of lesson time under-students spent in JEPM. We surveyed danger of inclination, separated information, and directed meta-investigations to decide mediation adequacy. From an underlying pool of twelve, one-twenty-four non-copy records, fourteen think about met the incorporation criteria. Under-students in intercession conditions invested twenty-four percent more lesson energy in JEPM contrasted and under-studies in common practice conditions. Given the modest number of studies, direct to high danger of predisposition, and the heterogeneity of results, alert is justified with respect to the quality of accessible proof. In any case, this audit shows that intercessions can expand the extent of time under-students spend in JEPM amid PT lessons. As most kids and youths take an interest in PT, these intercessions could prompt generous general medical advantages.

Keywords: Physical Education, Judicious-To-Energetic Physical Movement, School Physical Training Lessons.

INTRODUCTION

There is abundant proof that taking an interest in judicious-to-energetic physical movement (JEPM) can prompt an assortment of advantages for youngsters and teenagers. Contrast and their latent partners, youth who are adequately dynamic appreciate better physical wellbeing, report more positive physical personality conception and worldwide confidence, see a superior personal satisfaction, and accomplish higher scholastic outcomes[1-3]. Tragically, the physical movement (PM) levels of numerous youngster and youths are right now lacking to advance these advantages. Because of this confirmation, the significance of schools in PA advancement has been highlighted, and the focal part of physical training (PT) programs in this exertion has been underscored[4]. PT classes include practically all individuals from an age companion; in this manner, quality PT could have extensive wellbeing suggestions for almost all adolescent. Shockingly, under-studies’ JEPM levels in PT lessons are frequently low. Surely, the extent of lesson time amid which under-studies are occupied with JEPM is normally less, and regularly far less, than the half focus on that was proposed by the Branch of Health and Human Services and the Association for Physical Education[5-6].

Thus, these lessons may give lacking JEPM to under-studies to profit. School-based intercessions can advance JEPM in youth and expanding dynamic learning time in PT has been a segment of huge
numbers of these mediations. Be that as it may, as far as anyone is concerned, no orderly audit has been finished to decide the impact of mediations gone for expanding dynamic getting the hang of amid PT lessons. Other deliberate audits were not centered particularly around intercessions intended to build JEPM amid PT. Rather, these audits have analyzed: first, in the impact of school-construct mediations with respect to aggregate every day JEPM or second, a blend of intercessions intended to build add up to day by day JEPM and those particularly intended to expand JEPM amid PT lessons. Likewise, as far as anyone is concerned, no meta-examination of PT-centered intercessions has been directed. Subsequently, the adequacy of intercessions on JEPM in PT has not been resolved.

METHOD

Adequate Criteria

Included reviews examined understudies from PT classes in grade schools or auxiliary schools. Pre-school or post-auxiliary foundation tests were rejected. Concentrates more likely than not tried a mediation, to be specific a ponder endeavor to actualize a change to normal showing rehearsal keeping in mind the end goal to build the extent of PT lesson time spent in JEPM. Considers concentrating on an examination of conditions, yet not an intercession, were prohibited. For instance, a review looking at dynamic learning time amid ball games versus net games would not have been incorporated, in light of the fact that both sorts of exercises are considered piece of normal practice in PT. We included reviews utilizing test and semi-trial strategies. Cross-sectional and accomplice outlines were avoided. No confinements were set with respect to the length of the mediation or the subsequent period. Concentrates expected to incorporate a measure of the extent of PT lesson time spent in JEPM. This measure could be objective or include precise direct perception by an autonomous rater. We included English dialect, peer-audited articles that revealed essential information and had been distributed on the web or in print by set no restrictions on the most punctual distribution date.

Study Assortment

In the wake of sending out records into closing stagecommunication reference supervisor programming and erasing copy records, we expelled concentrates whose title unmistakably showed the review did not meet the incorporation criteria. Next, we read abstracts from the rest of the reviews and avoided those that did not meet our incorporation criteria. At last, two analysts autonomously read the full form of the rest of the articles and prescribed each for incorporation or rejection, recording the particular foundation not satisfied for studies suggested for avoidance. At the point when a rule was not satisfied, the article was not viewed as any further. The request in which criteria were viewed as was as per the following: Copy information from another article, no target or observational measure of JEPM, no extent of time in JEPM revealed, off baseage, no intercession intended to expand JEPM contrasted and a control, not a full-content associate inspected article containing essential information and Different Disagreements with respect to criteria satisfaction were settled by discourse between the two analysts.

Data Assortment Procedure

Two individuals from the examination group autonomously extricated information from each article. Information things included attributes of study outline and examining, intercession conveyance, result measure used to evaluate the extent of lesson time spent in JEPM, span of development, and the mean extent of lesson time spent in JEPM in the mediation and control conditions. Taking after extraction, any non-indistinguishable information was talked about and purposes of contrast settled. At the point when information required for meta-examination was not displayed, these were evaluated, where conceivable, in view of computations as well as presumptions conceivable from the data given in the report. A biostatistician (BS) made all estimations, steady with techniques laid out by the Cochrane Collaboration.

RESULTS AND DISCUSSION

All information identified with the extent of lesson time spent in JEPM can be seen in reviews included examinations that represented benchmark JEPM
levels, while others just included correlations at development. Subsequently, hugeness levels and impact sizes are not straightforwardly equivalent. In a few reviews, a noteworthy finding demonstrated a between-gathering contrast in the adjustment in the extent of lesson spent in JEPM. In different reviews, a critical finding demonstrated a between-gathering distinction at follow-up just. All reviews found a higher extent of dynamic learning time in the intercession aggregate contrasted and the control gathering. In ten of the twelve concentrates that utilized a solitary estimation instrument, the distinction was factually huge. Among studies that utilized two measures of JEPM, revealed a noteworthy impact just on the measure of JEPM, while in both heart rate screen and scores supported the mediation condition.

The point of our review was to efficiently survey the confirmation identified with mediations intended to expand understudies’ JEPM inside PT lessons. In general, intercessions were related with twenty-four percent more dynamic learning time contrasted and regular practice. Viable intercession procedures included instructor proficient getting the hang of concentrating on class association, administration and guideline, and supplementing normal PT lessons with high-force action. There was impressive heterogeneity as far as study plan, length, and test estimate. In this manner, our discoveries ought to be translated with alert. Since there are so few reviews, yet their outcomes are for the most part positive, there is a need and chance to assess the impacts of intercessions to expand dynamic learning time in great group randomized controlled trials.

CONCLUSION

Schools are perfect settings for the advancement of physical movement among youth, and PT is the essential vehicle related with this goal in schools. Proficient learning concentrated on instructor teaching method and conduct offers significant potential for expanding physical movement in youth. First, more straightforward revealing of mediation systems, including points of interest of expert learning for instructors, is required. Second, consistency in physical action appraisal will take into consideration more significant correlations of intercession impacts crosswise over reviews. In rundown, the current confirmation shows that intercessions can build the extent of PT lesson time understudies spend in JEPM, however higher quality trials are expected to decide how best to advance JEPM in PT lessons, and to decide the best and economical mediation techniques.

Ethical Clearance: Taken from , AMET University.

Source of Funding: Self

Conflict of Interest: NA

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Improved Semantic E-learning Framework for Complex Query Processing in Heterogeneous Web Services

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ABSTRACT

Semantic e-learning has emerged as a next generation e-learning platform by enabling advanced manipulation, sharing, exchange, usage, and complete understanding of learning resources. Semantic framework is an appropriate methodology for extracting relevant contents from e-learning applications. However, Web-based data extraction suffers from the lack of discovery of heterogeneous Web services. Also, e-learning contents mainly focus on single domain ontologies. This paper presents an improved Semantic e-learning framework by extending or enhancing single domain ontologies to heterogeneous Web services. The proposed e-learning framework is built by integrating different and efficient matching mechanisms for handling and acquiring all kinds of heterogeneous Web-data contents and complex query data processing. The discovery of unified query processing services resulted in the extension of Web services. Our proposed framework also involves the processing of complex query in the heterogeneous e-learning framework. From the comparative analysis, it is clearly observed that the proposed framework yields higher precision, recall, and F-measure values than the existing attribute-based and item-based filtering algorithms.

Keywords: E-learning, Heterogeneous Web, Query Processing, Semantic Framework

INTRODUCTION

E-Learning (Eklund et al., 2003), (Pandit, 2010) provides an easy access for learning resources anytime and anywhere through a repository of learning resources (Cao and Zhang, 2006). It also supports features, such as, personal definition of learning goals, dynamic learning, the association amongst learners, and between learners and instructors (Ghaleb et al., 2006), (Alsultanny, 2006). In recent years, Semantic Web (Davies et al., 2003), (McIlraith et al., 2001), (Berners-Lee et al., 2001) is an emerging topic in the Internet community, for enabling a clear understanding of the Web. It provides a clear declaration of knowledge embedded in the Web-based applications, intelligent integration of the information, and extraction of information from the texts. It also provides an environment that enables communication between human and machine agents. The primary characteristic of the Semantic Web is shared understanding based on ontologies as a backbone. Owing to its merits, Semantic Web technology is used widely in various industrial organizations, academic institutions, and research firms. Semantic Web (Payne and Lassila, 2004) is used to express information for software agents in an accurate and machine-readable form to process, share, reuse, and understand the terms in the data. Figure 1 shows the architecture of Semantic e-learning framework.

In the world of learning facts and terminologies, e-learning plays a major role in gathering the best kind of knowledge through online. e-learning provides an effective way for learning and teaching-learning applications, through the usage of interactive and innovative approaches of network technologies, such as, the Internet and business networks. The main advantages of e-learning are stated below:
Delivery: Enables the learner to determine the agenda.

Responsiveness: Permits the learner to respond to the problem at hand.

Direct access: Enables direct access to knowledge.

Symmetry: Allows learning as an integrated activity.

Modality: Enables execution of learning process in parallel to business tasks.

Authority: Allows deriving of contents from communication between learners and educators.

Personalization: The content is determined according to the needs of the individual user.

Adaptivity: The content can be modified constantly through the user input, experiences, innovative practices, and business rules.

Motivation

Currently, Semantic Web framework is the most suitable, effective content processing, and retrieving methodologies for the e-learning system (Stojanovic et al., 2001), (Barros et al., 2011). Semantic-based e-learning methodologies (Cao and Zhang, 2006), (Konstantinos et al., 2009) have emerged as an innovative methodology for providing rich-learning contents extracted from various Web resources. e-learning based Web data mining is performed by using structured semantic processes of discovering Web services. Through Semantic-based technologies, e-learning has emerged as an intelligent platform in the real-time era of educational Semantic Web (Anderson and Whitelock, 2004). The emergence of Semantic Web technologies has changed the focus of e-learning system from task-based approach to knowledge-based approach. The problems identified in most of the Semantic Web-based framework is the lack of discovery of heterogeneous Web services. Also, e-learning contents mainly focus on single domain ontologies (Geetha et al.). This paper focuses on the development of Semantic e-learning framework for heterogeneous Web services.

Proposed work

The main objective of the proposed framework is to extend or enhance single domain ontologies to heterogeneous Web services by building an improved e-learning framework. The proposed framework is built by integrating different and efficient matching mechanisms, for handling and acquiring all kinds of heterogeneous Web-data contents and complex query data processing. In e-learning framework, Web-services are extended or enhanced by discovering unified query processing services or incorporating the heterogeneous e-learning framework. Some Web-based services experience the lack of complex query matching process that produces non-valid contents, such as logical operators or any data driven operator processes (Geetha et al.). Our proposed framework incorporates the processing of complex query in heterogeneous e-learning framework. Complex queries also include the processing of data operators to enable effective semantic retrieval of e-learning contents.

Fig. 1. Architecture of Semantic e-learning Framework

Organization of the paper

The remaining sections in the paper are systematized as follows: Section II provides a brief overview of the current works related to Semantic-based e-learning approaches. Section III explains the proposed Semantic e-learning framework. Section VI presents the comparative analysis of the proposed framework with the existing attribute-based and item-based methods. Section V includes conclusion and a discussion on the future scope of the proposed work.

Related Work

This section provides an overview of the Semantic-based e-learning approaches. Barbagallo and Formica (Barbagallo and Formica, 2016) developed an ontology-based system by combining the similarity-based semantic search method and e-learning technologies. The system enabled customization of e-learning courses according to the needs and preferences of learners. Sharif et al. (Sharif et al., 2015) proposed semantic-based recommendation system to facilitate effective e-learning. The proposed model achieved higher precision and recall for the returned records. Masud (Masud, 2016) presented solutions for semantic data interoperability, distributed metadata management, and an agent-based query processing
approach to support the exchange of learning content from different e-learning systems. The proposed solution resulted in high user satisfaction. Walia et al. (Walia et al., 2015) designed an e-Learning approach to improve the significance of the meaningful information by adding human conceptual representation and reasoning mechanism for learning based on the knowledge and experience of the learner. Sarwar et al. (Sarwar et al., 2016) developed an ontologymbased adaptive e-Learning framework for providing semantic contents to the learner. Alomari et al. (Alomari et al., 2015) proposed an automatic semantic e-learning system for the graphical representation of course contents with illustrations and semantic meaning using ontology. Vesin et al. (Vesin et al., 2016) developed a modern e-learning system for adapting learning contents to the mobile device of learners. Mahmoud et al. (Mahmoud et al., 2013) defined a Semantic Web-based framework for e-learning system, for improving the potential of making Web content comprehensible. Yarandi et al. (Yarandi et al., 2013) developed an ontology-based adaptive e-learning system based on the design of semantic content to modify the teaching process, for satisfying the needs of an individual learner. The proposed system supported personalized learning. Antony et al. (Antony et al., 2012) proposed an adaptive e-learning system for classifying users based on the similarity measure and providing adaptive recommendations to individual users.

Srivastava et al. (Srivastava et al., 2014) developed an e-learning system based on the Semantic Web while focusing on the Resource Description Framework (RDF) and Web Ontology Language (OWL). Rui and Maode (Rui and Maode, 2012) introduced a Semantic Web-based e-learning framework for solving the drawbacks of the traditional e-learning platforms. Patel and Bhadka (Patel and Bhadka, 2015) solved the limitations of current e-learning environment based on the Semantic Web technology for quickly providing the relevant resources to the learner. Kannan and Saravanan (Kannan and Saravanan, 2013) developed an ontology-based and Semantic Web-based e-learning support system for creating dynamic learning paths for learners. Tiwari et al. (Tiwari et al., 2014) conducted a survey on different types of e-learning models.

Halimi et al. (Halimi et al., 2014) presented an approach for controlling the personalization of learning process according to the preferences, interests, and knowledge of students by using the social Semantic Web. Rashid et al. (Rashid et al., 2013) proposed an e-learning management system by using the Semantic Web technologies. El-Seoud et al. (El-Seoud et al., 2015) studied the integration of the Semantic Web technologies with the e-learning systems, while considering the standards and reusable learning objects. Icoz et al. (Icoz et al., 2014) created an ontology editor for generating concept maps for Semantic Web-based e-learning systems. Sheeba et al. (Sheeba et al., 2012) discussed the semantics applied to the learning content for enabling large-scale e-learning activities over the service-oriented infrastructures.

Proposed Work

This section explains the proposed e-learning framework. Initially, the user query is obtained and preprocessed to remove the stop words. Then, the keywords are extracted, and the semantic words of the extracted keywords are obtained. The keywords are obtained and ranked based on the category. The words are extracted and weight of the words is computed based on the number of occurrence of the word in that document. The words are ranked based on the weight, and the approximate results are extracted from the database. Figure 2 illustrates the overall flow diagram of the proposed semantic e-learning framework.

Fig. 2. Overall Flow Diagram of the proposed Semantic e-learning Framework
Preprocessing

Initially, the dataset is loaded. During the preprocessing stage, the category is extracted, and initial keywords are obtained from the category. The Part of Speech (POS) taggers are applied, and comprehensive keywords are extracted from the category.

Initial Document Processing Procedure

Let $W_b$ be the distributed data
Let set of all Documents be $D$ in $W_b$
Extract Top categories from the $D$,
For all $i = 1$ to $N$, in $D$
Apply POS tagger;
Tag words to extract Keywords from $D_i$;
$K \rightarrow$Keywords($D_i$);
Update $K$ with $D_{index}$
End For

User data management process

In this stage, first time user registration is performed, and identity (ID) and one-time access code are provided to the user. The backup of the previous search history of the user in the database is maintained.

Query Search & data retrieval

The user query is obtained and split into words. The stop words are removed, and keywords are extracted. The semantic words of the keywords are found out, and the category is identified. The rank of the keywords is computed, and exact matching of the keywords are extracted from the database. The approximate results are extracted from the database by using the previous history of the users.

Query Processing and Result Extraction

Let $Q_r$ be the User Query;
Let $SW_{first}$ be the predefined stop words list
Let count $c=0$;
$Q(i) \leftarrow$ split($Q_r$,word);
For $i=1$ to $Q_{size}$
If $(Q_i, in )$
Remove from $Q$;
End If
Until $i=$;
End For
Update
For $i=1$ to $K$
If $(K)$
$C++$;
Set $=$
End If
If $c>1$;
Set $=$
End If
End For
End For

Query pattern identification and generalization

A search system receives one or more queries from the user and provides corresponding information relevant to the user queries. The user can send a query to inquire facts, such as, characteristics, properties, and attributes of a person, place or object, and so on. Initially, a search system receives the query about the attribute of a topic. For example, to determine the height of the Eiffel tower, the user may submit queries, such as, “How tall is Eiffel tower?,” “What is Eiffel tower’s height?,” or “What is the height of Eiffel tower?”. These queries may be filtered and normalized using different techniques, and may be stored as query patterns. The search system can store the queries as query patterns and generalize the query patterns, to allow users to obtain information about similar attributes of different topics or different attributes of similar topics. For example, since the topic
“Eiffel Tower” is indicated as a ‘world wonder’ category or ‘monument,’ the specific query patterns that refer to the height of Eiffel tower are generalized as [how tall is /worldwonder/], [how tall is /monument/], or [/world wonder/ height], [/monument/height].

The search system generalizes the query patterns by selecting one or more portions of the query patterns, removing those selected portions from the query patterns, and replacing the removed portions with one or more identifiers. For example, the query pattern “how tall is Eiffel Tower?” is generalized as “how tall is /building/”. Also, the query pattern “What is Eiffel tower’s height?” can be generalized into a first generalized query pattern “What is /Building/’s height?” and a second generalized query pattern “What is /Building/’s/Attribute/.” Here, the word ‘height’ is generalized as an attribute. The second generalized pattern includes generalized identifiers for both the topic and the attribute. The generalized patterns are also possible for any combination of attribute and topic.

The search system can associate the generalized query patterns with one or more topics or one or more attributes to obtain information about similar attributes of different topics or different attributes of similar topics. For example, when another user submits a query such as “How tall is Great Wall of China?,” the search system can determine that the topic “Great Wall of China,” is also indicated as a member of the ‘world wonder’ or ‘monument’ category, and can match this query to the generalized query pattern. Then, the search system determines whether the user query is a question related to the height of the Great Wall of China. The search system may return the value associated with the ‘height’ attribute for the topic ‘Great Wall of China’.

Performance Analysis

For the performance evaluation, a real-world dataset is obtained from the Modular Object-Oriented Dynamic Learning Environment (MOODLE) learning platform (Community, 2016). The proposed semantic-based e-learning (SLF) framework is compared with the existing attribute-based methods including Collaborative Filtering (CF), Content-Based Filtering (CBF), Most Frequently Visited material (MFV), Most Similar Visited material to target learner (MSV), Most Similar Visited to the Most Similar Learner (MSV-MSL), MFV-MSL, and Item-Based CF (IBCF) methods (Salehi and Kmalabadi, 2012).

Recall

The recall is a measure of the amount of the approximate results extracted from the database. Figure 3 shows the recall analysis of the proposed SLF and existing attribute-based methods and item-based CF. From the comparative analysis, it is observed that the proposed SLF yields higher recall than the existing methods. The difference between the recall values of the proposed SLF and existing CF, CBF, MSV, MSV-MSL, and IBCF methods is 0.079%, 0.064%, 0.027%, 0.02%, and 0.097% respectively.

Precision

Precision is a measure of extraction of the approximate results from the database. Figure 4 depicts the comparative analysis of the precision value of the proposed SLF and existing attribute-based methods and item-based CF. The proposed SLF yields higher precision value than the existing methods. The difference between the precision values of the proposed SLF and existing CF, CBF, MSV, MSV-MSL, and IBCF methods is 0.087%, 0.061%, 0.036%, 0.005%, and 0.175% respectively.
F-measure

F-measure is defined as the weighted harmonic mean value of the precision and recall. Figure 5 shows the F-measure of the proposed SLF and existing attribute-based methods and item-based CF. The F-measure of the proposed SLF is higher than the existing methods. The deviation between the F-measure of the proposed SLF and existing CF, CBF, MSV, MSV-MSL, and IBCF methods is 0.098%, 0.08%, 0.042%, 0.028%, and 0.135% respectively.

Table I: Comparative analysis of the recall, precision, and F1-measure of the attribute-based methods, item-based CF and proposed SLF

<table>
<thead>
<tr>
<th>Algorithms</th>
<th>Recall (%)</th>
<th>Precision (%)</th>
<th>F-measure (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CF</td>
<td>0.342</td>
<td>0.672</td>
<td>0.454</td>
</tr>
<tr>
<td>CBF</td>
<td>0.357</td>
<td>0.698</td>
<td>0.472</td>
</tr>
<tr>
<td>MSV</td>
<td>0.394</td>
<td>0.723</td>
<td>0.51</td>
</tr>
<tr>
<td>MSV-MSL</td>
<td>0.401</td>
<td>0.754</td>
<td>0.524</td>
</tr>
<tr>
<td>IBCF</td>
<td>0.324</td>
<td>0.584</td>
<td>0.417</td>
</tr>
<tr>
<td>SLF</td>
<td>0.421</td>
<td>0.759</td>
<td>0.552</td>
</tr>
</tbody>
</table>

Table I shows the comparative analysis of the recall, precision, and F1-measure of the attribute-based methods, item-based CF and proposed SLF. The proposed SLF yields higher precision, recall and F-measure than the existing CF, CBF, MSV, MSV-MSL, and IBCF methods.

Recall vs. number of recommendations

Figure 6 shows the recall plot of the proposed SLF and existing CF, CBF, MFV, MSV, and MSV-MSL methods with respect to the number of recommendations. The recall value increases with respect to the increase in the number of recommendations. From the recall graph, it is observed that the proposed SLF yields better recall than the existing MFV and MSV methods.

Precision vs. number of recommendations

Figure 7 illustrates the precision analysis of the proposed SLF and existing CF, CBF, MFV, MSV, and MSV-MSL methods with respect to the number of recommendations. The precision value increases with the increase in the number of recommendations. The precision of the proposed SLF is higher than the existing methods.

F-measure vs. number of recommendations

Figure 8 shows the F-measure analysis of the proposed SLF and existing CF, CBF, MFV, MSV, and MSV-MSL methods with respect to the number of recommendations. There is a linear increase in the F-measure with respect to the increase in the number of recommendations. From the F-measure analysis graph, it is observed that the proposed SLF yields higher F-measure than the existing method.
Top-n-precision

Figure 9 shows the graph illustrating the percentage of improvement in the Top-n-Precision for personalized search over normal search with three sizes of queries, such as, SK, TWK, and THK (Zhuhadar et al., 2009). The proposed SLF achieves higher Top-n-Precision with respect to increase in the top-n-documents.

Top-n-recall

Figure 10 shows the graph illustrating the percentage of improvement in the Top-n-recall for personalized search over normal search with three sizes of queries, such as, SK, TWK, and THK. The proposed SLF yields higher Top-n-recall with increase in the top-n-documents. Table II shows the comparative analysis of the Top-n-precision and Top-n-recall vs. top-n-documents. For five documents, the Top-n-Precision of the proposed SLK is 7%, and Top-n-Recall is 16%. The Top-n-Precision of SK is 5%, TWK is 2%, and THK is 6%. The Top-n-recall of SK is 5%, TWK is 15%, and THK is 5%. For 50 documents, the Top-n-Precision of the proposed SLK is 26%, and Top-n-Recall is 39%. The Top-n-Precision of SK is 25%, TWK is 25%, and THK is 23%. The Top-n-recall of SK is 38%, TWK is 37%, and THK is 37%. Hence, the Top-n-Precision and recall values of the proposed SLK are higher than the normal search with SK, TWK, THK.

Table II: Comparative Analysis of Top-n-Precision and Top-n-Recall vs. Top-n-Documents

<table>
<thead>
<tr>
<th>Number of top-n-documents</th>
<th>SK</th>
<th>TWK</th>
<th>THK</th>
<th>SLF</th>
<th>SK</th>
<th>TWK</th>
<th>THK</th>
<th>SLF</th>
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<tbody>
<tr>
<td>5</td>
<td>5</td>
<td>2</td>
<td>6</td>
<td>7</td>
<td>5</td>
<td>15</td>
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</table>
CONCLUSION AND FUTURE WORK

In this paper, an improved semantic-based e-learning framework is proposed for processing complex user queries. The proposed framework is built by integrating different and efficient matching mechanisms for handling all kinds of heterogeneous Web data contents. Our proposed framework incorporates the processing of complex query in heterogeneous e-learning framework. The complex queries include the processing of data operators to enable effective semantic retrieval of e-learning contents. The proposed SLF is compared with the existing CF, CBF, MFV, MSV, MSV-MSL, and IBCF methods. From the comparative analysis, we observe that the proposed SLF yields higher precision, recall, and F-measure values than the existing methods. The precision, recall, and F-measure of the proposed SLF are higher than the existing methods with respect to the number of recommendations. The proposed SLF yields higher Top-n-precision and Top-n-recall with respect to the increase in the top-n-documents. In future, our proposed work is extended and applied for mobile-based query search applications.

Ethical Clearance: Taken from STET Women’s College

Source of Funding: Self

Conflict of Interest: Nil

REFERENCES


Demonstrating of the Signal Formation in SIC Sensors for Measurements of the Radiation Spectrum in Nuclear Energy

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ABSTRACT

The displaying procedure of the signal improvement in SiC sensors is displayed. The demonstrating uses two procedures: the first is the organized approach while the second is the explanatory approach. The sensor response is gotten from both approaches: this is the standard course of action of the forward issue. Besides, the reaction capacity of the sensor is assessed by methods for the diagnostic approach and it can be utilized to take care of the backwards issue: recuperating the essential radiation range utilizing the reaction of the sensor. Also, the reaction work returns data about the signal development in the sensor, for example, the state of the reaction framed by particles with a particular vitality. Comes about gotten by reenactments are then contrasted and exploratory information.

Keywords: Detector, Inverse Problem, Measurement, MCNP, Modeling.

INTRODUCTION

Sensors in light of silicon carbide (SiC) are exceptionally appropriate for spectroscopic estimations in atomic vitality recorded because of points of interest given by the 4H-SiC polytype. Its capacity to work in lifted temperature, the expanded radiation resistance and the wide band crevice (3.25 eV) enable it to work in unforgiving radiation situations.

The sensor response is generally known as checks per channel (Ci) and is described in [1-3]. The amount of channels (M) is dictated by essentialness divisions. This influences the response shape since the amount of checks in each channel depends on upon the channel width.

We use two approaches to manage deal with the forward issue. The first is the fused approach, returning only the response of the sensor under a well specific radiation. This article is expressed from the following papers, Current channelling in time-domain airborne electromagnetic data[4] presented the methodical approach, gives us the sensor response, and, what is more basic, it makes the response limit of the sensor, which is used to deal with the regressive issue. The response limit will be used to assess the limit of the sensor in dealing with the regressive issue with a delightful level of imperativeness range assurance.

METHOD

The integrated approach shown in Fig. 1 includes two steps, consisting of two separated simulations using MCNP/MCNPX

Step 1: Gathering of the radiation range.
Step 2: connection between the sensor and the gathered radiation. The circle surface is utilized to spare particles crossing it in the initial step. In the
second step, the surface is a limit of the model and produces particles spared in the initial step.

The code produces four reaction capacities. Two adaptations of the capacity are accessible for neutrons and gammas to get more data in tackling the backwards issue. The first depends on a consistent width of channels, and it is named LIN; the second one is LOG and incorporates channels with the coasting vitality. In addition, the quantity of channels, which are utilized to appropriate tallies, may differ accordingly it impacts on determination of the reaction work. The quantity of divers in the reaction capacity is characterized by the client.

Inversion of airborne EM data using thin-plate models\(^5\) described the models of the thin plate. The response limit is a grid in which segments address responses conveyed by particles whose essentialness is inside a specific range and lines identify with channels. The unit of the response limit is check probability per atom fluence occurring in the sensor.

With a specific end goal to accomplish the reaction work which is more general, the committed code incorporates a capacity considering connected voltage in the sensor. It is realized that the connected voltage impacts the width of the space charge district where the reaction is gathered. In this manner, we can build up the reaction of the sensor under different radiations and voltages. We stretch that directs in the reaction capacity are characterized by the client.

**RESULTS**

The investigation geometry utilized as a part of reenactments is displayed in Fig. 2. The sensor is found roughly 10 cm far from the D-T generator target, which is cooled by water. The sensor is behind the 2 mm aluminum plate. Fluency ranges of various particles in the sensor were figured utilizing MCNPX. Table I shows neutron-incited responses happening in SiC\(^6\). Neutrons, photons, electrons, alphas and protons are taken into account and followed in points of interest by MCNPX. Optional particles are delivered by associations between 14 MeV neutrons and the matter.

The range of electrons, protons and alphas in SiC is important since influences the deposition of energy in the space charge region by those particles. Ranges of particles may be bigger than dimensions of the space charge region, thus only part of the particle energy is deposited. The range of protons and alphas as a function of energy is shown in Fig. 3. The range of 1 MeV electrons is approximately 1.5 mm, whereas the range of electrons with energy above 3 MeV is higher than 5 mm. In case of heavy ions produced in reactions shown in Table I, the range can be a few micrometers depending on energy.
CONCLUSION

The exhibited displaying technique of the signal improvement gives us responses of the sensor. Besides, we will get the response work which can be used to deal with the retrogressive issue and to think the signal course of action in SiC sensors. By and by, our need is to get the response of the sensor, which copies as precisely as possible the exploratory response. From that point, we will create the response limit of the sensor and test it. The effect of the space charge area evaluate on the response will be investigated, since it out and out effects on the response shape. The accompanying phase of our work is to develop the code, remembering the true objective to look at the response work. Hence, we will have the capacity to survey the capacity of the sensor in tackling the backwards issue. Additionally, a future module of the code will have the capacity to mimic the neutron converter layer and the piece of the reaction created by it. The neutron converter layer is an exceptional part communicating with warm neutrons and making them more obvious.

Ethical Clearance: Taken from AMET University

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Conflict of Interest: Nil

REFERENCES

School Physical Instruction Informatization Advancement Explore

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ABSTRACT
The wide utilization of data innovation in the training quickens the advancement procedure of the informatization of school physical instruction, and shows more difficulties to it. This exposition studies the present circumstance of informatization in school physical instruction, and proposes a portion of the approaches to reforce and develop the procedure.

Keywords: College Physical Education, Informatization, Research.

INTRODUCTION
Informatization is the world’s present monetary and social improvement of the pattern. Since the 1990s, with the media innovation and the expanding notoriety of the Internet, Information innovation is changing the method of creation of the human culture, method for working, living and learning methods. At a similar time the training thought, showing strategy and showing means are additionally delivered broad effect. Education informatization is the data instruction framework as one of the fundamental components, to advance the training modernization process. College physical training as a critical piece of value instruction, how to use the data innovation to school sports bring chances of improvement and accelerate the procedure of games informatization, is the present advancement of school physical instruction must face the vital point.

Audited articles, Analyzing women empowerment in working conditions: A study on women employees: (With special reference to Public Sector Banks)[5]. An outcome of periodized small side games with and without mental imagery on playing ability among intercollegiate level soccer players[6]. Human Personal Attribute towards Industrial Social Contribution[7]. Culture Shock on Learning of International Students in India[8].

The Influence of Informatization on the College Physical Education
Present day correspondence innovation on human culture creation and life will have an immense effect, additionally give capable support on games. Informatization advances the school sports idea and example change, more supportive in games showing means and strategies for the quick refreshing. A. Sports Education Resources Digitization Along with the PC level incredibly raised, the customary circle sort stockpiling way as of now can’t fulfill the rapid improvement of train advancement, vast measure of picture information, specialized investigation in the conventional instruction implies there is a colossal challenge. However, informatization is a decent answer for this issue, it can make the instructing of a lot of data, video and other data exceptionally concentrated. not just capacity sum is extensive, quick transmission speed, additionally simple to get to and safeguard forever. School instruction digitization, data development for games showing digitization gives an enormous stage B. Sports Education Resources to Presents Diversification The customary school sports instructing has the unity, Mainly instructor teacher is offered need to, through the divider graph, content for assistant instructing. In the entire showing process, instruction shape exhausting, methods for a solitary, understudies’ learning without eagerness. Through
developing interactive media data platform, students can through the video is extremely instinctive comprehension of the venture itself about the development of the screen, and can watch in the heart of the symbol of competitive scene, enhance learning premium. The educator can play online computer game, gives the understudy a chance to feel rivalry environment. In an instinctive feeling innovation activity in the meantime, the preparation of understudies’ emotional, social values grow, so repetitive educating has turned out to be expanded, dynamic, clear, the mind boggling specialized activity scene.

Information Technique is Applied to Analysis the Current Situation of College Physical Education

Understudy Use of Network and Other Information Technology Condition China Internet Network Information Center (CNNIC) discharged “thirtieth China Internet improvement report”. The report information appears to the finish of June 2012, the Chinese Internet clients achieved 538 million, Internet entrance is 39.9%. The primary portion of 2012 the netizen in additions of 24500000, ubiquity rate expanded 1.6 rate focuses. Netizens degree structure, advanced education or over the horde of Internet clients than the essential immersion, ascendant space is constrained. Consequently, undergrads have as of now needed to acknowledge the system limit, the dire need to the data innovation application in games instructing. The customary educating, the instructor had no opportunity to speak with each student, between the educators and understudies absence of association and communitarian acquiring. In any case, the data resources changed all that through effective intelligent open framework, gave understudies broad trades and learning openings, extraordinarily prepared the energy, activity, inventiveness. B. School Teachers Using the Network Information Technology Condition Part of school physical instruction branch of the web seek demonstrates that viable utilization of present day data innovation, sharing showing assets from the genuine request hole is enormous. (see table 1).

School Sports Information Development Lack

School sports data as of now have essential conditions and equipment conditions. The execute of enlightening subject games instructors’ quality upgrades constantly, showing implies ceaselessly enhance and certification the usage of school games data, in the meantime likewise exists some deficiency.

Absence of Information Technology

Development and Industrialization of Outstanding Scientists, Technical Experts, Engineering and Technical Personnel At present, our school physical instruction office still did not ace PC delicate, equipment investigating innovation of making website page. Work force division all, encased operation and absence of joint collaboration inquire about about example, created our nation some data innovation long haul can not achieve the world’s propelled level. To advance school sports data quick improvement must develop sports and PC coordinated proficient abilities.

Nation to College Sports Information Industry

Speculation Shortage China and the western nations is distinctive, our nation college economy additionally for the most part depend on state-claimed resources for support, the group and private capital quality is still very weak. Enter the colleges sports data industry the group and private capital quality is generally little, has not been framed a specific scale.

Showing Basic Computer Skills to Further Improve

Instruction modernization in a quick paced, present day data innovation has as of now entered the classroom. Just clear the cutting edge data innovation instructing and conventional games teaching relations, current data innovation instructing in physical training educating can play a decent helper work. Current data innovation instructing can not be utilized as the primary showing strategy in physical training educating, it is helper educating a sort of showing means and structures. Showing substance and showing strategy on instructing plays the choice role. Therefore, educators ought to fortify the PC application capacity, play to the upsides of present day data innovation teaching, and understand the modernization of physical training educating.

<table>
<thead>
<tr>
<th>The teacher class</th>
<th>Number</th>
<th>On key People</th>
<th>Ratio</th>
<th>Computer time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer teacher</td>
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<td>100%</td>
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<td>75%</td>
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<tr>
<td>Sports Teacher</td>
<td>60</td>
<td>22</td>
<td>36%</td>
<td>20</td>
</tr>
</tbody>
</table>
Physical Education Resources Need to Regulate

Joining Multimedia in games instructing, has prompted another round of physical training mixed media courseware improvement upsurge, monotonous advancement wonder is more serious. For illustration “Volleyball” “Basketball” “tennis” “heart stimulating exercise” courseware, content with the one in the school.

CONCLUSION

Increment the College Sports Information Input Countries ought to fortify the school sports data industry venture, in the strategy be slanted support, take different financing effectively creating school sports data industry, to make the physical data onto the fast track.

Ethical Clearance: AMET University

Source of Funding: Self

Conflict of Interest: NA

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Biological Interactions of Endophytic Fungi in their Natural Habitats

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ABSTRACT
Endophytic fungi are symbiotic microorganisms of healthy plants. Both are benefitted due to their interaction through chemical pathways which form the antagonistic balance between endophytic fungi and plants (host). Hence this association considered to find the biotechnological application from endophytic fungi as novel resource.

Keywords: Endophytic Fungi, Biotechnological, Symbiotic Microorganisms

INTRODUCTION
Endophytes are defined as microorganisms that colonize internal plant tissues without causing any disease symptoms or apparent injury[1][2]. Among these microorganisms, many fungal, bacterial, actinomycete groups are isolated as endophytes but most frequently isolated endophytes are fungi groups[3]. They have been found infected with every plant species investigated so far. It is believed that plants from unique environmental accommodation and which are endemic are likely to accommodate distinct endophytic microorganisms as well as microorganisms making novel bioactive products. A number of indefinite organisms can reportedly reduce plant diseases by killing the phytopathogens of host plants and also enhance plant growth and their production[4][5][6].

Mode of Endophytic fungi in plant association

As defined as endophytes, endophytic fungi are also defined as microfungi capable of living within the host plant tissue without causing any symptoms[7]. The fungal endophytes and their host plants associations make the three basic ecological groups such as Balansiaceous, non-Balansiaceous endophytes and Mycorrizhal fungi. Their symbiosis with hosts is widely accepted as being mutualistic[8]. The Balansiaceous endophytes grow systemically, rarely epicuticularly, and intercellularly within all above ground plant organs of grasses, rushes and sedges, resulting in vertical transmission of the endophyte through the seeds[9]. But the non-balansiaceous fungal endophytes are diverse, both phylogenetically and with respect to life history strategy. Most of these fungi belong to the Ascomycota[10], and they have been isolated from every organ of almost all sampled plants[11][12][13]. Colonization can be inter- or intracellular, localized or systemic. Some endophytes have been found to be non-aggressive, not causing disease, some to be latent pathogens, others play mutualistic roles within them. Differences between endophytic associations and mycorrhizal associations of mycorrizal fungi are based on the absence and the presence of complex hyphal growth synchronized with substantial cytoplasm synthesis formed by host cells that is diagnostic of mycorrhizas which is useful in nutritional transfer. But in Endophytic fungi association that special kind structure is not formed[16]. Further, endophytic fungi divided into four separate classes. In general, two major groups of endophytic fungi have been accepted previously, reflecting differences in evolutionary relatedness, taxonomy, plant hosts, and ecological functions[17][18].
Endophytic fungi spent their life inside the plant tissue as their habitat with mutual relationship in host plants. Endophytic fungi have been measured as useful as possible sources of natural products in the search of new and innovative biologically active compound. Due to the endophytic fungi naturally show the symbiotic association with host plants, they can protect plants from insect attack and diseases and are also able to produce substances of biotechnological interest.

In spite of the everywhere presence of endophytic fungi in plant host, the extent of their contribution to fungal biodiversity and their interaction between themselves and with host still remain indistinct. Few studies have been conducted with regards to the diversity and colonization of the endophytes\[19\]. Endophytic fungi are present in the intercellular spaces of leaves, petioles and inner tissues of stems. Many endophytic fungi present in the root tissues forming mycorrhizal symbions play a vital role in phosphate uptake in plant nutrition\[20\][21].

Specificity of endophytic fungi in plant associations

Based on the association of endophytes with single or multiple plant hosts it can be described as host specificity, host recurrence, host selectivity, or host preference \[22\][23]. Host specificity is the association in which a fungus is limited to a single host or a group of related species, but does not occur in other unrelated plants in the same habitat\[24\]. The host preference, is more frequently used to indicate a common occurrence or uniqueness of the occurrence of a fungus on a particular host plant \[25\][26]. Endophytes are also able to colonize multiple host species of the same plant family within same habitat, and the distribution of some endophytes can be similar in closely related plant \[27\]. And also, differences in endophyte colonization have been found in different tissue of the same host plant species, or even in different tissues of a single plant, which is a reflection of tissue specificity \[28\][29][30]. The differences in endophyte assemblages from different hosts and single host specificity at the plant species level respectively might be related to the chemical differences of the hosts and the environmental conditions\[31\]. Hence, these relationships of endophytic fungi indicates host plants and endophytic fungi based on the adaption of their symbiotic association during different environmental.

The biological association characters (host species, host endophyte interactions, inter specific and intra specific interactions of endophytes, tissue types, types of fungal colonization, ages) and environmental factors (geographic and habitat distributions, culture conditions, surface sterilants, and selective media) influence the effectiveness of a sampling approach for detection and enumeration of endophytic fungi. The Bacon and White (1994) have reviewed the techniques and materials used for the isolation, maintenance, identification, and preservation of grass endophytes and also compared the efficacy of several surface-sterilization procedures on various host plants and organs (Petrini, 1986; Schulz and colleagues, 1993). Much convenient information on methods for isolation of filamentous fungi from natural substrate, including techniques, selective agents, and common media, can be found in documents of Bacon and White (1994), Bills (1996), Booth (1971), and Seifert (1990). For example roots of three plant species: Ipomoea pes-caprae, Launaea sarmentosa and Polycarpae corymbosa established on
the coastal sand dunes of the west coast of India were examined for the presence of endophytic fungi by plating on malt extract agar media and using with damp incubation techniques in this wet sand have to spread over the media.

CONCLUSION

Endophytic fungi are richest microorganism of the all healthy the plants and in addition which is distributed within plants organs with biological association properties. These properties formulate the mechanism of endophytic fungi to produce the novel bioactive compounds.

Ethical Clearance: Taken from AMET University.

Source of Funding: Self

Conflict of Interest: Nil

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Electron Beam in Gyrotrons Diagnostics Microwave

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ABSTRACT

The strategy for assurance of speed attributes of the electron pillar in gyrotrons is talked about. In this paper affirmed in the counts that the data about pivotal part of electron speeds can be gotten from the examination of connection of the electron bar with a GHz-wave proliferating in a moderate wave structure. Tests have been performed to produce high power, long-beat microwaves by the gyrotron component in rectangular cross-segment connection pits. Long-beat electron bars are created by MELBA (Michigan Electron Long Beam Accelerator), which works with parameters: - 0.8 MV, 1-10 kA, and 0.5-1 microsecond pulselength. Microwave control levels are in the megawatt go. Polarization control is being considered by alteration of the solenoidal attractive field. Beginning outcomes demonstrate polarization control proportions up to an element of 15. Electron shaft elements (Vperp/Vpar) are being measured by radiation obscuring on glass plates. PC displaying uses the MAGIC Code for electromagnetic waves and a solitary electron circle code that incorporates a dispersion of points.

Keywords: Gyrotron, Electrons Beam, H Lines.

INTRODUCTION

One of the fundamental issues of high-power gyrotrons is to shape an excellent helical electron pillar (HEB). The “established” electron-optical framework (EOS) of gyrodevices comprises of the magnetron-infusion weapon (MIG) and the area of expanding attractive field where the transverse vitality of electrons raises. In an all around planned and adjusted framework, the principle component of pillar quality disintegration is associated with the activity of the self-field of electron space charge coming about incompletely from advancement of different sorts of parasitic space-charge hazards and from nonuniformities of electron discharge.

The high-control gyrotron estimations have habitually indicated disparities between the watched estimations of yield parameters (yield control, proficiency, and so forth) and the hypothetical expectations. These disparities are for the most part because of a few variables of pillar quality decay that cannot be considered in the computational models utilized, for instance, for estimation of electron directions in the gyrotron EOS described the underlines the significance of trial studies which ought to be founded on utilizing useful and pitifully aggravating procedures to gauge the primary HEB parameters. The paper depicts another approach for the assurance of electron speeds in the district before HEB entering the gyrotron microwave depression. Evaluation of antimicrobial activity of green-synthesized manganese oxide nanoparticles and comparative studies with curcumin-aniline functionalized nanoform in this paper described the data about normal pivotal and transverse speeds of electrons in this district can be utilized as a part of the reenactments of the cooperation of electrons with the RF-field to give more exact hypothetical information on gyrotron yield parameters.

PROPOSED METHOD

Al-doped PbS nanoparticles hybrid composite for optical and electrical response described the proposed diagnostics depends on intensification of the electromagnetic wave proliferating synchronously with electrons, like the system of TWTs. The electron
wave connection happens in a unique indicative area speaking to a portion of the moderate wave structure and situated toward the finish of the attractive pressure district of a gyrotron. Within the sight of the information motion at a settled recurrence, the RF-wave connects with a bar part moving in the hub bearing with a similar speed. On account of a dispersive moderate wave structure, changing the info flag recurrence gives us the connection of the RF-wave with pillar portions of various pivotal speeds. Along these lines, investigation of the deliberate enhancement as an element of recurrence permits acquiring the data about the dispersion of the shaft electrons on pivotal speeds. Their appropriation on transverse speeds can be computed in the suspicion of zero full-vitality spread, which might be right without RF-field related, for example, with improvement of parasitic motions in the shaft space charge.

RESULTS AND DISCUSSIONS

Figure 2 demonstrates the reliance of pick up coefficient G on mean pivotal electron speed in the presumption of zero speed spread at the info flag recurrence of 5.65 GHz. For the ideal estimation of hub speed, the electromagnetic wave proliferates synchronously with electrons and the pick up coefficient achieves most extreme esteem. Move from the ideal speed brings about a reduction of G. Take note of that the scope of the pivotal electron speeds from 0.24c to 0.29c compares to the scope of the mean contribute figure the depression district around from 2 to 1.

The expanding attractive field of the gyrotron EOS influences the electron shaft, which is packed, and the pickup vanishes on account of the tube shaped SWS. A cone shaped indicative segment was intended to work with the practical attractive field profile of the gyrotron. A separation between the shaft and the moderate wave structure is kept consistent in this framework. The power picks up to ~ 10 dB were acquired at the info energy of 1 watt. The conditions of the pick up on the info flag recurrence were computed for various mean estimations of pivotal speed in the electron bar (Figure 3).

On a fundamental level, the proposed diagnostics can be construct in light of intensification as well as on lessening of the info RF-flag. Execution of the proposed indicative method depends firmly on geometry and electron bar parameters of the examined gadget. Our figuring’s were made for the test 74.2 GHz, 100 kW gyrotron. It has an extraordinary chamber at the downstream end of the attractive pressure locale in which a moderate wave structure can be put. An improved plan of the indicative segment is appeared in Fig. 1. It incorporates the moderate wave structure, the info and yield coaxial waveguides, the barrel shaped resonators with coupling circles, and the RF-safeguard. The moderate wave structure as a roundabout creased waveguide was picked as the most reasonable arrangement.
It can be seen that with the expansion of pivotal speed the position of the most extreme of the reliance $G(f)$ movements to lower frequencies. This affirms legitimacy of the proposed technique for assurance of mean estimations of hub speed. Presentation of a spread of electron speed brings about a lessening of the pick up. In the meantime, the greatest position in the $G(f)$ plot is feebly subject to the spread, which gives a probability to apply the diagnostics to the electron shafts with non-zero speed spread.

**CONCLUSIONS**

A hypothetical review was performed on the standards of another technique for microwave diagnostics. Examination of proliferation of GHZ-recurrence motions in a moderate wave structure combined with the shaft can be utilized for assurance of speed qualities upstream from the microwave pit. Numerical reenactments affirmed that information on hub part of electron speeds can be gotten from recurrence conditions of the moderate wave pick up.

**Ethical Clearance:** Taken from AMET University

**Source of Funding:** Self

**Conflict of Interest:** Nil

**REFERENCES**

Chemical Analysis of Pet by Aquatic Bacteria

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ABSTRACT

The chemical analysis of PET was effectively altered by aquatic microscopic organisms, demonstrating the primary stages of biodegradation in this paper. Analysis of PET surfaces became thicker in respect to the control surfaces within the occurrence of bacterial groups in spite of whether they were basically phototrophic or heterotrophic. In this paper, Chemical and Nanotopography surfaces of PET by aquatic microscopic organisms has been analyzed and proposed. The simply the surfaces presented to fundamentally heterotrophic microscopic organisms, however, notwithstanding, changed essentially in surface chemistry; these samples demonstrated a reduction in oxygen groups over the surface. The outcomes appear to show two different components of PET degradation relying upon whether the bacterial group is essentially phototrophic.

Keywords: Chemical Analysis, Poly Ethylene Terephthalate (PET), Aquatic bacteria.

INTRODUCTION

Growth of plastic debris in the world’s seas is a noteworthy ecological issue. And additionally the very noticeable and clear appearance of plastic debris on Shorelines, in a few sections of the open sea there are six times extra plastic particles than tiny fish by mass\(^1\). Plastics are usually cheap, generally utilized and strong, which prompts their collection in the earth. Such plastic develop in the ocean causes few serious economical and environmental concerns\(^2\).

At present, there are three principle of plastic disposal system being used: landfill, burning and reusing, and all have critical disadvantages. Landfill and burning release risky auxiliary toxins into the groundwater and air and reusing of most plastics is a moderately wasteful and costly process, made more troublesome by the nearness of different added substances and polluting influences\(^3\).

Biodegradation by microscopic organisms is a smart choice plastic disposal scheme. Microscopic organisms have high metabolic potential and a few strains are known to be capable to degrade fuel hydrocarbons. In this paper, the capability of aquatic microorganisms to change the surface chemistry and nanotopographical composition of PET\(^4\).

ANALYSIS OF MATERIALS

Analysis of Surface Chemistry

Analysis of surface chemistry was completed by X-ray photoelectron spectroscopy (XPS). A monochromated Al Ká source (hv= 1486.6 eV) was utilized, working at 150 W. The energy scope of 0 – 1400 eV to recognize major essential commitments, before recording high-determination spectra of the C1s and O1s crests\(^5\).

Analysis of Nanotopography

Nuclear force microscopy (NFM) was performed to survey nanotopography of PET surfaces. A Solver P7LS gadget and a silicon cantilever with a spring steady of 10 N/m were utilized. Examining was performed in semi-contact mode. NFM imaging of microorganisms was likewise performed, on an Innova SPM (Veeco), utilizing a silicon tip with a spring steady of 40 N/m, in tapping mode\(^6\).

RESULTS

Elemental analysis

XPS review spectra exposed changes in the surface of PET, other than only on heterotrophic samples.
Comparative to the whole amount of carbon, the amount of oxygen on the surface of heterotrophic samples reduced.

CONCLUSION

In this paper, the capability of aquatic microorganisms to change the surface chemistry and nanotopographical composition of PET. Heterotrophic microorganisms show to cut polymer chains by converting the oxygen atoms. The device engaged by phototrophic microorganisms is less apparent, though it is clear that in order to remove pieces of PET polymer chains they do not require to permanently change the surface chemistry. Additional study requirements to be conducted to distinguish these mechanisms and recognize their differences.

Ethical Clearance: Taken from AMET University.

Source of Funding: Self

Conflict of Interest: Nil

REFERENCES


Internet Connected Biometric Voting Machine with Split Architecture

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²Professor, Department of Electrical and Electronics Engineering, Oxford College of Engineering & Technology, Bangalore

ABSTRACT

This paper proposes an innovative idea that aims to construct an electronic voting machine with internet connection capability that would enable voters to cast their vote from anywhere on the planet, a process called remote voting process. The device has biometric sensor to verify the voter’s integrity that leads to a much more secured local voting process than the existing one. In addition to this, the device comes with capacitive touch keys and mp3 quality audio to aid visually impaired or illiterate people to cast their vote independently.

Keywords: Biometric, Sensor, mp3.

INTRODUCTION

India’s general elections with 814 million eligible voters expand the vision of all conducting reasonable elections, neutralizing the malicious tendencies. Due to a result of uncontrolled corruption in this exercise, the people have been raising unconvincing eyebrows about it and the general expression has prevailed that the democratic system has proved to be a boon only to a handbreadth of people having capital[1]. The success of elections highly relies upon liberal masses, careful citizens. The Election Commission has taken measures through susceptibility mappings to endeavour smooth elections. During the polls, several paramilitary forces are employed across India, observation cameras are placed at polling station. During 2014 General Elections in India[2], there were reports allegedly indulged in booth-capturing, proxy voting, missing names from the voters list, voter turnout to be greater than 100%.

EXISTING PROBLEM

The voter turnout in the recently held elections in Tamilnadu and Kerala was less than the last assembly elections in 2011, according to the election commission. Tamilnadu recorded a turnout of 73.7 % as against 78.1 % in the last assembly[3].

At the dawn of IoT era, in this highly connected world, where a product could be purchased at the click of a button, people are not readily willing to travel long distances just for the sake of a few second process: voting[4]. Although Electronic Voting Machine has modernized the voting process from the previous paper-based method, it is not yet sufficient to achieve a 100 % voter turnout. Now, this is a serious issue because, those 25 % voters who are not turning out can change the result of the polls and thus the country’s fate. We see a need to modernize the Indian election process as we know it[5].

PROPOSED METHOD

This paper proposes an innovative idea that aims to construct an electronic voting machine with internet connection capability that would enable voters to cast their vote from anywhere on the planet, a process called remote voting process. The device has biometric sensor to verify the voter’s integrity that leads to a much more secured local voting process than the existing one. Design and performance analysis of MIMO-OFDM system using different antenna configurations is discussed in [6]. In addition to this, the device comes with capacitive touch keys and mp3 quality audio to aid visually impaired or illiterate people to cast their vote independently.
Here using ST Microelectronics STM32F429 microcontroller that serves the web pages using which the voter does remote voting. The user must enter a unique ID and password before accessing the remote voting web page. Web server is responsible for serving the web pages, servicing the client request and for maintaining the TCP/IP connection until the voting process gets completed. Web pages are constructed with HTML language. The device uses the LwIP open source TCP/IP protocol stack for its internet connectivity and HTTP protocol at the application layer.

The machine has an integrated Fingerprint sensor module to verify the voter’s identity. Capacitive touch keys replace the traditional mechanical buttons and a Cap-Touch controller is used to sense user press events on these keys. A Graphics display shows the menu with different party names and symbols and helps the user to select the preferred candidate. Reactive Power Pricing Using Group Search Optimization in Deregulated Electricity Market is explained[7].

Visually impaired people get the feedback through an audible voice. An MP3 audio codec chip is used to play the stored audio files on the memory card. A FAT-32 formatted microSD card (2GB) is used to store the audio tracks in MP3 format. The audio playback is controlled by LPC1313, a separate microcontroller dedicated for that process. Both the microcontrollers communicate via an onboard serial link based on UART.

A real time operating system is necessary to handle the timely events and other multitasking requirements of the project. FreeRTOS provides this multitasking ability for our project. It is chosen because; FreeRTOS is the number one real time operating system in the world.

In theory, any device with a web browser can be used to cast the vote. In that case, there is low degree of control and least amount of security. Hence we suggest that the remote voting can be carried out on a secured polling booth with an internet connected kiosk terminal in which a voter will be allowed only after verified by an authorized election commission personnel. Having said this, by adding end-to-end security in the mobile app, and on the machine, remote voting is possible and can be done at the comfort zone of the voter, from any internet connected computers or mobile devices.

The advantages of our method are
- It modernizes the election process using Internet technology
- Reduces travel expenses of people
- Can be used even by visually impaired or illiterates.
- Biometric security prohibits illegal voting
- Improved user interface using cap-touch technology
- Facilitates quick and accurate counting
- Lowers the operating expense
- User friendly and simple to operate

IMPLEMENTATION AND RESULT

CONCLUSION

This paper presents the design and development of a secured polling based on IoT and bio-metrics,
fading the possibilities of racket and voter deception. The encoding method diminishes the security loop holes and adorns the system to be more forceful, accurate and effective.

**Ethical Clearance:** Taken from AMET University, committee.

**Source of Funding:** Self.

**Conflict of Interest:** nil.

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A Study on the Evaluation of Selection Attributes for Resorts

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ABSTRACT

Background/Objectives: This author intends to figure out choice attributes which resort users regard important when selecting a resort and positively analyze how those choice attributes differ by mountain-based, ocean-based, and complex resorts to provide implications.

Method/Statistical analysis: The data gained from positive analysis based on the survey were analyzed by SPSS WIN 18.0. First of all, to examine general, demographic characteristics, frequency analysis was done. Through reliability analysis on collected data, Cronbach’s ? coefficient was verified. Regarding choice attributes resort users perceive to be important, factor analysis was done by each of the factors.

Findings: According to the results of examining resort choice attributes, the primary purpose of this study, seven factors, reliability, convenience, facilities, food and beverage, natural environment, employees of data; technique employed; mention unique/ important poiults of IPA analysis, in all three types of resorts, convenience and reliability are regarded as crucial choice attributes, and about the degree of satisfaction, convenience is found to be high in general; however, reliability is high only in the ocean-based resort type but is low in the mountain-based and complex resort types.

Improvements/Applications: This study implies that among the resort choice attributes, convenience is the choice attribute to be maintained continuously, and reliability is the one requiring efforts for concentration. In other words, it is necessary to make more efforts for a resort’s refutation, image, safety, or security.

Keywords: Resort, Choice Attributes, Use Pattern, Importance, Satisfaction Rating

INTRODUCTION

Due to advancements in means of transportation and changes in the awareness of leisure culture, sports in particular, a growing number of customers prefers and uses resorts, which have become multi-purpose complexes of recreation, sports facilities, commerce, culture, liberal, and lodging all available in one place. Furthermore, leisure patterns are trending away from one-day stays for travel into retreats for health, recuperation, and rest, and, travelers prefer resorts that offer various activities in one place, which can include facilities with new cultural themes such as health, returning to nature.

A sheer increase in the number of resorts since 1990 driven by the entrance of conglomerates into the leisure and sport industry and the diversity of needs of resort customers provided the momentum to transform the resort market from provider oriented to supplier oriented. In addition, this change has led into an increase in the number of areas that have constructed by shared financing between local municipalities and corporations.

With respect to this need, McCarville et al. (1993) dispute that it is necessary to grow a differentiated marketing strategy to respond to consumer expectations, needs, and value systems in accordance with a market segmentation that reflects the characteristics of consumer behavior, and Yoon et al. (1998) stated that it is required to break down a market by recognizing different consumer behaviors across geographical, demographical, and psychological factors and to provide partial,
professional, class-wide services for homogeneous markets to attempt to differentiate service quality.

Many previous studies on resorts revolve around ski resorts7,8,9,10,11 or hot spring resorts12,13 rather than four-season resort complexes.

MATERIALS AND METHOD

The hypotheses of this research are as follows

Hypthesis 1: There is a significant difference between resort choice attributes’ importance and satisfaction placing.

Hypothesis 2: The importance of a resort choice attribute differs significantly depending on the use pattern.

To accomplish the purpose of the research, we selected three representative resorts in Korea and distributed questionnaires to 150 sample groups each resort, totaling 450 people. We retrieved 401 questionnaires and used 384 copies to carry out our fact-finding research after discarding unreliable questionnaires. In terms of resort choice attribute measurements, various measurement tools were used. Lewis(1984)14 categorized resort choice using 17 factors and 57 attributes. Knutson(1988)15 presented eight attributes by analyzing considerations in hotel choice. Cadotte and Turgeon(1988)16 studied attributes that satisfy and dissatisfy hotel customers and identified and ordered 25 major attributes. Lee(1999)17 suggested that resort tourists’ choice behaviors are based on 15 attributes. Kim(2003)18 categorized ski resort choice attributes according to five factors and 25 attributes. Lee and Eun (2005)19 proposed service quality choice attributes for a ski resort, whereas Jun and Yim(2009)20 proposed choice attributes in accordance with resort users’ lifestyles.

RESULTS AND DISCUSSION

Characteristics of Samples

The sample of this study consisted of 384 resort users in three places. The general characteristics of the data are as follows. In terms of gender, 278(72.4%) were male, and 106(27.6%) were female. For age, the most common age group was 20-29 with 96(25.0%) observations, followed by the 30-39 age group with 94(24.5%) observations, the 40-49 age bracket with 80(20.8%) observations, the 50-59 age group with 73(19.0%) observations, the over 60 age group with 22(5.7%) observations, and the under 20 age group with 19(4.9%) observations. For occupation, office workers dominated with 96(25.0%) observations, followed by 84(21.9%) business owners, 53(13.8%) civil servants (government investment agency), 52(13.5%) students, 42(10.9%) professionals (doctors, lawyers, and professors), 34(8.9%) housewives, 17(4.4%) farmers/forestry workers/fishermen, and 6(1.6%) others. In terms of the level of education, the largest number of people, 141(36.7%), graduated from university, followed by 115(29.9%) college graduates, 70(18.2%) graduate school graduates or higher, 70(18.2%) high school graduates or below, and 14(3.6%), others. For marital status, 292(76.0%), were married, and 92(24.0%) were single. As for residence, 57(14.8%) lived in Seoul, 55(14.3%) lived in Busan/Ulsan/Gyeongnam, 53(13.8%) lived in Incheon/Gyenggi-do, 39(10.2%) lived in Daegu/Gyeongbuk, 39(10.2%) lived in Gwangju/Jeonnam, 39(10.2%) lived in Chungbuk, 37(9.6%) lived in Daejeon/Chungnam, 29(7.6%) lived in Gangwondo, 5(1.3%) lived in Jeju Island, and 1(0.3%) lived overseas. Lastly, in terms of average monthly income, 79(20.6%) made over 5 million won, followed by 77(20.1%) with less than 1 million won, 69(18.0%) with 2 to 3 million won, 59(15.4%) with 4 to 5 million won, 55(14.3%), with 3 to 4 million won, and 45(11.7%) with 1 to 2 million won.

Verification of Hypotheses

To find out if there is any significant difference between importance and satisfaction ratings in resort choice attributes, we carried out a paired sample t-test. The test showed that the most important resort choice attribute was "safety and security" (average 4.19), followed by "hygienic condition" (4.16), "staff’s skilled work performance" (4.15), "resort reputation" (4.12), and "quick reservation and check-in process" (4.11). In terms of satisfaction with the resort choice attributes, the attribute rated the highest was "hygienic condition" (average 3.27), followed by "quick reservation and check-in process" (3.21), "resort ambience" (3.17), and "convenient cooking facility & leisure facility" (3.08). The orders of the importance and satisfaction placing of resort choice attributes are shown in Table 1.
Table 1: Technical analysis of the relationship between importance & satisfaction for resort choice attributes

<table>
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<th>Resort choice attribute</th>
<th>Importance</th>
<th>Satisfaction</th>
<th>Satisfaction-importance</th>
<th>Paired t-test correlation(t)</th>
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<td>Average Order</td>
<td>Average</td>
<td>Order</td>
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<tr>
<td>Safety and security</td>
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<td>3.27</td>
<td>1</td>
</tr>
<tr>
<td>Staff's skilled work performance</td>
<td>4.15</td>
<td>3</td>
<td>3.04</td>
<td>13</td>
</tr>
<tr>
<td>Resort reputation</td>
<td>4.12</td>
<td>4</td>
<td>3.02</td>
<td>17</td>
</tr>
<tr>
<td>Quick reservation and check-in process</td>
<td>4.11</td>
<td>5</td>
<td>3.21</td>
<td>2</td>
</tr>
<tr>
<td>Friendly staff</td>
<td>4.09</td>
<td>6</td>
<td>3.03</td>
<td>15</td>
</tr>
<tr>
<td>Various food/beverage outlets</td>
<td>4.09</td>
<td>6</td>
<td>2.97</td>
<td>23</td>
</tr>
<tr>
<td>Easy accessibility</td>
<td>4.09</td>
<td>6</td>
<td>3.04</td>
<td>13</td>
</tr>
<tr>
<td>Convenient cooking facility</td>
<td>4.08</td>
<td>9</td>
<td>3.08</td>
<td>4</td>
</tr>
<tr>
<td>Reasonable costs</td>
<td>4.07</td>
<td>10</td>
<td>3.05</td>
<td>11</td>
</tr>
<tr>
<td>Resort ambience</td>
<td>4.07</td>
<td>10</td>
<td>3.17</td>
<td>3</td>
</tr>
<tr>
<td>Level of service</td>
<td>4.07</td>
<td>10</td>
<td>3.06</td>
<td>8</td>
</tr>
<tr>
<td>Climate &amp; weather</td>
<td>4.05</td>
<td>13</td>
<td>3.03</td>
<td>15</td>
</tr>
<tr>
<td>Food &amp; beverage quality(taste &amp; price)</td>
<td>4.04</td>
<td>14</td>
<td>3.01</td>
<td>20</td>
</tr>
<tr>
<td>Various subsidiary facility</td>
<td>4.04</td>
<td>14</td>
<td>3.07</td>
<td>6</td>
</tr>
<tr>
<td>Surrounding natural landscape</td>
<td>4.04</td>
<td>14</td>
<td>3.07</td>
<td>6</td>
</tr>
<tr>
<td>Resort image</td>
<td>4.03</td>
<td>17</td>
<td>2.98</td>
<td>22</td>
</tr>
<tr>
<td>Resort size</td>
<td>4.03</td>
<td>17</td>
<td>3.01</td>
<td>20</td>
</tr>
<tr>
<td>View from room</td>
<td>4.02</td>
<td>19</td>
<td>3.02</td>
<td>17</td>
</tr>
<tr>
<td>Internal decoration &amp; interior</td>
<td>4.00</td>
<td>20</td>
<td>3.06</td>
<td>8</td>
</tr>
<tr>
<td>Leisure facility</td>
<td>3.98</td>
<td>21</td>
<td>3.08</td>
<td>4</td>
</tr>
<tr>
<td>Nearby amenities</td>
<td>3.96</td>
<td>22</td>
<td>2.97</td>
<td>23</td>
</tr>
<tr>
<td>Connection with neighboring tourist attractions</td>
<td>3.94</td>
<td>23</td>
<td>3.06</td>
<td>8</td>
</tr>
<tr>
<td>Differentiation with other resorts</td>
<td>3.91</td>
<td>24</td>
<td>2.89</td>
<td>25</td>
</tr>
<tr>
<td>Children’s facility</td>
<td>3.91</td>
<td>24</td>
<td>3.02</td>
<td>17</td>
</tr>
</tbody>
</table>

The finding of a difference between importance and satisfaction ratings in resort choice attributes implies that users were not satisfied with the factors that they considered important.

The factor analysis outcome on the importance of resort choice attributes, which groups the attributes into eight factors, including “image”, “diversity”, “convenience”, “expediency”, “employee service”, “surrounding landscape” and “internal setting”, is illustrated in particular in Table 2.

Table 2: Factor analysis of the importance of resort choice attributes

<table>
<thead>
<tr>
<th>Factor name (Reliability coefficients, Variance explained%)</th>
<th>Factor variable</th>
<th>Factor loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Image (α=.865, 12.528)</td>
<td>- Resort reputation</td>
<td>0.862</td>
</tr>
<tr>
<td></td>
<td>- Resort image</td>
<td>0.841</td>
</tr>
<tr>
<td></td>
<td>- Resort ambience</td>
<td>0.767</td>
</tr>
<tr>
<td></td>
<td>- Climate &amp; weather</td>
<td>0.688</td>
</tr>
<tr>
<td>Program (α=.723, 9.696)</td>
<td>- Resort size</td>
<td>0.777</td>
</tr>
<tr>
<td></td>
<td>- Children’s facility</td>
<td>0.749</td>
</tr>
<tr>
<td></td>
<td>- Leisure facility</td>
<td>0.613</td>
</tr>
<tr>
<td></td>
<td>- Connection with neighboring tourist attractions</td>
<td>0.527</td>
</tr>
<tr>
<td>Diversity (α=.742, 8.620)</td>
<td>- Food &amp; beverage quality(taste &amp; price)</td>
<td>0.815</td>
</tr>
<tr>
<td></td>
<td>- Differentiation from other resorts</td>
<td>0.736</td>
</tr>
<tr>
<td></td>
<td>- Various food &amp; beverage outlets</td>
<td>0.583</td>
</tr>
<tr>
<td></td>
<td>- Nearby amenities</td>
<td>0.495</td>
</tr>
</tbody>
</table>
To determine the differences in the factors of resort choice attributes across different resort use patterns, we conduct the analysis of variance and Duncan’s multiple range test (DMR-test) for post-analysis of the analysis of variance to distinguish the degree of significant differences from the average in terms of low (L) < middle (M) < high (H), etc.

The difference in resort choice factor and use patterns across different durations of stay, as shown in Table 3, revealed significant differences in four factors, including “image”, “program”, “expediency” and “employees service” whereas “diversity”, “convenience”, “surrounding landscape” and “internal setting” did not show any meaningful differences. What drew our attention to this analysis was that daily users had the highest average value for every choice factor, whereas those who stayed for the longest durations, 6 days and over a week, had the comparatively lowest average values.

### Table 3: Analysis of differences in choice factors across different durations of stay

<table>
<thead>
<tr>
<th>Factor</th>
<th>Day</th>
<th>2 days</th>
<th>3 days</th>
<th>4 days</th>
<th>5 days</th>
<th>6 days</th>
<th>Over a week</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Image</td>
<td>4.25H*</td>
<td>4.10</td>
<td>4.18</td>
<td>4.03</td>
<td>3.94M</td>
<td>3.63</td>
<td>3.58L</td>
<td>3.89**</td>
</tr>
<tr>
<td>Program</td>
<td>4.10H</td>
<td>3.86M</td>
<td>4.00</td>
<td>4.10</td>
<td>3.77</td>
<td>3.62L</td>
<td>4.08</td>
<td>3.15</td>
</tr>
<tr>
<td>Expediency</td>
<td>4.36H</td>
<td>3.84</td>
<td>4.17</td>
<td>4.12</td>
<td>3.96M</td>
<td>3.82</td>
<td>3.67L</td>
<td>3.06</td>
</tr>
<tr>
<td>Staff service</td>
<td>4.46H</td>
<td>4.16</td>
<td>4.18</td>
<td>4.16</td>
<td>4.03M</td>
<td>3.52L</td>
<td>3.67</td>
<td>3.43</td>
</tr>
</tbody>
</table>

* M.R.T(Duncan multiple range test based on p<0.05), distinguished as L(Low) < M(Middle) < H(High).

** Represents statistical significance with p<0.1

As we analyzed differences in resort use patterns and choice attribute importance across different numbers of visits, there were important differences in all eight factors, including “image”, “program”, “diversity”, “convenience”, “expediency”, “employees service”, “surrounding landscape” and “internal setting”. Similarly, the analysis showed that, in general, the average values for low visit frequencies, i.e., oneto the visits, were the highest, whereas the averages for high visit frequencies, i.e., four to over six visits, were relatively lower, as shown in Table 4.

### Table 4: Analysis of differences in choice attributes across different numbers of visits

<table>
<thead>
<tr>
<th>Factor</th>
<th>Once</th>
<th>2 times</th>
<th>3 times</th>
<th>4 times</th>
<th>5 times</th>
<th>Over 6 times</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Image</td>
<td>4.23H*</td>
<td>4.15</td>
<td>4.16</td>
<td>4.06M</td>
<td>3.69L</td>
<td>3.81</td>
<td>5.99**</td>
</tr>
<tr>
<td>Program</td>
<td>4.08</td>
<td>4.10H</td>
<td>4.03</td>
<td>3.90M</td>
<td>3.67L</td>
<td>3.79</td>
<td>3.66</td>
</tr>
<tr>
<td>Diversity</td>
<td>4.09</td>
<td>4.09</td>
<td>4.14H</td>
<td>3.90M</td>
<td>3.79</td>
<td>3.74L</td>
<td>3.87</td>
</tr>
<tr>
<td>Convenience</td>
<td>4.09</td>
<td>4.09</td>
<td>4.14H</td>
<td>3.90M</td>
<td>3.79</td>
<td>3.74L</td>
<td>3.87</td>
</tr>
</tbody>
</table>
As we carried out the analysis of differences in the importance of choice attributes across different accompanying persons and among resort use patterns, as shown in Table 5, significant differences resulted for the factors "image" and "internal setting", whereas there were no meaningful differences for the other six factors, including "program", "diversity", "convenience", "expediency", "employees service" and "surrounding landscape".

As we investigated the difference in importance of choice attributes in bearing to the type of membership, as shown in Table 6. There were important differences in two factors, "expediency" and "employees service." The average values for "expediency" and "employees service" were the highest for the non-member group, whereas "expediency" was the lowest for individual members, and "staff service" was the lowest for government investment agency.

Lastly, Table 7 depicts the investigation of the difference in the importance of choice factors in relation to the type of preferred resort.

### Table 4: Analysis of differences in choice attributes across different numbers of visits (Contd.)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Once</th>
<th>2 times</th>
<th>3 times</th>
<th>4 times</th>
<th>5 times</th>
<th>Over 6 times</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expediency</td>
<td>4.42H</td>
<td>4.20</td>
<td>4.07</td>
<td>4.05M</td>
<td>3.74L</td>
<td>3.83</td>
<td>6.21</td>
</tr>
<tr>
<td>Employees service</td>
<td>4.45H</td>
<td>4.26</td>
<td>4.23</td>
<td>4.15</td>
<td>3.56L</td>
<td>3.68</td>
<td>10.88</td>
</tr>
<tr>
<td>Surrounding landscape</td>
<td>4.38H</td>
<td>4.05M</td>
<td>4.09</td>
<td>3.83</td>
<td>3.63L</td>
<td>3.81</td>
<td>5.45</td>
</tr>
<tr>
<td>Internal setting</td>
<td>4.20</td>
<td>4.21H</td>
<td>4.20</td>
<td>3.99M</td>
<td>3.68L</td>
<td>3.81</td>
<td>6.91</td>
</tr>
</tbody>
</table>

* M.R.T(Duncan multiple range test based on p<0.05), distinguished as L(Low) < M(Middle) < H(High).

** Represents statistical significance with p<0.1

### Table 5: Analysis of differences in choice factors across different accompanying persons

<table>
<thead>
<tr>
<th>Factor</th>
<th>Alone</th>
<th>Children</th>
<th>Parents</th>
<th>Club</th>
<th>Friends/ partners</th>
<th>Co-workers</th>
<th>Others</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Image</td>
<td>4.29H*</td>
<td>4.17</td>
<td>4.10M</td>
<td>3.93L</td>
<td>3.94</td>
<td>4.05</td>
<td>4.20</td>
<td>1.91**</td>
</tr>
<tr>
<td>Internal setting</td>
<td>4.18H</td>
<td>4.11</td>
<td>4.07</td>
<td>3.82</td>
<td>4.07</td>
<td>4.18H</td>
<td>3.67L</td>
<td>1.82</td>
</tr>
</tbody>
</table>

* M.R.T(Duncan multiple range test based on p<0.05), distinguished as L(Low) < M(Middle) < H(High).

** Represents statistical significance with p<0.1

### Table 6: Analysis of differences in choice factors across different memberships

<table>
<thead>
<tr>
<th>Factor</th>
<th>Individual member</th>
<th>General corporation</th>
<th>Government investment agency</th>
<th>Non-member</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expediency</td>
<td>3.93L*</td>
<td>4.03M</td>
<td>4.00</td>
<td>4.27H</td>
<td>5.39**</td>
</tr>
<tr>
<td>Staff service</td>
<td>4.02</td>
<td>4.12M</td>
<td>3.93L</td>
<td>4.32H</td>
<td>4.930</td>
</tr>
</tbody>
</table>

* M.R.T(Duncan multiple range test based on p<0.05), distinguished as L(Low) < M(Middle) < H(High).

** Represents statistical significance with p<0.1

### Table 7: Analysis of differences in choice factors across different preferred resort types

<table>
<thead>
<tr>
<th>Factor</th>
<th>Mountain</th>
<th>Seaside</th>
<th>Mountain/ seaside</th>
<th>Waterfront</th>
<th>Seaside/ waterfront</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programs</td>
<td>3.79L</td>
<td>4.01</td>
<td>3.97M</td>
<td>4.18H</td>
<td>3.95</td>
<td>3.498**</td>
</tr>
<tr>
<td>Employees service</td>
<td>3.92L</td>
<td>4.31H</td>
<td>4.13M</td>
<td>4.23</td>
<td>4.00</td>
<td>3.423</td>
</tr>
</tbody>
</table>

* M.R.T(Duncan multiple range test based on p<0.05), distinguished as L(Low) < M(Middle) < H(High).

** Represents statistical significance with p<0.1
CONCLUSION

The study theoretically considered the importance and satisfaction ratings of resort choice attributes so as to supply a speculative foundation to unveil the characteristics and relationships of each factor, to derive implications from the first-hand examination of differences between the importance and satisfaction placing of choice attributes, and investigate how resort choice attributes vary according to different use patterns of resort customers to present measures to enhance the effectiveness of marketing and to aid domestic resorts to better understand the desires and needs of users to provide appropriate products and services in as every and continuously competitive setting. The following is the summary of the research outcomes obtained from empirical analysis:

- First, the analysis showed that there is a significant difference between the importance and satisfaction ratings of resort choice attributes.
- Second, the analysis showed that there was a significant difference in the importance of choice attributes depending on resort use patterns.

Although this study focused on accurately assessing choice attributes for four-season resort complexes, further study would benefit from examining the differences in choice attributes for different resorts, including healing-type resorts that aim to heal tired minds and bodies with the power of mother nature (forest), recently popular water parks, golf resorts, hot spring resorts, ski resorts, etc.

Ethical Clearance: Taken from Gwangju University

Source of Funding: Self

Conflict of Interest: NA

ACKNOWLEDGMENT

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An Analysis of Customized Personal Health Information for Smart Healthcare Systems

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ABSTRACT

Background/Objectives: This study looks at how healthcare services can be built by analyzing and processing personal health information data on a large scale.

Method/Statistical analysis: The accelerating speed at which our society is aging has led to an increase in the importance of healthcare and the diverse needs within it. This study proposes a personalized healthcare system that aids health management. Users can input their health related data and answer questionnaires into the system, which will categorize them into healthcare target groups.

Findings: The smart healthcare system uses questionnaires to collect key data such as the users’ physical health, family medical history, exercise, and nutrition. Users are then categorized into groups based on the data, and can receive personalized healthcare services including exercise programs and nutrition-based meal plans that can help them maintain their peak physical condition and cultivate healthy lifestyle habits.

Improvements/Applications: The system helps users live a healthy life by recommending personalized exercise and nutrition programs that reflect changes in their health and physical conditions.

Keywords: Smart Healthcare, Personalization, Measuring Tools, Questionnaires, Smartphones.

INTRODUCTION

With the advancement of medical technology came an increase in the average life expectancy and the elderly population. As a result, the medical healthcare industry has risen in importance and related markets have grown steadily. This follows the development and expansion of healthcare services from the early rudimentary village systems providing residents with diagnoses and treatments for ailments, to the expanded version today where healthcare services include environmental hygiene, the prevention of diseases and disorders, and general improvement of healthy living standards. The healthcare environment is changing to not only provide treatment, but also guidance on required exercise and meal plan logs aimed at accelerating recovery or maintaining peak physical conditions within a set period of time. This has naturally progressed into a more individual-based management of health. To meet the growing need for healthcare in the daily life of the 21st century, the IT industry is becoming integrated into healthcare via wearable devices that collect daily exercise data that can be used to further personalize healthcare.

Fig. 1. Structural change in the healthcare system
However, unlike the previous healthcare system where a small number of specialists provided care for a large group of people, the rise of individualized healthcare has led to an exponential increase in the amount of healthcare data. Personal body data, family medical history, various data collected via smart exercise equipment or wearable devices, etc. need to be processed together, which increases costs. Such an asymmetric system structure could lead to neglecting personalized healthcare, which increases the possibility of obscuring the point of healthcare in itself.

To overcome this structural problem, this study proposes a system where the users themselves can input basic data such as physical information and facts about their lifestyle as well as answer questionnaires. This will allow the system to differentiate between lifestyles and categorize the users into groups. The groups are then subdivided and are provided with personalized exercise and meal plan programs that encourage the users into actively and consistently participating in their healthcare process, thereby increasing the effectiveness of the healthcare service provided.

Related Studies

Main Health Info Net

The ‘Main Health Info Net’ collects data from acute care hospitals, outpatient facilities, behavioral health sector caregivers, and long-term caregivers in order to create an Electronic Health Record that can aid in identifying high-risk patients. The system showed high accuracy, with 74% of the patients visiting the emergency room.

University of Iowa Hospital and Clinics

The ‘University of Iowa Hospital and Clinics’ uses Predictive Analysis Software to identify high-risk patients for infection to prevent re-admission due to infection. The system also predicts complications by analyzing the patient’s medical history or their condition during surgery.

Carolina’s Healthcare System

The ‘Carolina’s Healthcare System’ analyzes patients’ lifestyle habits and has data from about 900 care centers in the states of Carolina. Using predictive analytical methods, the system uses this data to extract risk factors for patients and utilizes this data to identify patients at risk of contracting lethal diseases.

GS1

The GS1 is a standardization organization dedicated to the development, dissemination, and management of international standard identification codes, barcodes, and electronic documents for the identification of products and clients and the exchange of trade information. GS1 international standard barcodes are used by more than 1 million companies in more than 10 industries including distribution, logistics, medicine, transportation, chemicals, and military equipment.

Oliot

Global IT giants, in order to gain an upper hand in the IoT(Internet of Things) sector, are currently working to standardize the service sector for incorporating telecommunication between various equipment and things. In comparison, Oliot(Open Language for Internet of Things) is an open source project based on GS1 EPCglobal to provide internationally integrated Internet services that go beyond local smart-home services. It is an international standard-oriented IoT platform that accepts various IoT connections and protocols such as barcodes, RFID, ZigBee, and 6LoWPAN, as well as allows them to become IoT infrastructure platforms.

Healthcare Services

The healthcare service proposed in this study is based on information that users input themselves, such as basic health checkup content such as blood glucose and blood pressure levels; body composition tests for body composition and obesity; as well as questionnaires about nutrition and exercise in order to check the current physical state of the user and provide health information.

The system plays the role of specialists such as health coordinators, trainers, nutritionists, doctors, nurses, etc. The user can choose the service they want to use prior to registration. Services available include homecare, exercise and physical activity care, and nutritional care. For exercise and physical activity care and nutritional care, users have to take a questionnaire needed for optimal service[Figure 2].
Homecare

Homecare services are provided in the users’ homes, and focuses on blood pressure and blood sugar level management. The levels are measured using smart measurement equipment, and the data is collected via wireless telecommunication (Bluetooth, NFC) between the equipment and smartphone. The collected data is accumulated and presented as a graph to allow users to see the changes in their health. The system diagnoses the users’ current health state based on the data, and uses the accumulated data to propose suitable exercises, exercise guides, and balanced meal plans.[Figure 3].

Exercise and Physical Activity Care

When users request the exercise and physical activity care service, they first have to input information on average activity level, Frail Scale, and grip strength, and fill out a questionnaire. Once the questionnaire is completed, their service request status will be changed into a request for a 3-month exercise class. Users can select between the four recommended exercise packages (A, B, C, D) and can personalize the intensity of the sessions based on their conditions to complete the registration.[Figure 4].

The system compares accumulated exercise data to the initial exercise goals set by the users, and provides weekly exercise analyses to guide the following week’s exercise activities.

Nutritional Care

Users who applied for nutritional care services have to input their dietary habits and fill out a questionnaire.
Once the questionnaire is completed, the service request status will be changed into a request for a nutritional class and users will be able to select between one of the four nutritional packages (A, B, C, D) available[Figure 6].

Users can upload their daily food intake via their smartphones, and the system will use this data to continuously update the recommended meal plan[Figure 7].

CONCLUSION

The smart healthcare system suggested in this study categorizes users based on the basic information they input and suggests appropriate healthcare programs to help them manage their own health. While the system can be much more effective in terms of time and cost compared to systems that match numerous users with a small number of experts, the system might not be highly accurate when it comes to how the users are categorized. Thus, further research into establishing a system that both reduces the need to match experts and users and ensures credible categorization is required.

Ethical Clearance: Taken from Namseoul University.

Source of Funding: Self

Conflict of Interest: NA

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REFERENCES


Chinese Character Education and the Brain

Joo-EunLee
Chinese Language and Literature Department, Sook-Myung Women’s University, Korea

ABSTRACT

Background/Objectives: This research study was conducted to provide the up and coming generation with a keen sense of awareness regarding the necessity of self-directed learning.

Method/Statistical analysis: Such as metacognition, and through research on how the combined education and usage of Chinese Characters and Korean language will be conducted in the future.

Findings: This research study hopes to serve as the precedent and most relevant reference for follow-up research. Improvements/Applications: This research study also expects to encourage follow-up research that examines and develops new educational contents or methods that utilize additional educational references and resources (Chinese Character picture cards or Chinese Character supplementary textbooks etc.).

Keywords: Left Brain Right Brain, Chinese Mix, Activated Brain Regions, Metacognition, Self-Directed Learning, Training, Content Development, Training Materials, Ideograms.

INTRODUCTION

We sometimes come across geniuses with amazing cognitive abilities. But when tracing and monitoring the outcomes of these geniuses 20 to 30 years later, we can see that they live normal lives just like everyone else. Research has concluded that while these geniuses have extremely high levels of intelligence, because their abilities and talents were not able to keep up with this hyper-intelligence, they were not able to properly leverage their high intelligence levels. Because these people could have become world famous for their intelligence and abilities if only they had developed their talents to be at a level on-par with their intelligence, this truly can be considered to be a waste of talent.

In the future, our left brain and also our right brain must continuously be developed together in order to fully leverage our intellectual abilities. While we have previously lived in an age of the left brain, the future is the age of both the left brain and also the right brain. This research paper presented backup evidence and data that support a new index for Chinese Character Learning that was designed to develop both the left brain and also the right brain at the same time. The research results confirmed by the research team at the Gachon University Neuroscience Research Institute are expected to propose a newly created curriculum designed to provide an education program that is both truly needed and also appropriate for our times that is able to meaningfully connect and associate both the Chinese Character and also the Chinese Language education programs with other academic fields.

The Future is the Age of 'Left Brain' and 'Right Brain'

In the future, our left brain and also our right brain must continuously be developed together in order to fully leverage our intellectual abilities.

Intelligence is associated with the left brain while abilities and talents are associated with the right brain, so our left brain and also our right brain must continuously be developed together in order to fully leverage our intellectual abilities.

While we have previously lived in an age of the left brain, the future is the age of both the left brain and also the right brain. This is also the reason why professional neuroscientists emphasize the importance related to the activation of both the left brain and also the right brain.
Alike to how we have to plant healthy seeds in the spring in order to have a successful and bountiful harvest in the fall, while academic learning in the subject areas of the English language, Mathematics and Chinese Characters etc. is important, brain development education should be the top priority for elementary school children.

If we have previously lived in an age of the left brain, the future is the age of both the left brain and also the right brain. The left brain and the right brain must be used simultaneously to be able to achieve high level intellectual objectives. This is also the reason why professional neuroscientists emphasize the importance related to the activation of both the left brain and also the right brain.

**Education is a long-term plan**

By educating our students to be smart and intelligent so that we can train them to be global leaders of the world, we can overcome our status as a weak and powerless nation. To make Korea great, we must first cultivate great human resources. It is important to erect the pillars of our nation to be tall and strong by fostering brain development based on proper and sound human character and integrity.

Korean people are a highly capable people that have become an interest and focus of the world as a nation of people that has achieved extreme economic growth and Democratization within an extremely short period of time immediately after recovering from the ruins of a painful war. The Korean corporation Samsung Electronics has thwarted Japanese electronics makers, which dominated the global electronics industries up to just a few years ago. Psy, the now globally famous K-Pop star, also took the global community by storm with his ‘Gangnam Style’ song and dancing.

To Deepen Cognitive Thoughts and Abilities, We Must Learn and Understand the Chinese Character Language, which is an Ideograph-based Language

(Ideograph or ‘pyoeuimoonja’ or ideographs/ideograms are graphic symbols that represent an idea or concept, independent of any particular language, and specific words or phrases)

From a character perspective, both the Chinese language and also the Korean language are able to utilize ideographs (‘pyoeuimoonja’) and also phonetic symbols, (‘pyoeuimoonja’). This relationship between the two languages is an unprecedented relationship that is not easily discovered between any other languages in the world. The Chinese language can only use ideographs (‘pyoeuimoonja’). However, the Japanese language cleverly uses both ideograph and also phonetic symbol mechanisms where appropriate. On the other hand, the Korean language sticks to a linguistic policy where only phonetic symbols must exclusively be used (exclusive use). Research claims that the utilization rate of Chinese Character knowledge of Japan compared to that of Korea is about 19:0.

The score of ‘Japan 19 : Korea 0’ is in fact also the score of the number of Nobel laureates that have been awarded Nobel Prizes in science related fields. Because Japan produced three Nobel laureates this year alone, this disparity has widened. Editorials and article submissions lamenting over this gap and calling for an awakening flooded the media Korea.

Unfortunately, Korea is quick to prescribe a temporary remedy, and there is a lack of analytical diagnosis that pin points the exact cause (‘byeong in’: cause for disease) for this phenomenon. Out of the proposed remedies, there were many opinions claiming that Korea needs to significantly increase R&D (Research and Development) and other infrastructure level investments. While these insights are not incorrect, the gap in the scale of the economies or R&D investments between Japan and Korea certainly do not amount to a score of 19:0. Therefore is does not seem that the fundamental reasons for Korea being unable to produce Nobel laureates are related to a lack of investments.

The Nobel Prize is a flower rather than a tree. A flower does not fully bloom just from being watered and being kept moist. The flower needs strong roots, and just like how a tree needs to have deep roots, people need to have deep thoughts. To engage in deep thoughts, we must study Chinese Characters, which are pyoeuimoonja(ideograph or ‘pyoeuimoonja’). In other words Chinese Characters (meaning Chinese Characters) cultivate science (meaning science) and creativity.

The Mixed Use of Chinese Characters and the Activation of the Related Regions of the Brain

Recent comparative analysis based on the imaging results of two cases of fMRIs (Functional magnetic
resonance imaging) conducted by the research team of Ph.D. Cho Zhang-hee at the Gachon University Neuroscience Research Institute confirmed that there were differences in the cognitive abilities and the activated regions in the brain in the comparison between when the Chinese language and when the Korean language were read.

The research team selected 12 adults (average age of 28 years old) that were proficient at reading Chinese Characters and gave them 150 2-syllable Chinese Characters that were in accordance with level 5 of the Korean Association for the Promotion of Hanja Education (KAPHE) and also 150 commonly used Korean words to read. The words were shown in word clusters of 30 words for 1 second each during a 30 second period with a 30 second rest period in between word clusters, and the test participants were required just to read the words to themselves without saying the word aloud. The imagery from the MRI was used simultaneously to observe the activated regions in the brain.

On the other hand when reading Korean words, the angular gyrus of the left hemisphere and the inferior prefrontal area showed increased brain activation.

This can be interpreted to mean that the areas of the brain with increased activation when the Chinese language and when the Korean language were read were different.

Ph.D. Cho explained that 'this phenomenon is due to the different characteristics of the Chinese language and the Korean language depending on whether they are ideographs ('pyoeummoonja') or phonetic symbols, ('pyoeummoonja') and emphasized that just because "more regions of the brain were activated when the Chinese language was read" was not adequate to conclusively interpret that the Chinese language was a superior language. But Professor Cho added that "based on the different regions of the brain that are activated when comparing the Chinese language with the Korean language, increased activation of different regions of the brain would be possible starting at a young age if both Chinese Character and also Korean language education are provided to students in parallel."

These research results were published in a recent volume of JKM (Journal of Korean Medical Science), which is a research publication of the Korean Academy of Medical Sciences.

The research team investigated the difference in the memory abilities related to Chinese Characters and the Korean language. After showing 12 male adults (average age of 27 years old) random Chinese and Korean names including ’(Mi-ok)’ and ’(Jung-ok)’ and ’Hyun-ja’ and ’Dong-eun’ etc., these named were randomly mixed and shown to the test participants again at 1 minute, 10 minute and 120 minute intervals, and the test subjects were tasked with finding names that they remembered.

The results of the test confirmed that cognitive memory was maintained for a longer period of time for Chinese names than for Korean names. While the cognitive memory for Chinese names at the 1 minute, 10 minute and 120 minute intervals was measured to be 0.96, 0.88, and 0.79, respectively, the cognitive memory for Korean names at the 1 minute, 10 minute and 120 minute intervals were all measured to be lower at 0.52, 0.28, and 0.12, respectively. The research team analyzed these results to be caused by the fact that the cognitive functions of the people were mainly transferred to visual cognition and the fact that Chinese Characters, which are hieroglyphic characters, have a more significant and emphasized visual element when compared to characters in the Korean language.

Professor Young-bo Kim, who was the PI (Principal Investigator) of the research study added that "based on the different regions of the brain that are activated when comparing the Chinese language with the Korean language, increased activation of different regions of the brain would be possible starting at a young age if both Chinese Character and also Korean language education are provided to students in parallel."

These are fMRI images that show the active regions of the brain when the Chinese language and when the Korean language were read, conducted by the research team of Ph.D. Cho Zhang-hee at the Gachon University Neuroscience Research Institute. The left image shows the active regions of the brain when the Chinese language was read / and the right image shows the active regions of the brain when the Chinese language was read.

When the Chinese language and when the Korean language were read, the areas of the brain that reacted were confirmed to be different.
Metacognition' - the Secret to Self-directed Learning

According to the research of Ph. D Steve Fleming of the Center for Neural Science at NYU, the front area of the prefrontal cortex, or in other words the gray matter area located immediately on the inside of the forehead, showed a high correlation with metacognition, which is a higher order of thinking skills that enable the ability to examine oneself. Professor Marcel Veenman of the Leiden University in the Netherlands analyzed that while IQ was a contributing factor that decided about 25% of academic performance, metacognition was a contributing factor that decided about 40% of academic performance.

In the TV Program 'A Window to Current Affairs' broadcasted by the KBS 1TV broadcast network of Korea, 'metacognition' was analyzed in depth for its ability to help lead self-directed learning. The broadcast channel executive production team conducted a test that compared the study methods of 10th grader students from the Haneul High School (Incheon, Korea) together with Lisa Son, Associate Professor of Psychology at the Department of Psychology, Columbia University, who majored in and is an expert in the field of Metacognition, and also a team of researchers from the Psychology Department of Ajou University. After having the test participant students read and memorize word pairs, they were tasked with reading (re-learning) the word pairs one more time, and the second time they were tasked with conducting a self-test (self-directed testing) as if they were giving a quiz to themselves. The students were then asked to submit these quizzes along with their expected scores. The results of the test confirmed that the expected scores of the students were higher when they engaged in the re-learning method, but the results also confirmed that the actual scores when they engaged in self-directed testing were higher by 10 points. Because the act of self-directed testing requires the students to engage in the metacognitive process of checking what they might not know, just this extra cognitive step resulted in an increase in the academic scores of the children.

Metacognition can be divided into self-evaluation, which is a self-assessment of one’s studies, and self-control, which is the behavior of creating a study strategy and executing this strategy. The results of the broadcast channel executive production team filming the study process of student Soo-wan Kang (male), who was the valedictorian of the Haneul High School (Incheon, Korea), confirmed that his study process and methods included metacognition elements. Professor Kyeong-il Kim of Ajou University emphasized that “metacognitive abilities are responsible for a significant amount of self-directed learning”. In other words, this can be interpreted to mean that metacognition, which enables a student to examine their own study processes and methods and to discover and even address any problems or issues related to their methods of study, is the foundation and core of self-directed learning.

CONCLUSION

When the author of this research paper arrived at the strong sense of curiosity and conclusion based on academic exploration after reading the article on how the "combined usage of Chinese Characters is helpful in activating certain areas of the brain" helps use the left and right brain simultaneously, the author of this research naturally concluded a positive evaluation on the combined usage of Chinese Characters while also concluding that the active provision of Chinese Character education and the combined usage of Chinese Characters in the education curriculum of Korea is urgent.
This research study has the expectation that the results and discussions can provide the up and coming generation with a keen sense of awareness regarding the necessity of self-directed learning, such as metacognition, with the additional expectation that an abundant amount of research on how the combined usage of Chinese Characters and Korean language will be conducted in the future, and this research study hopes to serve as the precedent and most relevant reference for follow-up research.

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Analysis and Research in College Physical Education based on Credit System Organization

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ABSTRACT

According to the necessities of the credit framework organization, which is a beginning stage of school instruction change, the system of school P.E (short for physical training) credit framework organization is built through the act of school P.E credit framework organization in Huazhong Normal University, and the integrative favorable position and impact of P.E are enhanced through practice and research.

Keywords: PC Application; School Physical Instruction; Credit Framework

INTRODUCTION

What sort of abilities is required in these days and in the future? In what manner ought to present day training develop such gifts? This has turned into a famous point all around the globe. Research on the General Evaluation of Working Quality of Physical Education Teachers in Universities is explained by [1]. The setting up of communist market economy frameworks, the effect drove by the new-procedure transformation and the going into WTO all achieve new difficulties and chances to the improvement of school instruction. Multimedia Technology in Physical Education and The comparative study on the organizational structure of department of public sports and physical education in China and America are described by [2-3]. The social observation and estimation of training have been enormously changed. On a premise of concentrate present day person, the objective and example of capabilities for gifts of advanced education have been straightened out, requiring that understudies ought to be appropriate to meet social needs with rich learning and blended capacities. Organization and positive psychology with diversity and Human Personal Attribute towards Industrial Social Contribution are discussed by [4-5]. All together to adjust to such prerequisite and to accelerate the improvement of instruction change, honing and enhancing the credit framework has turned out to be one of the immense activities to extend the instruction change and enhance instructive effectiveness in universities and even in center schools in the current years. An outcome of periodized small side games with and without mental imagery on playing ability among intercollegiate level soccer players is described by [6].

In this article, the structure of school P.E credit framework is built through the act of school P.E credit framework organization in Huazhong Normal University, which is direction for the advancement of school P.E instruction change also, organization in China [7-8].

Origin of Credit system

Credit framework was created from subject-picking framework in Harvard University toward the finish of the nineteenth century and was rapidly spread among American universities. Toward the start of the twentieth century, numerous universities in America put credit framework into practice. After the Second World War, some western nations likewise set up credit framework in school instruction. The authoritative example of school in our nation was very like American credit framework before the freedom and amid the early period after the freedom. In the 1950’s, taking after the case of the Soviet Union’s school organization, our schools acclimated to scholarly year framework. In 1978, Wuhan University led the pack in experimenting with credit framework. In 1985, “CCPCC’s Decision on Educational System Change” affirmed the credit framework. From that point forward, Chinese schools have accelerate the pace of experimenting with credit framework. With the profound going openness and change, particularly the
improvement of communist market economy, which brings along the general change in human asset showcase and other social fields, schools begin in the tide of honing and progressing credit framework examine extending and reinforcing the instructive change, so as to develop abilities with blended qualities. Amid the previous century, credit framework has been progressively created and made strides. In this way, the clarifications of credit framework ought to be distinctive in various times. “The Dictionary of Education Administration” distributed by Shanghai Education Publish House considered credit framework as a sort of instructive organization framework in universities, in which understudies’ credits are utilized to gauge their review conditions, and organization is done by it. Different clarifications are like this one in other lexicon.

**Constitution of Physical Education Credit System**

The present credit arrangement of high instruction in China has consolidated the customary credit framework, subject-picking framework, different necessities of value training and the agreeing organization design methodically.

On a premise of the exploration on more than 10 schools in China and the truth of our college, Huazhong Normal College has advanced “Huazhong Normal University P.E Training Reform Proposal”, which builds the system of school P.E credit framework organization and directions. The physical training educational programs structure credit framework is shown in Figure 1. The directions include: The P.E open courses will proceed all through the 4 a long time and are partitioned into three sorts: two terms of essential lessons, two terms of uncommon preparing lessons and two years of P.E clubs. The credits of students P.E course is absolutely 6: amid the initial two years, 1 credit for every term; amid the most recent two years, every understudy ought to at any rate pick one club and 1 credit for every year. For P.E gifts and understudies with P.E strengths, our school offers a twofold degree major called Physical Instruction and Training with 20 courses and more than 50 credits. Any understudy who doesn’t get the mandatory P.E credit can’t have the capabilities to be picked as a “three- great” understudy or given grant or be prescribed as a postgraduate without examinations when he or she applies for access to postgraduate school. Students who have not fulfilled the accompanying solicitations are viewed as flopping in this course and in this way are not fit the bill to the Bachelor’s degree. These solicitations are followings: i Learn to play the 24-pose shadowboxing 8. Learn to swim (50 meters for young men also, 25 meters for young ladies). ÅGet the 6 credits. The credit is just a numerical measuring stick to gauge credit framework. Its preference is that to figure understudies’ review sum in the organization of credit framework is generally straightforward. Be that as it may, this is not the embodiment of credit framework, and credit framework is built up and created on the premise of subject-picking framework, which is the center and essential elements of credit framework. Subject-picking framework gives the understudies energy to settle on their own choices with the accompanying real focuses: In the syllabus, uncommon preparing and P.E clubs ought to offer upwards of 20 subjects and will increment by years so as to give understudies more decisions. Offer distinctive level classes, for example, essential class and propelled class for subjects, which are favored and chosen by huge number of understudies, for instance aerobatics, wear moving, weight training, table tennis, badminton, and so on. Students can openly pick the courses, educators and the class time, thus that understudies may arrange and improve their own particular information structure as indicated by social request, individual intrigue and forte also as their own particular premise.

![Fig. 1. The physical education credit system](image)

**Effect of Credit Physical Education Systems**

A. Changing the Old Concept of Education and Promoting the Reform of Teaching Content and Method One of the critical motivations behind completing credit framework is to erect the idea that understudies are the subject of instruction. The conventional idea dependably holds that P.E in schools, particularly the class instructing, is focused on educating P.E information, strategies
and abilities. The greater amount of these, the more fruitful P.E instruction is, which makes understudies as detached beneficiaries of this information, and after that understudies lose their autonomy in learning and working out. After the act of credit framework, our P.E Department reexamined showing arrangement and syllabus as per archives of the Department of Instruction and our college, which lifted P.E training to the level of value instruction and after that the P.E classes was changed to cover four years unique in relation to covering the initial two years. The primary substance of essential classes for green beans is: P.E hypothesis what’s more, wellbeing information, essential methods and abilities, criteria of essential qualities, shadowboxing, fundamental characteristics of things, and so on. These substance are centered around enhancing physical quality, creating sports capacity, developing games interests and propensities, furthermore, get ready for the following year. In the second year around 20 particular subject courses include: b-ball, volleyball, soccer, table tennis, badminton, tennis, and so forth. Both essential classes and propelled classes are offered to develop understudies’ intrigue and propensity for maybe a couple particular subject, to enable them to ace and enhance P.E hypothesis, systems, abilities, work out techniques, coordinate guidelines and judging strategies, which will be extremely helpful in games rivalry and additionally gather exercises. For the most recent two years, clubs incorporate aerobatics, weight training, teakwood, wrestling, et cetera. The point of these is to make strides their games strategies, frame propensities to do works out, ace strategies for doing practices amid their entire life, and serve for development of blend qualities gifts. This sort of subject class guided by quality training and the origination, wellbeing is basic, greatly affects the customary instructing design. It regards the substance and strategy for educating, and also the development of understudies’ information and development of their capacity. This example especially request that instructors give careful consideration on the change of showing substance and strategy, to receive propelled means, to develop understudies’ inventive contemplations, imaginative capacity and hone capacity, to persistently enhance their own particular qualities what’s more, capacities. Consequently, the act of credit framework plays an dynamic part in educators’ change on instructive idea and showing substance and technique.

B. Slowly Forming that Students are Subjects in Educating Activities The center of credit framework is subject-picking framework, which enables understudies to pick courses and things freely, class time and educator too. Seen from the case of Grade 2004, among the courses, five most loved ones are: games move in extent to 22%, table tennis to 16%, aerobatics to 12%, badminton to 10%, and working out to 9%. So we expanded these classes doubly to meet the understudies’ needs. Picking time, classroom, thing and instructor empowers understudies to figure out how to pick, to frame their subjective status, to enact them. Reviews demonstrate when understudies pick a certain subject, 80.1% of them have a tendency to consider their advantage, 50.7% will check whether it suits his future employment, 35.3% care the closeness to his major, 34.4% think if it’s helpful to enhance exhaustive qualities. It’s not hard to see understudies’ consciousness of freedom in picking courses. Most importantly, the act of credit framework focuses on understudies’ independence, gives understudies free rights, and prepares their liveliness. As an outcome, the rate of finishing the P.E capability criteria test furthermore, courses among understudies has significantly risen.

**CONCLUSION**

In various nations and diverse time, the accentuation on credit framework ought to appear as something else. The credit framework beginning in the finish of 1970s was centered around proficiency of developing gifts. In 1990s, credit framework is not just received to satisfy the going before capacities additionally focus on widen understudies’ learning and build up their extensive capacities. In P.E of the new thousand years, how to join ideological instruction with instructing of learning, systems and aptitudes, how to consolidate general training with individual instruction, and how to consolidate extraordinary ability training with blend qualities ability instruction all together, still remain a hotly debated issue which is worth of profound research and dynamic practice.

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Fe(III)-Tetracycline Complexes in Aqueous Solution Under UV Irradiation Based on Photochemistry

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ABSTRACT

The shape and photochemistry of the Fe(III)-Tetracycline complex (Fe(III)-TC) in watery arrangement were explored under UV-C light (254 nm) by UV-Vis spectrometry. The proportion of Fe(III) to Tetracycline (TC) in the Fe(III)-TC complex was 1:2, as dictated by Job’s strategy at a trademark assimilation wavelength of 440 nm. The convergence of Fe(II) delivered by the photoreduction of Fe(III) species and the quantum yield of Fe(II) (ΦFe(II)) were resolved. The photoreactivity of the Fe(III)-TC complex was higher than that of the Fe(III)-OH complex as far as ΦFe(II). The photochemical generation of Fe(II) diminished with expanding pH in the range 3.0-9.0.

Keywords: Tetracycline; Photochemistry; Quantum Yields; Iron (II).

INTRODUCTION

Press is the most inexhaustible metal in the earth, discovered regularly at centralizations of a few m. The photochemistry of iron(III) edifices was examined generally amid the most recent decade. The photochemistry of these buildings can contribute significantly to the adjust of natural mixes in watery frameworks.[1, 2] Our gathering has been occupied with reenactment ponders on the photochemical oxidation of natural mixes incited by various ferric species. Antibiotic medications were discovered as of late in the dirt, surface water, and much groundwater tests collected close waste and wastewater tidal ponds. They can frame all around reported solid coordination edifices with metal particles (Cr(III), Mn(II), Fe(III), Co(II), Ni(II), Zn(II), Cd(II), Hg(II), Pb(II), Al(III))[3-4]. Explored the complexation conduct of antibiotic medication with Mg²⁺ and Ca²⁺ and their outcomes repudiated the presence of 1:2 M²⁺-TC edifices that were frequently proposed for the low metal particle focus space. Demonstrated that ligand-interned disintegration of TC and dissolvable metals (Me: Al or Fe) gives off an impression of being a two-stage prepare. At first, 1:1 Me-antibiotic medication solvent buildings are framed, and the response advances to shape 2:1 edifices. Utilized the capacity of tetracyclines to shape metal-ligand buildings to recognize antibiotic medications in sedate definitions. They call attention to that iron particles have higher proclivity than different cations for chelation[5-8] with antibiotic medication in water. In this paper, we report our investigations on the physicochemical properties of the Fe(III)-TC complex and clarifies the impact of arrangement science on the creation of Fe(II) press and to report the photograph era of OH radicals in fluid arrangements of TC with Fe(III) particles. The chemical decomposition and contribution for 2-Bromo-1-(1-phenylsulfonyl-1H-indol-3-yl) propan-1-one - ActaCrystallographica was described in [9]. Crystal growth, spectral, thermal and optical properties of an organic single crystal–Dye doped hippuric acid was illustrated in [10].

MATERIALS AND METHOD

Chemicals and equipment

Antibiotic medication was acquired from Fluka Co. (Steinheim, Germany), and utilized without encourage refinement. FeCl₃•6H₂O (Tianjin, PRC) was utilized as the iron source. A suitable measure of FeCl₃•6H₂O was weakened with 0.001 M hydrochloric corrosive to give the coveted centralization of Fe(III) at pH 3.0 (±0.01). Ammonium acetate derivation, ammonium fluoride, and 1,10-phenanthroline, were of logical reagent review (Shanghai, PRC). HCl and NaOH were utilized to alter the pH estimations of the
arrangements. Twofold refined water was utilized as a part of all trials. The UV-Visible spectra of the arrangements were recorded utilizing Shimadzu UV-1601 spectrophotometer. Every one of the analyses were done in a 1 cm quartz cuvette at 298 K.

**Photoreaction system**

The illumination tests were completed in a 1.0 L glass photochemical reactor. The response vessel had an interior distance across of 7.5 cm, and it was loaded with 0.5 L of arrangement amid each test. The Fe(III)-TC complex was adapted for a hour prior to light introduction. At that point, the examinations were led at surrounding temperature, and the substance were blended persistently utilizing an attractive stirrer. A 15 W UV light (Lanxi, PRC) was utilized for the trials with UV-C radiation (254 nm). The illumination way length in the reactor was 1.35 cm. The light force was 1.33×10⁻⁷ E S⁻¹, as recognized by a photometer (Beijing, PRC).

**Analysis methods**

The light analyses were done in a 1.0 L glass photochemical reactor. The response vessel had an inward distance across of 7.5 cm, and it was loaded with 0.5 L of arrangement amid each examination. The Fe(III)-TC complex was adapted for a hour prior to light introduction. At that point, the trials were directed at surrounding temperature, and the substance were mixed constantly utilizing an attractive stirrer. A 15 W UV light (Lanxi, PRC) was utilized for the trials with UV-C radiation (254 nm). The light way length in the reactor was 1.35 cm. The light power was 1.33×10⁻⁷ E S⁻¹, as distinguished by a photometer (Beijing, PRC).

**UV-VIS Spectra of the Fe(III) Complex with TC**

Antibiotic medication goes about as a ligand that would complex be able to with Fe(III). At the point when antibiotic medication was added to an answer of Fe(III) particles, with 0.001 M hydrochloric corrosive, a dark colored solvent compound was gotten with a trademark wavelength of most extreme assimilation at 440 nm. The maximal retention can be credited to complex arrangement between iron(III) with antibiotic medication. Figure 1 demonstrates the UV-Vis range of the Fe(III) complex with tetracylines, and the range is in concurrence with that revealed beforehand. There are various destinations in the antibiotic medication structure where chelation with metal cations may happen, and the most imperative of these are the two enolized 1,3-diketone groupings. It is proposed that iron (III) chelated with antibiotic medication, and the synthetic structure of the Fe(III)-TC complex is that appeared in Figure 2.

![Fig. 1. UV spectra of Fe(III) complexes with tetracycline (curve 1)](image1)

![Fig. 2. The chemical structure of the Fe(III)-TC complex.](image2)

**CONCLUSION**

The focus proportion Fe(III):TC is another vital component. Along these lines, tests were done with different proportions in arrangements of pH 3.0. The outcomes demonstrate that both the Fe(III) and TC focuses influenced the yield of Fe(II). The Fe(II) fixation expanded with an expansion in the TC focus from 50 µM to 150 µM. With an expansion in the Fe(III) focus from 50 µM to 150 µM, the Fe(II) fixation expanded quickly. The centralization of Fe(II) photoproduced after 10 min of illumination was relentless. At pH 3.0, an adjustment in the Fe(III)/TC proportion can prompt an adjustment in the relative substance of various Fe(III)-TC buildings in the arrangement. The evident quantum yield of photolysis of Fe(III)-TC at 254 nm is...
0.098 which is somewhat less than that of the Fe(III)-oxalate complex. The pH esteem and Fe(III)-TC proportion are key variables for the photoreactivity in the Fe(III)-TC framework. The quantum yield of Fe(II) diminished with expanding pH in the range 3.0–7.0. The Fe(II) fixations created in the framework expanded with expanding TC focus, however at a specific proportion diminished with expanding TC fixation. Besides, the Fe(II) fixation expanded with expanding starting Fe(III) focus.

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REFERENCE


The Relationship between Knowledge Learning and Strategic Variety in Born Global SMEs

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ABSTRACT

Background/Objectives: The purpose of this study is to integrate strategic variety unlike previous studies to expand the discussion based on the result of the existing born global research.

Method/Statistical analysis: Hypotheses were established between four latent variables, and a total of seven hypotheses were established including the mediated effects of ability to codify knowledge. The number of primary collection sample was 192. Of these, 185 were used as the final sample excluding 7 questionnaires with multiple non-answers and insincere responses. In addition, this study set a structural equation model (SEM) to conduct empirical analysis with LISREL.

Findings: This study explored the factors influencing the various strategies that born global companies could use in their overseas market entry. Analysis showed that novelty of external knowledge had a significant impact on ability to codify knowledge, and it had a positive effect on strategic variety.

Improvements/Applications: It is necessary for future studies to analyze the influence of network perspective and external environmental factors on the relationship between the capacity and performance of a born global SMEs.

Keywords: Born Global, Knowledge based View, Strategic Variety, Ability to Codify Knowledge, Diversity of External Knowledge, Novelty of External Knowledge

INTRODUCTION

With the changes in global environment, start-up companies are becoming more active in overseas markets. Stage-theory, which is a traditional foreign market entry theory, explains the process of entering overseas markets by accumulating knowledge based on experience and in inverse proportion to physical and psychological distance. However, it is difficult to apply this premise to the born global startup, which enters the overseas markets within a short period of time. Born global company is a startup company, limited in size and resources. Larrañeta et al. (2014), in a recent study, defined born global as a company that has entered the international market within three years of its inception for less than six years.

There are some studies that have been analyzing the motivation of global companies to enter overseas markets as local information acquisition applying knowledge based view. All of these studies have contributed to expanding the discussion on born global, but there is a limit to unilinearly incorporate existing theories. First, this study attempts to analyze the process of entry into the overseas market of startups through an integrated approach of knowledge based view and strategic variety aspect.

Second, this study adopts the concept of knowledge codification by applying the knowledge based view, and attempts to explore the specific working principle of knowledge learning shown in born global companies. The existing knowledge based view...
studies analyzed the development factors and the influencing factors by internal dynamics.

Third, this study attempts to analyze the competitive advantage factors of the born global company by introducing the concept of strategic variety. This analysis is expected to provide a strategic approach to born global related research.

Theory and hypotheses

Knowledge based view

The knowledge based view is an extension of the resource based view study and is a useful approach to explain the competitive advantage of an enterprise. Knowledge based view is more interested in intangible resource of knowledge and its application than tangible resource characteristic of a company. The application of intangible resource means the process of creating new capacity by utilizing knowledge.

Strategic variety of born global

The characteristics of a born global company can be summarized by size and resource constraints. Born global company is a small start-up company with limited resources available. First, entry into the overseas market by born global companies is the result of the influence by development of communication technology and transportation technology. However, in the study by Larrañeta et al. (2014), the role of external knowledge to lead a strategic variety of born global company has been empirically confirmed.

Hypotheses

Knowledge based view and strategic variety

Born global companies lack the capacity to invest enough resources to acquire overseas market information. Nevertheless, a born global company must continue to seek access to a wide range of local information and develop new products. Ability to codify knowledge appears in the process of identification, absorbs new information from the source of external knowledge, and accumulates it into knowledge within the organization.

H1: The diversity of external knowledge sources will have a positive impact on the development of the ability to codify knowledge.

H2: The diversity of external knowledge sources will have a positive impact on strategic variety.

H3: The novelty of external knowledge will have a positive impact on the development of the ability to codify knowledge.

H4: The novelty of external knowledge will have a positive impact on the strategic variety.

The strategy of born global companies is usually bund by resource constraints, so they tend to focus on simple strategies. A simple strategy can aim for concentration, but it is difficult to capture new and diverse opportunities. An increase in strategic variety means stronger customer-specific approach. The following hypothesis is set through the above discussion.

H5: Ability to codify knowledge will have a positive impact on enhancing the strategic variety of a born global company.

Mediated effects of ability to codify knowledge

Ability to codify knowledge has the effect of creating new resources and learning resources by linking external knowledge with internal knowledge. If the competency is high, various way of approaching the local market are possible when entering the overseas market. Ability to codify knowledge is not a process of independent activity, but a competence in situations where external knowledge needs to be utilized. The diversity and novelty of external knowledge has a positive impact on resource-starved born global company activity.

As discussed above, ability to codify knowledge is positioned as a mediator in promoting a strategic variety using external knowledge characteristics. On this basis, the following hypotheses are set, and the analysis model of this study based on hypothesis setting is as shown in Figure 1.

H6: Ability to codify knowledge will have a positive mediated effect between diversity of external knowledge and strategic variety.

H7: Ability to codify knowledge will have a positive mediated effect between novelty of external knowledge and strategic variety.
RESEARCH METHOD

Measures

Independent variable

Because this study proposes a path model, all of the leading factors in the path excluding the final dependent variable, corporate performance, are considered as leading variables. This item examined focusing on the diversity of sources from which external knowledge can be obtained. In detail, the 5 items, ‘Our company regularly visits local customers or external organizations for the purpose of acquiring local information. a$ We collect industrial information in an informal way. b$ Our corporate members regularly visit other companies settled in the area. c$ Employees communicate frequently with executives to acquire new knowledge. d$ Our company regularly acquires information by contacting local consultants and experts in their field., were measured using a 7-point scale.

Second, the novelty of external knowledge was measured as the degree of external knowledge that can lead to innovation according to the studies by previous studies. In detail, the 5 items, ‘There are not many innovative external knowledge that can improve existing technologies (reverse scale). a$ External knowledge is the foundation of innovation that can drive technology change. b$ There are many innovative external knowledge that can change the existing organizational innovation. c$ There are a lot of external knowledge that can revolutionize products that are difficult to replace with existing technologies. d$ There is a lot of innovative external knowledge that can make a difference in the organization., were measured using a 7-point scale.

Mediated variable

Previous studies measured ability to codify knowledge as an ability to explicitly process and use tacit knowledge. In the present study, the following 5 items were measured on a 7-point scale according to these existing studies. ‘Our company documents most of the local market information and has formal, routine handling instructions within the organization. a$ Knowledge processing standards are developed and used for the purpose of finding and using external information. b$ It is well understood where the partners who can help clarify the necessary knowledge of external sources of information are. c$ We know how to get knowledge transfer from external information sources and local partners. d$ Our employees know how to absorb and utilize additional information from external sources of information.

Dependent variable

For product (service) quality strategy, ‘Our company emphasizes the strategy of maintaining high quality with strict quality control. For marketing strategy, a$ We promote market diversification and price competitive advantage strategy by aggressive promotion and design innovation. For market orientation strategy, b$ We pursue a strategy of supplying customized products (services) to meet niche customers’ needs. For process innovation strategy, c$ We promote product (service) process innovation strategy based on strategic supply purchase. For localization strategy, d$ We promote localization strategies through exchange of knowledge (technology) with local companies and marketing cooperation activities. The above items were measured using a 7-point scale, where the response of ‘1’ corresponded to ‘It does not fit our corporate strategy’ and ‘7’ corresponded to ‘It is our company’s core strategy’.

Sample

Born global company has a characteristic that belongs to the small and medium-sized enterprises, so the target is companies with less than 300 employees. In addition, considering the characteristics of this study targeting companies that have entered the overseas market relatively quickly, the target is companies that have been founded within the last 6 years. A total of 1,123 samples were selected from the selected companies.

RESULTS AND DISCUSSION

Testing the validity and reliability

Factor analysis results show convergent validity.
In convergent validity, path coefficient values are all significant, and it is judged that there is no problem if the variance extraction index value is 0.5 or more and the conceptual reliability value is 0.7 or more. Table 1 below shows the confirmatory factor analysis results, showing no problems in path coefficient significance, AVE, and CR values. In addition, the model fit of the confirmatory factor analysis is 0.055 for Root Mean Square Error of Approximation (RMSEA), and other values also met the recommendation criteria.

Table 1: The result of confirmatory factor analysis

<table>
<thead>
<tr>
<th>Path</th>
<th>Path coefficient</th>
<th>S·E</th>
<th>T-value</th>
<th>Standard path coefficient</th>
<th>AVE</th>
<th>CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEK</td>
<td>DEK1</td>
<td>0.975</td>
<td>0.067</td>
<td>14.503***</td>
<td>0.875</td>
<td>0.915</td>
</tr>
<tr>
<td></td>
<td>DEK2</td>
<td>1.076</td>
<td>0.066</td>
<td>16.263***</td>
<td>0.934</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DEK3</td>
<td>1.001</td>
<td>0.062</td>
<td>16.232***</td>
<td>0.932</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DEK4</td>
<td>0.829</td>
<td>0.072</td>
<td>11.461***</td>
<td>0.737</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DEK5</td>
<td>0.662</td>
<td>0.073</td>
<td>9.070***</td>
<td>0.618</td>
<td></td>
</tr>
<tr>
<td>NEK</td>
<td>NEK1</td>
<td>0.998</td>
<td>0.077</td>
<td>12.966***</td>
<td>0.821</td>
<td>0.912</td>
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<tr>
<td></td>
<td>NEK2</td>
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<td>0.068</td>
<td>14.346***</td>
<td>0.872</td>
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<tr>
<td></td>
<td>NEK3</td>
<td>1.04</td>
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<td>12.987***</td>
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<td>NEK4</td>
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<td>0.074</td>
<td>13.768***</td>
<td>0.849</td>
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<tr>
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<td>NEK5</td>
<td>0.844</td>
<td>0.075</td>
<td>11.305***</td>
<td>0.747</td>
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</tr>
<tr>
<td>KCC</td>
<td>KCC1</td>
<td>0.845</td>
<td>0.08</td>
<td>10.511***</td>
<td>0.688</td>
<td>0.702</td>
</tr>
<tr>
<td></td>
<td>KCC2</td>
<td>0.922</td>
<td>0.089</td>
<td>10.329***</td>
<td>0.679</td>
<td>0.92</td>
</tr>
<tr>
<td></td>
<td>KCC3</td>
<td>1.14</td>
<td>0.068</td>
<td>16.755***</td>
<td>0.936</td>
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<tr>
<td></td>
<td>KCC4</td>
<td>1.188</td>
<td>0.068</td>
<td>17.476***</td>
<td>0.958</td>
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<tr>
<td></td>
<td>KCC5</td>
<td>1.09</td>
<td>0.072</td>
<td>15.200***</td>
<td>0.884</td>
<td></td>
</tr>
<tr>
<td>SDV</td>
<td>SDV1</td>
<td>0.929</td>
<td>0.108</td>
<td>8.598***</td>
<td>0.704</td>
<td>0.528</td>
</tr>
<tr>
<td></td>
<td>SDV2</td>
<td>0.968</td>
<td>0.112</td>
<td>8.640***</td>
<td>0.707</td>
<td>0.846</td>
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<tr>
<td></td>
<td>SDV3</td>
<td>0.76</td>
<td>0.109</td>
<td>6.940***</td>
<td>0.566</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SDV4</td>
<td>1.031</td>
<td>0.161</td>
<td>6.412***</td>
<td>0.529</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SDV5</td>
<td>0.799</td>
<td>0.107</td>
<td>7.431***</td>
<td>0.597</td>
<td></td>
</tr>
</tbody>
</table>

VTK=diversity of external knowledge, INK=novelty of external knowledge, KCC=knowledge codification capacity, DVS=strategic diversity, ***=p<0.001, **=p<0.01, *=p<0.05

Model fit index: X2=248.589, D/F=157, RMSEA=0.056, NFI=0.953, NNFI=0.977, CFI=0.981, GFI=0.881, AGFI=0.841, SRMR=0.066

Next, the discriminant validity was tested. For discriminant validity, the method proposed by Formell and Larcker (1981) was used. Table 2 below shows these results, and it was confirmed that the values of AVE located on the diagonal line are all larger than the square of the correlation coefficient.

Table 2: The result of discriminant validity

<table>
<thead>
<tr>
<th>Latent variable</th>
<th>DEK</th>
<th>NEK</th>
<th>KCC</th>
<th>SDV</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEK</td>
<td>0.687</td>
<td>0.199</td>
<td>0.091</td>
<td>0.221</td>
</tr>
<tr>
<td>NEK</td>
<td>0.199</td>
<td>0.675</td>
<td>0.445</td>
<td>0.163</td>
</tr>
<tr>
<td>KCC</td>
<td>0.091</td>
<td>0.445</td>
<td>0.702</td>
<td>0.146</td>
</tr>
<tr>
<td>SDV</td>
<td>0.221</td>
<td>0.163</td>
<td>0.702</td>
<td>0.528</td>
</tr>
</tbody>
</table>

Hypotheses testing

The hypothesis test of the structural equation model was conducted through path analysis. The path analysis results were used to calculate the regression coefficient, standard error, and t-value for the path between latent variables. Table 3 below shows the path analysis results of this study. Analysis showed that novelty of external knowledge had a significant impact on ability to codify knowledge, and ability to codify knowledge had a positive effect on strategic variety. Therefore, number 3 and 5 among the 5 hypotheses were adopted.
Table 3: The result of path analysis

<table>
<thead>
<tr>
<th>Path</th>
<th>Path coefficient</th>
<th>S.E</th>
<th>T-value</th>
<th>Standard path coefficient</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1 VTK -&gt; KCC</td>
<td>0.012</td>
<td>0.069</td>
<td>0.175</td>
<td>0.012</td>
<td>Not support</td>
</tr>
<tr>
<td>H2 VTK -&gt; DVS</td>
<td>0.16</td>
<td>0.085</td>
<td>1.876</td>
<td>0.171</td>
<td>Not support</td>
</tr>
<tr>
<td>H3 INK -&gt; KCC</td>
<td>0.559</td>
<td>0.079</td>
<td>7.074***</td>
<td>0.661</td>
<td>Support</td>
</tr>
<tr>
<td>H4 INK -&gt; DVS</td>
<td>0.071</td>
<td>0.096</td>
<td>0.742</td>
<td>0.092</td>
<td>Not support</td>
</tr>
<tr>
<td>H5 KCC -&gt; DVS</td>
<td>0.243</td>
<td>0.109</td>
<td>2.237***</td>
<td>0.269</td>
<td>Support</td>
</tr>
</tbody>
</table>

VTK= diversity of external knowledge, INK=novelty of external knowledge, KCC=knowledge codification capacity, DVS=strategic diversity, ***=p<0.001, **=p<0.01, *=p<0.05

Model fit index: X²=271.976, D/F=158, RMSEA=0.062, NFI=0.950, NNFI=0.973, CFI=0.978, GFI=0.871, AGFI=0.829, SRMR=0.081

Next, Hypothesis 6 and 7 were tested through mediated effect analysis. Table 4 below shows the mediated effect test through effect decomposition results. Among them, in Hypothesis 7, it was found that ability to codify knowledge had full mediated effect on novelty of external knowledge and strategic variety.

Table 4: The result of effect decomposition

<table>
<thead>
<tr>
<th>H</th>
<th>Path</th>
<th>Total effect</th>
<th>Direct effect</th>
<th>Indirect effect</th>
<th>Mediation effect</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Path</td>
<td>Path coefficient</td>
<td>t-value</td>
<td>Path coefficient</td>
<td>t-value</td>
</tr>
<tr>
<td>H6</td>
<td>VTK → KCC</td>
<td>0.163</td>
<td>1.873</td>
<td>0.16</td>
<td>1.876</td>
</tr>
<tr>
<td></td>
<td>→ DVS</td>
<td>-0.174</td>
<td>-0.171</td>
<td>0.003</td>
<td>-0.003</td>
</tr>
<tr>
<td>H7</td>
<td>INK → KCC</td>
<td>0.207</td>
<td>2.715***</td>
<td>0.071</td>
<td>0.742</td>
</tr>
<tr>
<td></td>
<td>→ DVS</td>
<td>-0.267</td>
<td>-0.092</td>
<td>-0.175</td>
<td></td>
</tr>
</tbody>
</table>

VTK=diversity of external knowledge, INK=novelty of external knowledge, KCC=knowledge codification capacity, DVS=strategic diversity, ***=p<0.001, **=p<0.01, *=p<0.05

DISCUSSION

Empirical results of this study show the importance of novelty of external knowledge and ability to codify knowledge. Among the path analysis hypotheses, H3 and H5 were supported, indicating that the more innovative the external knowledge, the higher the ability to codify knowledge for internalization. On the other hand, diversity of external knowledge did not show significant effects on ability to codify knowledge or strategic variety. Analysis results showed that external knowledge characteristics did not directly affect the strategic variety of a born global company and only ability to codify knowledge influenced strategic variety. This result provides theoretical implications in applying the concept of strategic variety to the born global company and empirically analyzing the role of novelty of external knowledge and ability to codify knowledge.

CONCLUSION

This study explored the factors influencing the various strategies that born global companies could use in their overseas market entry. This is an extension of the knowledge based view study used in existing born global company studies, and it is meaningful in that it built a model integrated with the concept of strategic variety. 7 hypotheses were tested, through mediated effect of ability to codify knowledge in 185 born global companies.

Limitations of this study and future research directions are as follows. First, future research needs to proceed with performance in terms of profitability of the born global company as a dependent variable. Second, it is necessary for future studies to analyze the influence of network perspective and external environmental factors on the relationship between the
capacity and performance of a born global company, as well as knowledge based view.

**Ethical Clearance:** Taken from Duksung Women’s University

**Source of Funding:** Self

**Conflict of Interest:** Nil

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**REFERENCES**


Obesity Control by Yoga

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Assistant Professor, Department Of Physical Education, AMET University, Chennai

ABSTRACT

The reason for the study is to investigate the impact of chosen yoga-Pranayama on heavy individuals of influenced people, in Chennai Civil Corporation. An aggregate of 60 men inspected and pronounced 50 of them were medicinally fit for this review and they were haphazardly separated into two gatherings of Twenty-five each, out of which gathering I (N-25) Underwent Yoga-Pranayama, and aggregate II (N-25) Underwent control gathering. Pre-test were directed for every one of the two gatherings on BMI and abdomen and Hip Circumference. The trial gathered partaken in their particular chose yoga-Pranayama for a time of a month and a half. Post-test were directed on the previously mentioned subordinate factors following a month and a half of the preparation time frame. The t-test was used to discover the impact of Yoga-Pranayama on hefty individual of influenced people in the public arena. The consequences of the review show that the day by day practice and yoga-Pranayama movement done by those individuals show that there was low BMI than the inactive men. Its related weight issues can be higher in the inactive individuals than the individuals who do everyday Yoga-Pranayama movement. It reasons are recorded beneath. In short the Post-test think plain demonstrates that there is a huge distinction of BMI and midsection and Hip Ratio than the pre-test. It is at last presumed that the inactive people may get Weight and Heart related issues because of lacking activity and yogaPranayama.

Keywords: Yoga, Pranayama, Weight Loss, Waist & Hip Circumference, BMI And Obesity

INTRODUCTION

The widespread need and significance of every day Yoga and Pranayama methodically arranged and known as Yoga and Pranayama can’t be overlooked in any event in the present current cutting edge counterfeit world. In light of the developments of the man-made machines the man himself has made its organs so feeble that its survival has been in hazardous circumstance coming about less life expectancy and numerous genuine life executing illnesses like Heftiness, Blood sugar, Heart Disease and so on [1-3]. One of the major issues they are confronting today is to control their body Wight because of inertia. Keeping in mind the end goal to conquer the above issue they receive alternate way and simple techniques to decrease their weight by taking different meds or crash weight control plans to lose undesirable pounds and enhance their wellbeing. Along these lines marvel [8]. The advantages of Yoga and Pranayama have been neglected. The most prominent Yoga and Pranayama help to enhance cardiovascular framework and lessen fat and weight. The present discourse is in connection to the Control Weight and weight thought Yoga-Pranayama just, Because YogaPranayama has surest solutions for man’s physical and in addition mental afflictions [9]. It makes the organs of the body dynamic in their working and has great impact of inner working of the human body.

This paper reviewed by following articles, Analyzing women empowerment in working conditions: A study on women employees: (With special reference to Public Sector Banks) [4], An outcome of periodized small side games with and without mental imagery on playing ability among intercollegiate level soccer players [5], Human Personal Attribute towards Industrial Social Contribution [6], Culture Shock on Learning of International Students in India [7].

What is Obesity?

To begin with manifestation of stoutness is increment in weight; body loses its shape and because
of aggregation of fats in different parts of body now and then body adjust is influenced. The hefty individual needs to spend additional vitality for any development, so we have to control the weight from the earliest starting point. For the day by day work we spend calories, which we get from the nourishment we eat. Be that as it may, in the event that we take a greater number of calories and spend not as much as the calories are aggregated as fats. Increment in fats lessens body developments, which again builds the weight. In order to lessen the fat one must control the sustenance propensities. Weight can expand in view of stomach related issues. Valuable piece of the sustenance is caught up in blood amid the assimilation. On the off chance that there are a few issues in this prepare then it might bring about amassing of fats. On the off chance that the stomach related issue is cured then corpulence can decrease.

**Body Mass Index (BMI)**

Body Mass Index (BMI) is a relationship between weight and height that is associated with body fat and health risk. Research has identified the health risks associated with a wide range of BMIs (both high and low values)

<table>
<thead>
<tr>
<th>Underweight</th>
<th>Normal</th>
<th>Overweight</th>
<th>Obese</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;18.5</td>
<td>18.5-24.9</td>
<td>25-29.9</td>
<td>&gt;30</td>
</tr>
</tbody>
</table>

**Yoga**

Yoga’s a critical part to play in the treatment of heftiness. Yoga methods influence body, inside organs, endocrine organs, cerebrum, mind and different elements concerning Body - Mind complex. Different Yoga strategies can be rehearsed successfully to lessen the weight and accomplish typical sound state of Body and Mind.

**Pranayama**

Pranayama is made of two words “prana” and “yam”. Prana implies vitality or fundamental drive and yam implies control. Breath what’s more, Pran are two unique things through and through. Yet, we can’t see them separated from each other. Breath is Sthula (gross) and Pran is Suksham (unobtrusive). Breath is the outside sign of Pran. In this way, Pranayama is “Control of Breath”. One can control the rhythms of pranic vitality with Pranayama and accomplish sound body and brain. The distinctive sorts of Pranayama are the Bhastrika Pranayama, Anuloma-Viloma, Kapalbhati, Bhramri, Sitlee, Sitkari, Ujjayi, and VedheneBandh.

**Experimental Design**

The review was detailed as a genuine arbitrary gathering comprising of pre-test and post-test for this reason in Nagpur Municipal Partnership 60 man inspected and announced 50 of them were medicinally fit for this review and they were chosen by parcel strategy and they were separated arbitrarily into three gatherings as one control and second exploratory gathering. The chose fifty subjects were haphazardly separated into two gatherings of Twenty five each, out of which gathering I (N-25) Yoga-Pranayama and amass II (N-25) stayed as control. Pre-test were directed for every one of the two gatherings on BMI 2) abdomen and Hip Ratio. The trial assemble taken an interest in their individual Exercise for a time of a month and a half. Post-test were directed on the previously mentioned subordinate factors following a month and a half. The preparation period was booked at morning 6.00 a.m. to 7.00 a.m. what’s more, night 6.00 p.m. to 7.00 p.m. Accumulation of information for measuring BMI and midriff and Hip Periphery, An advanced measuring scale that could quantify to the closest 0.1kg was utilized to record weight, and stature was measured to the closest centimeter utilizing a stadiometer, in the Frankfurt plane position. The Body Mass Index is computed by partitioning the body weight in kilograms by the body tallness squared in meters.in pre and post instructional meeting.

**Table 1. Comparison of Control Pre-training and Post-training**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Test</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>M.D</th>
<th>S.E.</th>
<th>t' Ratio</th>
<th>Required 't' Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI-Weight (kg)/Height2(M)2</td>
<td>Pre-Training</td>
<td>25</td>
<td>27.50</td>
<td>1.59</td>
<td>7.08</td>
<td>14.7</td>
<td>0.47</td>
<td>2.01</td>
</tr>
<tr>
<td></td>
<td>Post-Training</td>
<td>25</td>
<td>27.22</td>
<td>1.90</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Waist &amp; Hip Ratio</td>
<td>Pre-Training</td>
<td>25</td>
<td>1.10</td>
<td>0.14</td>
<td>-5.2</td>
<td>31.43</td>
<td>0.16</td>
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<tr>
<td></td>
<td>Post-Training</td>
<td>25</td>
<td>1.07</td>
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</tbody>
</table>

Significant at 0.05 level of confidence
An examination of the table 1 uncovered that the mean of BMI in pre-preparing is 27.66 and SD 1.70 and in post preparing mean is discovered 25.66 and SD 2.28 correspondingly an examination of same table uncovered that there is centrality distinction in the mean for choBMI of Pre-preparing and Post preparing as the acquired “t” proportion esteem 3.1706 is more than the required “t” proportion esteem 2.0106 at 0.05 level of certainty.

An examination of the table 2 uncovered that the mean of BMI in pre-preparing is 27.50 and SD 1.59 and in post preparing mean is discovered 27.22 and SD 1.90 likewise an examination of same table uncovered that there is centrality distinction in the mean for Body Mass Index of Pre-preparing and Post preparing as the acquired “t” proportion esteem 0.47 is not as much as the required “t” proportion esteem 2.0106 at 0.05 level of certainty. An examination of the table 2 uncovered that the mean of aggregate Abdomen and Hip Ratio in pre-preparing is 1.10 and SD 0.16 and in post preparing mean is discovered 1.07and SD 0.16 comparatively an examination of same table uncovered that there is definitely notnoteworthiness distinction in the mean for Waist and Hip Ratio of Pre-preparing and Post preparing as they got “t” proportion esteem 0.16 is not as much as the required “t” proportion esteem 2.0106 at 0.05 level of certainty.

5. Conclusion

From our review we watched a noteworthy reduction in BMI, both systolic and diastolic blood weights in subjects who were honing yoga for a time of 3 months. Yoga and certain Asana’s have advantageous impact on certain cardiovascular hazard variables like weight, hypertension and dyslipidemia. Randomized controlled trials are expected to affirm and explain the impacts of institutionalized yoga programs. There is a need to give a superior acknowledgment of yoga by the social insurance group as a supplement to ordinary restorative care. It was inferred that the Pranayama and exercise can BMI and Waist and Hip Ratio diminish altogether. In the event that the stationary individual takes after the Pranayama and practice preparing will move forward.

1. Regular Yoga and Pranayama can help decrease BMI and Waist & Hip Ratio
2. Change of lifestyle also can help in decrease BMI and Waist & Hip Ratio.

Ethical Clearance: AMET University
Source of Funding: Self
Conflict of Interest: NA

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A New Direction for School Superintendents: Evolution of the Superintendency

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ABSTRACT

Background/Objectives: The primary goal of the study is to explore the characteristics of the school superintendent in contemporary times based on relationships with school boards, educational reform, changing role, and career mobility.

Method/Statistical analysis: In order to meet the goal, the study conducts in-depth literature reviews and incorporates historical perspectives regarding the superintendency such as 1) Callahan’s description of the superintendent as teacher-scholar, manager, and democratic leader; 2) Kowalski’s depiction of the superintendent as communicator, and 3) Brunner, Grogan, and Bjork’s portrayal of the role as political strategist focused on the excellence of student learning.

Findings: Through the historical review the study could select five main role conceptualizations which provide understanding about how the superintendent’s role has been evolved. Based on the conceptualizations the study identified the characteristics of contemporary superintendency in terms of career paths, relationship with school boards and school reform.

Improvements/Applications: Changing roles of the school superintendent suggested in this study could be a guideline for new educational leaders and they can consider it for their career development to the path of superintendency.

Keywords: School Superintendent, Leadership, Superintendency, Career Path, School reform.

INTRODUCTION

The history of the school superintendent position starting from the late 1830s has reflected social and economic changes and the changing needs for schooling. Until 1900, most urban school systems had established superintendent position in their districts to meet various school conditions including “the development of larger city school districts, the consolidation of rural school districts, expanded state curriculum, the passage of compulsory attendance laws, demands for increased accountability, and efficiency expectations”.

Regarding the historical evolution of the superintendency, there are various disputes resulting from the application of different sources, differing interpretations of historical accounts, and variation in the analytical approaches used. This section also provides the characteristics of the superintendent in contemporary times based on relationships with school boards, educational reform, changing role, and career mobility.

Evolution of School Superintendent Roles

In the historical literature, five major conceptualizations report how the role of the superintendency has evolved. Several authors’ accounts are incorporated in this paper: 1) Callahan’s (1966) description of the superintendent as teacher-scholar, manager, and democratic leader; 2) Kowalski’s (2005) depiction of the superintendent as communicator, and 3) Brunner, Grogan, and Bjork’s (2002) portrayal of the role as political strategist focused on the excellence of student learning. The following subsections describe these five major conceptualizations.
When the position was begun in the early 1800s, the superintendent was not a powerful role; rather, superintendents played the role of serving the board of education. School boards relegated them to working simple office and practical tasks. As the common school movement was beginning during the early twentieth century, the role of superintendent changed to one of managing a district curriculum and supervising teachers. After formal standards for public elementary and secondary education were established following the Civil war, the primary tasks and responsibilities of city superintendents were related to instruction and curriculum. In line with this movement, during the late 1800s and early 1900s, superintendents were generally considered as head teachers, and they spent much of their time supervising teaching-learning activities and managing curricular uniformity.

Administrative duties in schools at that time were considered as two domains: business management and supervision of instruction. While the executive function of instruction was assigned to the superintendent, this function was often expected by school board members and consigned to the staff, because at that time the superintendents did not want to be viewed publicly as either managers or politicians. As executive functions, such as implementing common curriculum and providing the supervision for classroom instruction, were delegated to the superintendent, boards began to play the role of a legislative body instead of an executive body.

Superintendent as Manager

The second historical stage of the superintendent’s role was focused mainly on managerial knowledge and skills. In the late 1800s, America was in a transitional phase and moving from an agrarian to an industrial society. Many at the time argued that schools were inefficient, unproductive, and an embarrassment to U.S.A. They tried to apply Frederick Taylor’s concept of “scientific management” to solve problems in school systems. In this perspective, school board members expected superintendents to be scientific managers who could improve operations by focusing on time and efficiency. As a result, the role expectation of a superintendent was changing to a businessman handling budget administration, standardization of operation, and managerial works.

Although superintendents embraced, in large part, the beliefs of business to meet the goals of school reform, targeting effective and efficient operations in the early 1900s, many felt dissatisfaction with the application of bureaucratic systems and scientific management techniques to educational contexts. They argued that business values imposed upon public education were incongruous with the core political and democratic values of a society. Maintaining equilibrium between leadership and management, which is a very stressful responsibility even in the contemporary superintendency, began during this historical stage. In addition, emphasis on business and managerial responsibilities created a conflicting superintendency discourse by setting up a dichotomy between the value of efficiency and the value of social justice.

Superintendent as Democratic Leader

Kowalski (2005) noted that Callahan’s historical analysis of the superintendent role from the 1930s to 1950s was focused primarily on political leadership. The conception of democratic leadership for the superintendent role is based on both philosophical and political realities of the times. In the 1930s, there were some efforts by prominent education professors to restore participatory democracy into local districts. They believed that the business values in superintendency had led the position for less reliant on the community. In this respect, superintendents as democratic leaders were expected to be policy makers and legislators.

At approximately the same time, political reality led to a change in the role of the superintendent from educational leader to political strategist. Because of the lack of financial resources in schools, administrators were forced to engage more directly in political activity such as lobbying state legislatures. The activity of political leadership in the superintendency became apparent so that public schools had to compete with other governmental services to acquire state funding. The concept of democratic leadership, however, was not very sustainable. Someone believed that shared power in decision-making worsened political, social, and economic problems rather than solving them.
Superintendent as Communicator

During the second half of the 20th century, American education experienced another shift. The public began to raise a problem on declining student achievement, and this public dissatisfaction also insisted that public education should play a role to resolve the social conflicts such as racism. In addition, schools were faced in 1957 with the impact of the Soviet Union’s successful Sputnik launch. As a result of the impact of the social and political context, the National Defense Education Act (NDEA) was enacted in 1958, which placed greater emphasis on some subject areas including math, science, and foreign language. To respond to the social demands upon public schools, superintendents were expected to work as communicators to the public in addition to their work as previously defined: educational leaders, managers, and political leaders. Brunner, et al. (2002) stated:

During this discursive stage, superintendents were perhaps expected to be more responsive to community members (including school boards), legislation, and other political pressures. At the same time, the rhetoric that superintendents be “communicators to the public” granted them the positional power to determine what, when, how, how much, and to whom they communicated or provided information. (p. 221)

Since many school improvement plans and strategies encourage superintendents to work collaboratively with educational stakeholders such as parents, teachers, principals, and other taxpayers to build collective visions, communication came to be a pervasive role requirement rather than a variable skill in the superintendency.

Superintendent as Political Strategist on Excellence

Brunner, et al. (2002) argued that by the 1980s, the conception of the superintendent’s role had grown to include multiple functions incorporating leadership skills with political maneuvering. The notion of the superintendency changed over time to reflect responsibility, capability, and accountability. Further, the superintendency developed into educational statesman or political strategist or a combination of both, as explained by Blumberg (1981), Boyd (1974), and Cuban (1976). During the 1980s, successive waves of educational reform shifted the primary goal of educational reform to the improvement of the quality (or excellence) of schools rather than the equality opportunity in education. Educational reforms, in part, have also shifted policy initiatives beyond accountability a) toward teacher skills, b) toward more complicated issues related to learning and school restructuring, and c) toward decentralization. These policy initiatives undervalued the importance of superintendents’ role as educational leaders. Instead, “knowing how to improve learning, teaching, and student performance, as well as distributing leadership and generating broad-based community support, became increasingly prominent aspects of job performance expectations” in the superintendency.

The Superintendent in Contemporary Times

Since past school boards wanted superintendents to work as agencies of control rather than as agencies of change, the job of the superintendent was more likely predictable and routine. A myriad of social, economic, and political conditions, however, require contemporary superintendents to work as all-around change agents capable of refining learning and teaching, improving management efficiency, and responding to the needs from local community. To identify the characteristics of the contemporary superintendency, several topics are discussed next: relationships with school boards, school reform, the changing superintendents’ role, and career paths.

Superintendent Career paths

Many superintendents have typical career pathways, moving through the chair positions and gaining experiences as educators and leaders. In addition, the most common path for the superintendency is from teachers to assistant principal to central office administrator and to superintendent. This career path is most typical way in large school districts, with more than 25,000 students. Observed carefully, however, this typical pathway for superintendent is not always pertinent case in terms of district size and gender. In small districts with fewer than 2,999 students, the common route led to the superintendent is that from teacher to assistant principal or principal and to superintendent without the step of central office administration.

A dominant career pathway for men is high school teachers, assistant high school principal, director or coordinator, high school principal, superintendent,
respectively. Men superintendents tend to be through the high school principalship. In contrast, women superintendents served as elementary school teachers, district coordinator, high school teachers, and assistant superintendents, respectively. Virtually twice as many women superintendents (55.6%) as men superintendents (28.7%) have experienced as district coordinators and assistant superintendents, and the majority (68%) of women superintendents held positions in rural districts with fewer than 2,999 students. According to the research of Bjork et al. (2005), “typically, superintendents begin their career paths as a teacher at age 23. Then, after 8 years of teaching, a significant majority (84%) then attain a position as either an assistant principal or principal between the ages of 25-35” (p. 29). The median age of superintendents is around 50 years of age, and the most of them begin the superintendency in their early to mid-40s.

**Superintendent and School Board Relationships**

Before 1900, one of the primary responsibilities of superintendents, as agents whose power was delegated by their school boards, was to provide school board members information about education policies. The position of superintendent at that time was not powerful in relationship to the school board. Since the 1900’s, however, “many superintendents advocated the adoption of the business ideology and management models, advancing the idea that CEOs should be highly trained professionals who make administrative decisions” 9. As a result of their professional and enhanced decision-making role across the multi-functions of the job, superintendents came to possess power as top-level administrators even in their relationships with boards.

Unfortunately, however, boards often fail to understand the demarcation of roles; boards interact with community interest groups in shaping educational policy, and administrators (superintendents) make decisions and ensure that policies are carried out appropriately 6. This role conflict can result in tensions between board members and superintendents, and sometimes superintendent turnover 7. To establish positive relationships, Kowalski (1999) recommended higher levels of collaboration between superintendents and boards through effective communication and mutual respect, as well as viewing policy and decision making as a shared responsibility.

**Superintendent and Education Reform**

Scholars concur that educational reforms were made in three consecutive waves and influenced separate but related themes 7&10. The first reform wave (1983 – 1986) called for “improving student test scores, assessing schoolwide performance and tracking progress, increasing the rigor of teacher licensure requirements” 9. This reform theme sought for increasing school accountability and systemic management for classroom teaching and learning activities. The second-wave of reform (1986 – 1989) emphasized five themes of educational improvement: 1) standards-based assessment systems; 2) critical thinking skills, problem solving, computational abilities, and cooperative learning; 3) improved educational circumstances for children living in poverty; 4) redesigned learning processes for students at risk; and 5) rigid bureaucratic structures and regulatory controls to reduce the student failure rates 9. This wave of reform primarily recommended school-based management (SBM) approaches to increase teacher participation and nurture professionalism 7.

The third-wave of reform (1989 – 2003) had different ideas from the previous reform recommendations that placed emphasis on school management and teacher development issues rather than students’ holistic learning 9. This reform focused more on enhancing children’s capacity to learn, rather than on organizational structures or teacher professionalism 12. In the same vein as these canons of the reform, several recent reform initiatives, including the No Child Left Behind Act (NCLB, 2002), reflects “the importance of strengthening teaching to enhance student learning – particularly with children viewed as being at risk – and they suggest that leadership is central to the success of school improvement” 9. With this reform initiative, school districts have more responsibility for ensuring that low socioeconomic status students perform at high academic levels.
CONCLUSION

Considered the various needs of social, economic, and educational reform, the primary role of contemporary superintendent should be compounded with new and multi-functional roles such as collaborator and culture re-builder. This new leadership role is a combination of previous role models from the early stages of the superintendency evolution: teacher-scholar, manager, democratic leader, communicator, and political leader. Kowalski (1999) described the multi-functional role of the superintendent as one in which

Superintendents are expected to enlighten the community; they are expected to nurture a sensitivity to the evolving educational needs; they are expected to fashion democratic procedures for reaching critical decisions; and they are expected to create cultures and climates enabling schools to redefine their purposes. These are tasks requiring professional knowledge and political skills. (p. 50)

Kowalski (1999) suggest three categories of superintendents’ tasks and responsibility: a wide range of managerial duties, instructional leadership responsibilities, and analytical tasks including planning and making policies. To fulfill their duties, superintendents must have pertinent knowledge and skills. Kowalski (2005) categorized pertinent knowledge and skills according to their use.

As a teacher-scholar, superintendents need knowledge of pedagogy, educational psychology and philosophy, curriculum, and staff development. Superintendents as managers should have skills related to law, personnel administration, finance, collective bargaining, facility development, and public relations. For democratic and political leadership, superintendents should be able to handle community relations, collaborative decision-making, and politics. And as a communicator, superintendents should possess verbal and written communication skills, public speaking, and ability to handle media relations.

In addition to these role expectations, contemporary superintendents should be able to work as collaborators and culture creator or re-builders. The most recent change in educational leadership requires superintendents to be collaborating with others and sharing leadership as one who provides guidance rather than one who is a powerful and directive manager. In this respect, “leadership in the superintendency, in particular, is now associated with words such as collaboration, community, cooperation, teams, and relationship-building.” Recent social and educational reform needs also require school leaders to be responsive to community feedback and to build consensus between school and community to improve educational environment. To consolidate the relationship with community and build organizational and social consensus, superintendents should be able to create or rebuild educational cultures and climates. Shared understandings and cultures in schools can be established by moral and ethical leadership, by diverse and multicultural acknowledgements, and by open communication.

Ethical Clearance: Taken from Hankuk University of Foreign Studies

Conflict of Interest: NA

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A Study on the Security Enhancement based on Network Separation for CloudHIS with Medical Healthcare Information

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ABSTRACT

Background/Objectives: Along with the growth of u-Healthcare, we propose a security enhancement based on network separation for CloudHIS with for handling healthcare information to cope with cyber attack.

Method/Statistical analysis: To protect against all security threats and to establish clear data security policies, we apply desktop computing servers to cloud computing services for CloudHIS. Use two PCs with a hypervisor architecture to apply physical network isolation and select the network using KVM (Keyboard, Video monitor, and Mouse) switched controller. The other is a logical network separation using one PC with two OSs, but the network is divided through virtualization.

Findings: Physical network separation is the physical connection of a PC to each network to block the access path from both the Internet and the business network. We apply a physical network separation under virtual desktop service using hardware (HW) direct assignments to overcome some problems. The proposed system is an independent desktop used to access an intranet or the Internet through server virtualization technology on a user's physical desktop computer.

Improvements/Applications: We can implement an adaptive solution to prevent hacking by configuring the CloudHIS, a cloud system that handles medical hospital information, through network separation for handling security enhancement.

Keywords: EMR, MHI, Cloud Computing, Cloud Service, HIS, network separation

INTRODUCTION

The level of healthcare organization, which is advanced medical IT and applied RFID, mobile EMR and cloud-based virtualization technology, is very high. The healthcare industry based on ICT (information and communication technology) has the many advances and applications based on the research being carried out actively as a paradigm of human-oriented ubiquitous healthcare. Medical information system and medical IT have been put together in close cooperation. Medical information system into a safe MHI (Medical Healthcare Information) integrated system based on IaaS cloud computing with the security enhancement is suggested in order to be the growth of u-healthcare system. It can be a common information by a number of people both within the healthcare industry and beyond. It is based to use the EMR for a treatment in the public hospital. Cloud is a computing technology using virtualization. It is a utility data server on the Internet, as a program that is put on a virtual server. CloudHIS is also a so-called medware, and CloudHIS is a conceptual solution service that combines “cloud” and “hospital information system” (HIS). Finally, we can configure CloudHIS, a cloud system that handles medical hospital information through network separation, to cope with cyber attack.

Medical Information System (MIS)

The electronic medical record is used to the hospital data how to operate the effective controlling program for hospital management with nurses and patients.
Recently, most hospitals have adopted some form of electronic medical record system instead of writing a paper without any loss of process structure, scope and content of information. A significant number of public institutions for the healthcare industry can use medical healthcare information to share medical data. Domestic medical information system is largely composed of PACS (Picture Archiving Communication System), EMR (Electronic Medical Record), and OCR (Order Compunction System), which is an active part for MIS in Korea[3]. The PACS system converts captured medical images into digitalization for the medical treatment information. It is useful for us to use the medical treatment information to cure the disease of patient. Currently, medical images are produced by the international standards of Digital Imaging and Communication for Medicine (DICOM). The protocol defines the transport mechanism and format, and most medical imaging equipment and solutions remain compatible. It is based on one international standard, HL7 (Health Level Seven), and is compatible with image acquisition, image storage, database[3]. The EMR automates hospital operations for the process in hospital management and automatically links with PACS to maximize hospital management efficiency. They begin to do the process in hospital quickly more than before. OCS is a system in which the physician informs the prescribing process after the patient treatment, which simplifies the patient’s procedure and decreases the waiting time. In the case of doctors, various examinations for medical treatment are accurately processed, and the sharing of medical information and the chart of medical statistics is easy for reporting. It is available to communicate with other medical institutions for the medical information exchange. It is essential to make the computerized medical information including EMR, OCS, and PACS as well[5,6,7]. Unique records are recorded by practitioners (doctors), there are some problems of medical treatment efficiency, and additionally, serious some problems of compatibility with some data formats differ depending on the manufacturer and the developer of the EMR / OCS system. From early 2000, domestic large hospital based integrated health information system has been developed from order communication system to electronic medical record system. However, today’s advanced medical information system is integrated with unit of the system because user needs is complex and various[9]. Recently, the environment of healthcare has changed rapidly due to the mobile computing appeared, the global intensive competition, and the explosion of healthcare needs. Mobile healthcare systems use portable devices such as smartphones and are made up of small computing devices[9]. Despite the need for new IT-based healthcare services and the need to invest IT resources to respond to environmental changes, small and medium sized hospitals could not be prepared to upgrade these systems due to limited management resources.

Cloud computing provides a way to effectively deliver a variety of service models and infrastructure resources that are configured and pooled across the Internet[9]. CloudHIS is designed to maximize resource pooling and sharing through visualization. This allows cloud service providers to minimize the maintenance costs of their cloud data centers and provide a high level of service at a reasonable cost-per-cost. Along with the growth of u-healthcare system, we propose Integrated medical information system of MHI (Medical Healthcare Information) which is safety information integration system based on IaaS cloud computing based on security information. Cloud is a computing technology using virtualization, which is a utility data server on the Internet, as a program that is put on a virtual server. For this reason, first of all, we can review the concept of cloud service and the visualization to consider computing service for CloudHIS.

Cloud computing is usually described by two ways as follows. It is offering the cloud location and the cloud service as well. First, it takes some kinds to make the cloud location such as public cloud, private cloud, hybrid cloud, and community cloud. Next, some kinds to make the cloud service as seen in Table 1.

<table>
<thead>
<tr>
<th>Service Type</th>
<th>Service Unit</th>
<th>Service Resource</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>SaaS(Software-as-a-Service)</td>
<td>Application</td>
<td>Business application, Web service, etc.</td>
<td>Gmail, Google Apps, Facebook etc.</td>
</tr>
<tr>
<td>PaaS(Platform-as-a-Service)</td>
<td>Platform</td>
<td>Software framework, Storage, etc.</td>
<td>GoogleAppEngine etc.</td>
</tr>
<tr>
<td>IaaS(Infrastructure-as-a-Service)</td>
<td>Infrastructure</td>
<td>Computation device(VM), Storage, etc.</td>
<td>NaverNDrive etc.</td>
</tr>
</tbody>
</table>

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And, the problem is security management of health information system in complex systems of large size hospital. It is also a serious problem of private information exposure because of user’s personal information exposure in hospital by hackers. The best way to fight against hackers is to prevent hacking access attempt of clouding computing server in hospital.

**Application method for Security Enhancement System**

**Physical network separation**

The physical network separation is to connect the PCs to each network physically to block access paths from both the Internet and business networks; i.e., it is divided into an Internet network and an internal business network physically. Finally, it has high security, but, the separation of the physical network requires a separate network, PC and network equipment as well. It costs a lot of introduction. There is a lowering of efficiency because of using a dual PC.

**Virtualization based multi-user connectivity**

It looks like one PC in appearance, but it consists of two PC structures based on one PC motherboard inside; By physically duplicating the HDD, NIC, VGA, and USB hubs. It allows two different operating systems to run on a single board PC. Multi-user can configure one PC environment to be used independently as follows Figure1.

**H/W direct allocation method**

We can apply the PCI Pass-through method for directly allocating physical PCI devices to the virtual machines. Virtual machines use their own independent virtual address space, supports PCI pass-through which can be connected to VT-D for 1:1 connection of physical H/W and virtual machine as I/O performance enhancement technology. The PCI Pass-through method in the motherboard’s BIOS and virtualization kernel to be fully supported.

So far, virtualization offers 60-70% utilization for hypervisors, but there is no technology available to optimize the servers and clients involved [11]. We can configure the PCI Pass-through in the motherboard’s BIOS and virtualization kernel to be fully supported through a hypervisor.

**ProposedWork**

In this section, we used virtualization to create a solution with physical and logical network separation to create an adaptive solution to prevent hacking based on network separation to enhance healthcare information security. That is, we apply network separation with both physical method and logical method to cloud desktop computing server to make the security enhancement for the medical healthcare information. We can review the method of the network separation to make the security enhancement for the medical healthcare information to cope with cyber attack. There are two network partition; One is physical network partition using 2 PCs using hypervisor architecture, select the network using KVM(Keyboard, Video monitor, Mouse) switched controller. and the other is logical network partition using 1 PC with 2 OS, but network is divided through virtualization. There are two kind of logical network partition: SBC(Server-based Computing) and CBC(Client-based Computing) according to the base of virtualization. Physical network partition is using one PC to connect to internet for external businesses, and the other for internal work without connecting to the internet. It has the merit of good safety as well excellent security. In this paper, we propose an adaptive structure of security enhancement based on network separation for CloudHIS with for handling medical information to cope with cyber attacks. Our proposal is necessary to a physical network separation system under virtual desktop service using HW direct assignments to overcome some problems. The proposed system is an independent desktop used to access intranet or Internet using server virtualization technology of physical

![Figure 1. The configuration for proposing dual PC server on board in network separation](image-url)
desktop computers. In addition, this system can also support a network separation without a lowering of performance to cope with cyber attack. We did the experiment of the proposed system. The cause of performance degradation is to inspect network packets for the logical network separation.

**Experiment&Result**

**Experiment&ResultAnalyss for Cyber-Attack**

The experiment of hacking test should be measured to cope with cyber attack. The results of independence test against DDoS attack should obey the procedures of security certification.

1) Internal network CPU and memory independence test result due to DDoS attack through external network.

The HOST PC2 does not affect the CPU and memory of the HOST PC1 even if the CPU and memory overload are caused by malicious code infection. The CPU and memory of the internal and external networks also work independently of each other, as shown in Figure 6 through Figure 8.

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**Fig. 2. Comparison of CPU utilization of HOST PC1 before and after DDoS attack when office-startall.com is executed**

**Fig. 3. Comparison of memory usage of HOST PC1 before and after DDoS attack when running office-startall.com**

**Fig. 4. Comparison of CPU utilization of HOST PC1 before and after DDoS attack when office-startall.com is executed**
2) Internal network CPU and memory independence test result due to malicious code infection through external network.

Even if CPU and memory overload due to malicious code infection occur in HOST PC2, it is confirmed that CPU and memory of HOST PC1 are not affected. The CPU and memory of the internal network and external network are also operated independently by each other as follows Figure 6 to Figure 8.
3) Internal network CPU and memory independence test result due to external network CPU and memory overload

Even if the CPU and memory are overloaded in the external host HOST PC2, it is confirmed that the CPU and memory of the internal HOST PC1 are not affected. The CPU and memory of the internal network and the external network are also operated independently by each other as follows Figure 10 to Figure 13.

Fig. 8. Comparison of CPU utilization of HOST PC1 when running Remote Desktop (CASE 1)

Fig. 9. Comparison of memory usage of HOST PC1 (CASE 1)

Fig. 10. Comparison of CPU utilization of HOST PC1 when running office-startall.com (CASE 1)
CONCLUSION

Nowadays, medical information systems into a safe MHI integrated system based on IaaS(Infrastructure-as-a-Service) cloud computing with the security enhancement is suggested. We propose adaptive deployment of security enhancement based on network separation of CloudHIS for health information processing to cope with cyber attack. To obtain the adaptive solution to prevent hacking to construct the based on network separation for CloudHIS with with security enhancement for handling a medical healthcare information, we build physical networks and logical network separation is applied to the network using virtualization. We carried
out experiments for independent test to each other based on network separation environment against DDoS attack, we make the some result reports. The proposed method was proved and obtained the results for the security enhancement of CloudHIS based on network separation environment to cope with cyber-attack. As a result, it was assured of safety through testing results to cope with cyber attack. We could implement cloud desktop dual PC server without lowering of performance for security enhancement system in network separation environment for CloudHIS with a medical healthcare information to cope with cyber attack. In the future, it will be positioned as the solution for a security enhancement system in many industrial fields required information security system to cope with cyber attack.

Ethical Clearance: Taken from Chungbuk National University

Conflict of Interest: NA

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Baby Face Makeup Awareness and Subjective Wellbeing of Korean Women: The Dual Mediation Effects of Makeup Motivation and Appearance Management Behavior

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ABSTRACT

Background/Objectives: The purpose of this study was to investigate the double mediating effects of motivation for applying makeup and appearance management behavior in relation to baby face makeup and subjective wellbeing among 404 Korean women in their 20s and 30s.

Method/Statistical Analysis: SPSS for Windows 21.0 and SPSS MACRO were used for statistical analyses. Reliability analysis, descriptive statistics, correlation analysis, mean comparison analysis, macro PROCESS analysis, and bias correction bootstrapping were performed.

Findings: The results of the study are as follows. First, there was a positive correlation between baby face makeup application and subjective wellbeing, makeup motivation, and appearance management behavior. Second, as evidenced by macro PROCESS analysis, baby face makeup awareness had a positive effect on the motivation to apply makeup and appearance management behavior, makeup motivation had a positive effect on appearance management behavior, and appearance management behavior had a positive influence on subjective wellbeing. Third, as per bootstrapping analysis, makeup motivation and appearance management behavior had a double mediation effect in relation to baby face makeup awareness and subjective wellbeing.

Improvements/Applications: These results can be used to further subjective wellbeing through baby face makeup application and appearance management behavior.

Keywords: Baby Face Makeup, Makeup Motivation, Subjective Wellbeing, Appearance Management Behavior, Dual Mediation Effects, SPSS macro PROCESS

INTRODUCTION

Appearance is an important factor for individuals as members of our modern competitive society, and an increase in interest in appearance has led to an increase in the desire for positive changes to appearance and behavior1. A behavior that expresses a person’s individuality in non-verbal ways in order to draw the attention of others is called appearance management behavior2; this category encompasses all behaviors related to an ideal physical appearance.

Studies have been done that compare those with attractive physical appearances with those who are unattractive. Such studies have reported that attractive people benefit from social life and interpersonal relationships, while those who are not attractive tend to be relatively disadvantaged and to have lower self-confidence3. Thus, appearance management behavior is a means of self-development that affects an individual’s perceived value and abilities.

Application of makeup is one aspect of appearance management behavior that affects the face, which is the most important body part in terms of subjective appearance4. Motivation for applying makeup involves the expectation that positive images and
effects can be obtained through makeup. Women who wear makeup are more favorably appraised by others than are women who do not, and make-up is an important element of appearance management that enhances social confidence and produces a good image.

Appearance management behaviors change as the criteria for evaluating appearance change. Recently, in Korea, the desire to look younger than one’s age is rapidly spreading among people and through mass media. In other words, there is a recent phenomenon of individuals preferring to present faces that appear younger, which has led to an interest in baby face makeup. The recognition of the baby face makeup as a trend impacts makeup motivation and appearance management behavior.

Research on happiness and life satisfaction began in earnest in the mid-1990s, and research on wellbeing also began around that era. Wellbeing involves such concepts as happiness, quality of life, subjective wellbeing, psychological well-being, and life satisfaction; the concept has yet to be entirely unified.

The term ‘subjective wellbeing’ has begun to be used in earnest, since happiness and satisfaction are best known and best appreciated by the individual party concerned. Subjective wellbeing is defined as a state of enjoyment experienced by an individual and the extent to which an individual positively assesses the quality of his or her life.

Subjective wellbeing has mainly been dealt with in the fields of psychology, pedagogy, and welfare, but the field of beauty has recently become involved as well.

In particular, studies on appearance satisfaction and appearance management revealed that satisfaction with appearance has a statistically significant effect on happiness, satisfaction with appearance directly affects subjective wellbeing, and visual beauty programs such as makeup and hair styling have positive effects on life satisfaction and happiness. In a similar study on psychological wellbeing and appearance, appearance-related satisfaction had a statistically significant effect on psychological wellbeing and there was a difference in psychological wellbeing according to appearance management behavior. Furthermore, the self-identified concept of physical self-efficacy had a statistically significant effect on psychological wellbeing.

Thus, subjective satisfaction, appearance management behavior, and self-defined physical status have been identified as causal variables of subjective wellbeing, but no studies have examined the relationship between makeup motivation, baby face makeup awareness, appearance management behavior, and subjective wellbeing. There is a need for empirical research on these variables in Korean society.

The purpose of this study was to investigate the double mediating effect of the motivation to do makeup and appearance management behavior in relation to baby face makeup awareness and subjective wellbeing in Korean adult women.

To achieve this goal, we addressed the following series of research questions. First, what is the correlation between subjective wellbeing, makeup motivation, and appearance management behavior? Second, what is the path coefficient between each variable? Third, do makeup motivation and appearance management behavior have a combinatorial mediation effect in relation to baby face makeup awareness and wellbeing?

**MATERIALS AND METHOD**

**Research Model**

The main analytical method of this study is the analysis of the double-mediated effect of model 6 of the MACRO process. The conceptual study model is shown in [Figure 1].

![Fig. 1. Conceptual Research Model](image)

**Survey subjects and methods of data collection**

A total of 404 women in their 20s and 30s were selected for this study. The general characteristics of the survey subjects were as follows: 67.2% were unmarried, 32.2% were married, and 0.2% had some other relationship status. Regarding age, 27.0% of the subjects were 30-34, 26.7% were 20-24, and 23.5% were 25-29. In terms of education, 61.1% of the subjects were four-year university graduates, 16.6% were college...
graduates, 15.1% were high school graduates, and 7.2% had attended graduate schools.

Research tools

Baby face makeup awareness

The baby face makeup awareness scale was modified from one designed by Kim 18. It was a five-point Likert scale ranked from 'Not at all' (1 point) to 'Very much agree' (5 points). The higher the score, the higher the interest in and preference for baby face makeup. In this study, a Cronbach’s $\alpha$ value of .858 was found for baby face makeup awareness.

Subjective wellbeing

In this study, we used a subjective wellbeing scale that was developed by Lyubomirsky and Lepper 19, and adapted into a five-point Likert Subjective Happiness Scale (SHS). This scale reflects overall cognitive assessment of subjective wellbeing. The higher the score, the higher the level of subjective wellbeing. The reliability of this study was Cronbach’s $\alpha = .749$.

Makeup motivation

Measurement of makeup motivation was done using 15 items in a scale developed by Choi20 and Lee21. It is a 5-point Likert scale where 1 point indicates 'not at all' and 5 points indicates ‘very much agree’. The higher the score, the higher the expectation and confidence level regarding the effect obtained through makeup. In this study, the reliability of makeup motivation was Cronbach’s $\alpha = .944$.

Appearance management behavior

To measure appearance management behavior, we used a 16-item list developed by Kim et al.22. The list contains items regarding the contents of makeup, clothes, hair care, skin care, body care, and cosmetic molding. Each item is ranked from 1 point (‘not at all’) to 5 points (‘very much agree’). The higher the score, the higher the level of appearance management behavior. In this study, the reliability of appearance management behavior was Cronbach’s $\alpha = .882$.

Data Analysis

In this study, SPSS Windows 21.0 and SPSS macro PROCESS (http://www.afhayes.com) proposed by Hayes23 were used for data analysis. SPSS Win. 21.0 was used for reliability analysis, descriptive statistics, and correlation analysis. The SPSS macro process was used to analyze the dual-mediation effect and the model was verified by bootstrapping.

RESULTS AND DISCUSSION

Correlation and Descriptive Statistics

[Table 1] shows the results of Pearson’s correlation analysis, which was used to identify correlations among variables. There was a statistically significant statistical correlation between each of the variables. In detail, there was a high correlation coefficient of .663 between baby face makeup awareness and appearance management behavior, and a correlation coefficient of .576 between baby face makeup awareness and makeup motivation. Subjective wellbeing had a correlation coefficient of .108 – .237 in relation to other variables. That is, the higher the awareness of baby face makeup, the higher the degree of makeup motivation, appearance management behavior, and subjective wellbeing. Previous results show that there is a positive correlation between happiness and appearance-related satisfaction 11 and a positive correlation between satisfaction with appearance and satisfaction with life24, which support the correlation results of this study.

In addition, our findings are in agreement with those of Noh5 that there is a positive correlation between happiness and pleasure in those who exhibit makeup motivation.

The mean of each variable was above 3 points on the 5-point scales.

<table>
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<th>Makeup Motivation Appearance</th>
<th>Management Behavior</th>
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<td>Subjective Wellbeing</td>
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<td>Makeup Motivation</td>
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<td>15.1</td>
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*p<.05, **p<.01
Effects of path analysis

We analyzed path coefficients in Figure 2 and found that baby face makeup awareness had a statistically significant effect on makeup motivation (0.648, p < .001) and appearance management behavior (0.561, p < .001). Makeup motivation had a statistically significant effect on appearance management behavior (0.282, p < .001), and appearance management behavior had a positive effect on subjective wellbeing (0.293, p < .001). The results of this study are in line with those of previous studies that showed differences in body image and psychological wellbeing according to appearance management behavior, and that visual beauty programs including makeup regimens have a positive effect on life satisfaction and happiness in elderly females. In addition, our results are almost the same as previous results showing that appearance-related satisfaction impacted psychological wellbeing, happiness, and subjective wellbeing.

This model also showed that the effect of baby face makeup awareness on subjective wellbeing was not significant (-0.1086, p < .001) when makeup motivation and appearance management behavior were added as mediators in the relationship between baby face makeup awareness and subjective wellbeing. Therefore, makeup motivation and appearance management behavior mediated the relationship between baby face makeup awareness and subjective wellbeing.

Fig. 2. Size of effect for each path

Verification of Dual Mediation Effect

[Table 2] shows the results of bootstrap analysis using SPSS macro PROCESS that was used to verify the double mediating effects of makeup motivation and appearance management behavior in relation to baby face makeup awareness and subjective wellbeing.

The SPSS macro developed by Preacher & Hayes is useful for verifying multiple or dual-mediated models by suggesting an indirect path between independent and dependent variables and elaborating on the analysis of mediating effects.

In this study, 5,000 bootstrapping tests were performed to determine whether there is a double mediation effect of makeup motivation and appearance management behavior on baby face makeup awareness and subjective wellbeing, and the confidence interval was set to 95%.

As shown in Table 2, the size of the mediating effect was -0.2310 (0.1080 – 0.3571), and 0 was not included in the 95.0% confidence interval. Thus, the mediating effect was significant.

Thus, given verification of the size of the dual mediation effect, a mediating effect exists because M1 & M2 (X ‘ M1 ‘ M2 ‘ Y) is 0.0536 (0.0215 – 0.1029) and the value 0 was not included in the 95.0% confidence interval.
CONCLUSION

The purpose of this study was to investigate the dual mediating effect of makeup motivation and appearance management behavior on the relationship between baby face makeup awareness and subjective wellbeing in women aged 20 to 30 years.

Our conclusions are as follows

First, there was a positive correlation between baby face makeup awareness, subjective wellbeing, motivation to do makeup, and appearance management behavior. In other words, the higher the interest and preference for baby face makeup, the greater the expectation of the changes that could be made through makeup and the greater the degree of appearance-related happiness.

Second, baby face makeup awareness had a positive effect on makeup motivation and appearance management behavior, makeup motivation had a positive influence on appearance management behavior, and appearance management behavior had a positive effect on subjective wellbeing. In other words, according to the interest and preference for makeup, which can be seen young, the expectation for a positive image change through makeup is created, and this expectation leads to actions that positively affect the self through appearance. In the end, makeup affects the degree to which an individual feels happy.

Third, in this study, while the path coefficient from baby face makeup awareness to subjective wellbeing was significant, it was not significant when makeup motivation and appearance management behavior were added as mediators.

To verify this result, bootstrap analysis was done. It showed that makeup motivation and appearance management behavior had dual mediating effects on baby face makeup awareness and subjective wellbeing. Namely, although the awareness of baby face makeup affects subjective wellbeing, the expectation of positive image creation through makeup and the actions that externally produce a positive image raise an individual’s level of wellbeing.

This study showed that in Korean society the most sought-after appearance has changed from having a ‘beautiful face’ to possessing and sustaining a baby face. We identified effective mediators that enhance the subjective wellbeing of Korean women’s lives.

Therefore, it is necessary to have an open view of the ‘baby face’ as a socio-cultural phenomenon rather than simply recognizing it as a fashion trend. Importantly, the development and application of a program to promote good health, psychological expectations of the effects of makeup, and appearance management behavior should follow from this research.

It is meaningful that this study has identified a dual mediation effect of makeup motivation and appearance management behavior in relation to baby face makeup awareness and subjective wellbeing.

Ethical Clearance: Taken from Hanseo University

Conflict of Interest: NA

Source of Funding: Self

REFERENCES


Substance Medicines Against Biofouling on Modern Gear Related with Marine Related Power ERA Advancements, Another way to Deal with an Old Issue

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ABSTRACT
Biofouling is an issue comprehended to makers and experts in various fields of learning (i.e. warm trade, marine building, desalination of sea water and the toward the ocean business. A standout amongst the most significant impacts, both money related and operational, is on current rigging that uses sea water for cooling purposes, this is connected with influence time progresses; and can fuse loss of the equipment's blueprint parameters, recommendations as to total loss of adequacy and an extension in unscheduled bolster exercises, both helpful and hindrance, that are developed in the operation and upkeep (O&M) masterminds grasped by organizations in which this sort of advancement is used. The procedure used as a piece of the fight and control against biofouling on present day equipment identified with marine related power time workplaces have been extensively researched in regions, for instance, the Persian Gulf, the Caribbean Sea and the Far East, yet not yet in some different areas where air conditions shift from the ones cited. In ask for to control and take out the above miracles, two rule frameworks to fight against biofouling have been created in late decades; physical treatment and compound treatment. The present research has made treatment of a creation nature by applying two different substance blends (chain quaternary ammonium and propylene glycol), both of which are earth heartfelt.

Keywords: Biofouling, Heat Exchanger, Quaternary Ammonium Compound, Propylene Glycol, Sea Water, Environmental Protection.

INTRODUCTION
The presence of Biofouling in mechanical procedures in which water is included is a natural piece of the business itself. Ocean water is a promptly accessible asset, the primary disadvantage is that natural creatures contained in seawater that under certain working conditions cause organic layers (biofilm) in working zones of the warmth exchanger[1]. The outcomes of this event is for the most part reflected in misfortunes of warm execution of offices, monetary misfortunes, powerlessness to do legitimate support hone, and so forth[2]. Biofouling is characterized as an undesirable marvel of attachment and amassing of biotic stores on a submerged simulated surface or a surface that is in contact with seawater. This development or fouling is a natural film made out of microorganisms installed in a polymer network framed by the biofilm[3], where inorganic particles can show up and remain (salts as well as erosion items) coming about because of different sorts of fouling created all the while[4]. This biofilm, comprising of microorganisms, microbial microfouling or biofouling can prompt the aggregation of large scale life forms, macrofouling biofouling or macrofouling [5]. There are two primary approaches to battle against biofouling, by physical means (mechanical cleaning gadgets, stream speed variety, ultrasound innovation) and by synthetic means, which comprise of various concoction definitions which can connect with the creature contained in the biofilm to permit the disintegration and vanishing of the organic state joined to a given surface[6].

DOI Number: 10.5958/0973-9130.2017.00173.6
This paper also reviews Synthesis, Characterization and Antimicrobial Activities of Turmeric Curcumin and Curcumin Stabilized Zinc Nanoparticles-A Green Approach [7]. Mining the amino acid dominance in gene sequences [8].

**MATERIALS AND METHOD**

**Area of Study**

The Bay of Santander was the land region where the investigation was driven, it is arranged in Cantabria (Spain) and is the huge estuary of the Spanish northern float covering a total extension of 22.42 Km², its length is 9 Km and its width is 5Km. Refrigeration sea water was pumped from the Bay of Santander to the pilot plant arranged in the Technical School of Nautical Studies of Santander. As a result of the proximity of the pilot plant from the Bay the physical-invention properties of the water drew proceeds as before in the midst of the entire length of the examination.

**Pilot Plant**

Once the isolated sea water met up at the receptor tanks of it was pumped to each of the eight warmth exchangers - capacitors tubes. The exploration focus pilot plant contained two geometrically vague warmth exchanger-condensers, with a length of 3163mm and its internal and outside widths were 10.2mm and 12.7mm separately, four tubes were made of AISI 316L steel and the remaining four tubes AISI 316Ti steel (see Fig. 1). To reenact effectively a glow exchange set up that occurs in an authentic mechanical or marine setting, fresh water streaming warmth was taken from the foundation of boilers of warm vitality of the ETSN. The estimation of the chemicals required in the examination was performed using electromagnetic metering pumps with a dry layer made by DOSAPRO MILTON ROY® the model of which was LMI P1, which, through versatile affiliation tubing, 5mm in width, blend compound was pumped to each of the exchanger tubes.

**RESULTS**

The biofilm advancement arrange had traverse of 43 days, each tube had another starting cleaning condition since the tubes were not crisp out of the container new, however going before the start of the pilot organize they were inside and out cleaned totally, since it is hard to achieve a level of cleanliness equal to that of when they were made. Fig. 3 and Fig. 4 exhibit the development of the biofilm through the estimation of the unusual elements of test.
The toxicology consider using fish (Scopthalmus Maximus) finished in the midst of the exploratory plan were productive as to investigate A, when higher estimations of quaternary ammonium blends were associated in the midst of toxicology tests the demise rate was inside the range allowed by PARCOM. It was not the same by virtue of propylene glycol where passing rates were over that permitted, which deduces that the estimation of this manufactured thing is not successful or pleasant, either from a particular point of view or an environmental viewpoint.

**CONCLUSIONS**

**Fundamental conclusions taken from the exploration are as per the following**

- QAC compound tried functions admirably for biofilm relief purposes.
- PG compound tried does not function admirably for biofilm relief purposes.
- QAC compound is ecologically amicable for the dosages tried amid the exploration.
- PG compound tried is not ecologically amicable for the dosages tried amid the exploration.

**Ethical Clearance:** Taken from, AMET University.

**Source of Funding:** Self

**Conflict of Interest:** NA

**REFERENCES**

Kinetic Study of Vitamin C Degradation from Pharmaceutical Product

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ABSTRACT
Two basic strategies for the assurance of ascorbic corrosive (Vitamin C) content in a Vitamin C tablet are proposed: conductometry and titrimetric technique with potassium bromat-bromide arrangement in the corrosive medium. The techniques have been connected to the examination of locally business Vitamin C tablet tests. The varieties of Vitamin C focus were examined in development of temperature. For the motor examination was determinate the rate consistent, the half-time and the initiation vitality for vitamin C.

Keywords: Ascorbic Corrosive, Potassium Bromat-Bromide, Vitamin C tablet.

INTRODUCTION
Ascorbic corrosive is one of the essential water dissolvable vitamins. It is basic for collagen, carnitine and neurotransmitters biosynthesis. Most plants and creatures blend ascorbic corrosive for their own necessity. Nonetheless, chimps and people cannot combine ascorbic corrosive because of absence of a protein gulonolactone oxidase. Consequently, ascorbic corrosive must be supplemented for the most part through natural products, vegetables and tablets. The present US suggested every day recompense (RDA) for ascorbic corrosive ranges between 100– 120 mg/ every day for grown-ups. Numerous medical advantages have been credited to ascorbic corrosive, for example, cancer prevention agent, antiatherogenic, hostile to cancer-causing, immunomodulator and anticipates chilly and so on. Hence, despite the fact that ascorbic corrosive was found in seventeenth century, the correct part of this vitamin/nutraceutical in human science and wellbeing is as yet a riddle in perspective of numerous useful cases and debates.

Conductometry Procedure
To start with was plotted the alignment chart of various ascorbic corrosive focuses (0,007N; 0,01N; 0,04N; 0,06N; 0,98N separately 0,1N) at the room temperature by understanding it at the conductivity meter (ìS/cm)[1].

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An unmeasured overabundance of potassium bromide is added to a fermented arrangement of the example[2]. The arrangement is titrated with standard potassium bromate to the primary changeless appearance of abundance bromine: this overabundance is then decided iodometrically with standard sodium thiosulfate [3]. The whole titration must be performed immediately to avert air-oxidation of the ascorbic corrosive[4]. The measurement of ultrasonic velocity in pure liquids and mixtures is an important tool to study the physico-chemical properties and also explains the nature of molecular interactions. The study of thermodynamic parameters
to explain molecular interaction of drugs in aqueous or non-aqueous medium provides useful information in medicinal and pharmaceutical chemistry. In present work molecular interaction of aqueous solution of 2-[1-(aminomethyl) cyclohexyl] acetic acid at different concentrations at 303K was studied by measuring ultrasonic velocity, density and viscosity of the solution[5]. The ultrasonic parameters such as adiabatic compressibility, free volume, free length, acoustic impedance, absorption coefficient, viscous relaxation time, available volume and Lenard Jones Potential were calculated. These parameters explained formation of hydrogen bond and molecular interaction existing in the solution[6].

Analysis of Samples

Different Vitamin C tablet tests, monetarily accessible locally, were broke down. The specimens were: standard ascorbic corrosive arrangement (Merck), Vitamin C 200 mg tablets, Ascovit 100 mg tablets with orange taste and Vitamin C nose drops 10%. Twenty tablets were weighed and a normal weight of a tablet was ascertained before being ground into fine powder. A bit of the powder, comparable to the normal weight of a tablet was broken up in water and sifted before making a volume of 50 ml. Suitable weakening might be required. The ascorbic corrosive fluid shape was weakened.

CONCLUSION

Each conductometry examination takes around 5 minute and titrimetry investigation around 20 minutes. No pre-medications of the examples are asked. The varieties of Vitamin C focus were examined in capacity of light work and at various temperatures. The extremely basic and quick methodology depicted in this paper can be another option to the more intricate and costly techniques for measure of ascorbic corrosive substance in Vitamin C tablets. The conductometric technique is exceptionally adaptable and valuable.

Ethical Clearance: Taken from, AMET University.

Source of Funding: Self

Conflict of Interest: NA

REFERENCES

Comparison of Seal Engraving Art of WU on the South and CHI on the North

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ABSTRACT

Background/Objectives: In the end of the Qing Dynasty of China, Wu Changshuo (1844-1927) and Chi Baishi (1863-1957) were the best in poems, writing, paintings, and even seal engraving and were followed by numerous students. Two people were called as 'Wu on the south and Chi on the north' because of where they practiced. Wu and Chi were the most remarkable in poems, writing, paintings, and even seal engraving. Especially two books named after their names indicate their positions in the history of Chinese seal engraving. There has never been a single personal dictionary that is not on calligraphy but modern seal engraving.

Method/Statistical analysis: Even though their backgrounds to births and other environments are different, both of them grew up to form independent sects, 'Wu school' and 'Chi school' later. Wu succeeded custom through imitation while Chi combined the old law with aspects of the people both creating distinctive seal engraving art. Backgrounds in birth, the world of seal engraving art, achievements, techniques, and works of these two remarkable artists of Chinese modern history will be analyzed in the text.

Findings: At the end of Qing Dynasty of China when epigraphy flourished, epigraphic ethos and metal hobbies spread producing many outstanding epigraphists. Particularly, the two greatest of all was Wu and Chi who worked till modern times. They are called as 'Wu on the south and Chi on the north'. It is because Wu worked in southern regions while Chi in northern regions. Both of them were the most remarkable in poems, writing, paintings, and even seal engraving. Especially two books named after their names indicate their positions in the history of Chinese seal engraving. There has never been a single personal dictionary that is not on calligraphy but modern seal engraving.

Both of these two people established their own world of art sublimating traditional seal engraving art to modern art. Two seal engraving sects created and named after them were Wu school and Chi school. The reason for these names is that Wu school also called as 'Hai school'(海派) was named after Wu who usually work in Shanghai. On the other side, Chi school sometimes called as 'Jing school'(京津派) was named after Chi who was active in Beijing. At last, there were great number of students who admired these two people because of their unique taste and trend in seal engraving art.

Improvements/Applications: Wu combined the old law with the meaning of tradition into a piece, creating time-honored and anticipated seal engraving art, while Chi dipped into the books of old epitaph handwriting, completing intense and straightforward art with strength from when he was a carpenter.

Keywords: Stamp, Seal Engraving, Art, Calligraphy, Sentence Style, Metals and Rocks

INTRODUCTION

In "Chinese Art Dictionary" from China, it describes Wu as a modern artist and Chi as a contemporary artist. Meanwhile, in Japanese book "A series of Chinese Seal Engraving", it describes Wu as an artist from Qing Dynasty while it describes Chi as a modern artist.

What is the reason? Let us compare through the year of their birth and death. Wu was born August 1st, 1844 and passed away November 6th 1927 (age of
84) while Chiwas born November 22th, 1863 and died September 16th, 1957 (age of 95). However dynasties when they were born were different with 19-year gap. Wu was born during the Dynasty of Min ning-Daoguang Emperor (1820-1850) and Chi was born during the Dynasty of Zaichun-Tongzhi Emperor (1861-1875). There was Yi Zhu-Chengli Emperor (1850-1861) in between these two dynasties. This is the reason why they are categorized differently: Wu as an artist in times of Qing Dynasty or modern artist and Chi as a modern or contemporary artist.

In this text, accomplishments by the significant sect 'Wu on the south and Chi on the north' in the history of seal engraving art will be emphasized whether than classification by surrounding situations.

**Used pen names**

Two versatile men in all of poems, writing, paintings, and even seal engraving, used more pen names except for Changshuo (長壽) and Baishi (白石). Wu used about 40, and Chi used around 60 pen names. They named themselves according to surrounding situations or people. The author defines pen name as 'title including all the names and pseudonym given to a certain person (or object)'.

**Characters of seal engraving art**

Wu enjoyed engraving on rocks since he was a boy and he was influenced by his father who became an authority in seal engraving field. Naturally he matured to obtain 'simple, generous and god-like movements' and 'magnanimous but delicate' style in seal engraving art.

At the age of 34, Chi started to learn seal engraving which was late. He learned to possess 'intense and straightforward' character of seal engraving with strength trained since he was a carpenter.

**Comparison of seal engraving art**

Let us comparatively analyze the characteristics of Wu and Chi by looking at their seals. As you can see in Figure 1, Wu's engravings are symmetrical, homogeneous, flowing, elegant, and upright. Wu emphasized the old rules and traditions. On the other side, Chi's engravings are relatively explicit, straightforward, square, simple, sharp, stirring, and contain radical lines and geometric figures. His carpentering experience and self-supporting study helped to create his engraving style.

<table>
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Fig. 1. Wu and Chi's impression of seal engraving
Comparative analysis between Wu and Chi's impression of seal

1. Wu: The top was rounded up.
   Chi: It is as simple as looking at iron nails.
2. Wu: There is equal footing between the upper and lower sides.
   Chi: There is no fixed interval between the left and right wing.
3. Wu: It has been treated with a long handle.
   Chi: It was treated in a ponderous manner.
4. Wu: The line is round and neat.
   Chi: He sharpened down the lines
5. Wu: The direction and length were varied depending on direction.
   Chi: A person is a form of holding a stick in both hands.
6. Wu: The line is blunt and tender.
   Chi: The lines are sharp and neat.
7. Wu: Zygomorphism’s Han Dynasty seal typical form.
   Chi: Geometric triangle form.
8. Wu: The gap is even elegant.
   Chi: A combination of space is very beautiful.
   Chi: Left and right's line to the summary.
10. Wu: It's like a soft line with the heart.
    Chi: The cord is sharp.
    Chi: Radical and exciting.
    Chi: Split terms of a geometric triangle and square.
    Chi: It is geometric shape.
14. Wu: It is a soft form of an ancient style of calligraphy.
    Chi: A unique structure.
15. Wu: Zygomorphism’s Han Dynasty seal typical form.
    Chi: An exquisite combination of triangular and square.
    Chi: Form of real snow.
17. Wu: Graceful handling.
    Chi: Make a difference by omission.

Appreciation of engravings

Let us appreciate Wu and Chi's engravings shown in Figure 2&3 below. Even though it is customary to display seals at their original size, it is very easy to distort the original size depending on inserting methods. Therefore, I marked the original stamp size at the end of each description. I also clarify that I put in Chinese characters in order to better translate the words engraved in stamps.

Fig. 2. Wu's engravings
Appreciation of Wu's engravings

1. This piece was engraved at the age of 30 with the great influence of Xu Sangeng (1826-1890). Wu did not stop at simple imitation, but went further to study the deeper meanings. These processes gave rise to Wu's mature engraving art in later years. (25×25mm)

2. Engraved when he was 52. The name of the dwelling place of Min Youngik (1860-1914, Korea) is engraved. Min's desire to go back to his hometown in Seoul is expressed. The ' which is not naturally present in ' is engraved because that was the way of writing in Qin Shi Hwang (始皇) era. Wu's desire to retain styles of the past is shown. The left and right arrangement of ' and ' to make them look as if they are one word shows his unique engraving style. (30×30mm)

3. Engraved at the age of 72. This work of his declining years shows his mature engraving art. The ' in the lower right corner of ' makes the five word letter look like four. He used ' instead of ' to follow the old writing custom. This piece was engraved by a blunt knife (刃牌刀), a seal engraving knife with blunt tip and round grip. A sense of elegant excitement is felt in this piece. (40×40mm)

4. Work when he was 81. It is designed typically with four letter arrangement. The letters seem almost like dancing. The edge processing around ' is impressive. The fan-shaped ' is also novel. The stretchiness of ' beside ' is to harmoniously arrange '. This almost-calligraphic engraving shows his unyielding will to stick to his principles of work. (印盡書出書徹印出) . (35×35mm).

5. Work at his age of 82. The quintessence of Wu's engraving art is shown here. The four sides of the seal were processed using lute method (印泥印章) engraved in lumps of clay. (21×21mm)

Fig. 3. Chi's engravings
Appreciation of Chi's engravings

1. Chi imitated Ding Jing (丁敬) 1695-1765), an authority of the famous seal engraving coterie (印章界), at his age 36. This made way to his simple and explicit (簡單明快) engraving style in later years. (18×18mm)

2. Work at his age 62. These generally square-shaped letters have sharp endings and acute angles to give a sense of peculiar tension. The margins between '老' and '夫' on the right and '毛' and '類' on the left have a strong contrast in density. It is one of his Calligraphy (筆書). (35×35mm)

3. When he was about 77. The ultimate beauty of Chi's engraving art. Who else can make seals with this level of uniqueness! The triangle made by the diagonal line above '是' is the ultimate beauty of this seal. The blank spaces form spatial contrast in a delicate manner. Three elements of seal engraving, the brushstroke (筆法), the arrangement (章法), and the engraving (刀法) are all spectacular. (32×32mm)

4. This is a piece of his declining years. Chi's general principle (空處可使走焉密處不使容針) is well expressed in this work. The way he homogeneously shaped '水' that is common in '沙', '霧', '霧' is very interesting. The harmonious arrangement of blank spaces in his seal shows Chi's excellent arrangement skills of letters. This is the so-called 'loose area is more loosely,dense area is more densely' (虛處實寫) arrangement method. (55×55mm)

5. This work is done at his age of 92. I can feel a mature elegance in this piece. He carved his lines on the engraving stone without hesitation, just as one would calligraph on a paper with a writing brush. The dynamic adjustments of his carving knife made the strokes thick and thin, making the overall piece simple and natural. (37×37mm)

Sealing method

Method of Sealing Stamp coated with ink is called sealing method. Therefore according to sealing method, weight feeling of shadow appears differently. Sealing methods Wu and Chi used were different from other writers. Wang Beiyue (王北岳) 1926-2006) mentioned about this as follows.

"Coating ink heavily onto hugestamp just like Wu and Chi did, means concentrating on its content. Trace by stamping is also same as personal motivethrough sealing method. Pieces of Wu and Chi are the perfect example. Therefore should coat stamp with ink heavily and seal it with strength."

First, one characteristic of Wu's sealing method is that the changes of its thickness, wetness, dryness and wateriness are visible. Following is Chi's sealing method. Let us look into it through Kim Yeonggi (金永基) 1911-2003, korea)'s impression after he witnessed Chi's sealing himself.

"After aged teacher completes his piece and writes his title, he holds a huge stamp, heavily coated with ink, and seal powerfully with it. Intagliocreated this way possesses thin but classical style. And engraving becomes thick but beautiful at the same time."

Closing remarks

Both two men emphasized the basic three elements: the technique of calligraphy, style of sentences, and painting. Wu implemented writings on tombstone from Chinese Han, and Chi mastered calligraphy from epigraph to biographical sketch of Qin Dynasty before he implemented them into stamps. They were very well aware that even with greatest calligraphy, mistaken sentences would bring the quality of seal engraving art down. Wu used painting skills combined with restrain and discipline while Chi used restrain and keenness as his own straightforward painting skills.

Consequently, Wu combined biographical calligraphy with meanings of old laws and tradition into his works, presenting time-honored and anticipated seal engraving art. On the other hand, Chi fused old epitaph with penmanship completing his own unique 'Baishi font'. With his strength from the time he was a carpenter, he completed his powerful and straightforward character of seal engraving art.

Until this point was the analysis of world, accomplishments, methods, and art works of the most remarkable artists in the history of Chinese modern and contemporary seal engraving art, 'Wu on the south and Chi on the north', Wu and Chi.

Ethical Clearance: Taken from Gwangju University
Conflict of Interest: NA
ACKNOWLEDGMENT

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A Design of Personal Secure Authentication Scheme based on the Digital ECG Code

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ABSTRACT

Background/Objectives: As the various online markets grow and wearable devices increase, the need for personal authentication is also increasing. Since authentication technology which is based on static bio-information is vulnerable, a characteristic extraction method that makes counterfeiting difficult is needed.

Method/Statistical analysis: If ECG information that is unique to each individual can be used for user authentication, an effective authentication is possible. The suggested method first receives ECG information through a wearable device and authenticates the user through the points of inflection in the ECG, namely, P, Q, R, S, T. Among the inflection points, P and T show different values every time, making it secure than authentication using static bio-information.

Findings: This paper presents a user authentication method that uses dynamic bio-information occurring from the ECG and that is in accordance with FIDO standards. The suggested authentication method uses a different value every time, making it secure against re-use attacks or hijacking attacks. Moreover, it is much secure than static bio-information that cannot be changed once they are stolen, such as information on finger prints or irises.

Improvements/Applications: The suggested user authentication scheme through ECG is expected to be the next generation of individual authentication that can be widely applied to healthcare or security entries.

Keywords: ECG, FIDO, Wearable Device, PQRST, Authentication.

INTRODUCTION

User authentication technology evolved from using simple ID and password to using official authentication certificates based on X.509 certification. Although authentication methods using simple ID and passwords are easy to use, they are vulnerable to farming or memory hacking. As the regulation that makes it obligatory to use official authentication was scrapped in September, 2015, and financial services that used to be face to face increasingly become non face to face, the need for user authentication technology that can replace the official authentication certificate is increasing. User authentication technologies can be categorized into those that are knowledge-based, ownership-based and biological information-based. They vary in terms of convenience and security levels. In Korea at present, bio information-based technologies are increasingly used, evolving away from knowledge-based and ownership-based systems. However, the current bio-information based authentication technology, despite many efforts have a high False Acceptance Rate (FRR) and False Reject Rate (FAR). One of the leading static bio-authentication technologies is fingerprint recognition. But fingerprint recognition is vulnerable to theft or counterfeiting. If it is stolen, it cannot be changed since it is unique information to the user1. As technology progresses and bio-authentication technology becomes more commonplace, authentication methods based on user’s bio-information will become an important technology. This raises the need for a universal authentication technology that can accept various bio-authentication technologies2. As such, this paper seeks to improve the user’s convenience in the next generation ubiquitous environment and provide various services.

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This paper suggests a user authentication technology that applies the user’s unique electrocardiography (ECG) dynamic bio-information to be in line with Fast Identity Online (FIDO) technology.

**Related Works**

FIDO technology authenticates by recognition of bio-information once, without having to enter a password. This is made possible by combining encryption technologies with bio authentication technologies for fingerprints, irises, and faces. It was formed in 2012, launched in February 2013 and jointly implemented a more convenient and secure authentication system in the online environment, and provides a technical standard for certification systems and certification systems. FIDO technology started to undergo standardization to use the security functions that are provided by the user’s device. FIDO consists of the following two standards

1. **Fido UAF Protocol**

Figure 1 shows a non-password authentication standard, the Universal Authentication Framework (UAF) method which uses an individual’s unique bio-information such as fingerprints and irises. In the user registration protocol, the registered bio-information is used to generate a public key and private key. The public key is sent to the FIDO server and the personal key is stored in the device’s security field. In the user authentication protocol, if the user requests to the server, the server sends a random number to the user that can be used only once and asks for authentication. The user gives an electric signature to the random number by taking out the personal key from where it was stored in the security area in the device, by using the fingerprint registered on the device. The signature is then sent to the server. The bio-information such as fingerprints or irises in this process are neither sent to the FIDO server through the UAF protocol, nor is it stored in the FIDO server.

2. **Fido U2F Protocol**

Figure 2 shows the configuration in Universal 2nd Factor (U2F) method that authenticates for the second time using a separate authentication device such as USB and Integrated Circuit (IC) where user information is stored. This is done in addition to the simple ID and password method. The U2F method relies less on passwords and implements additional authentication by the device when the password authentication is complete. Using the electronic signature of FIDO, it can be verified whether the user owns the device or not. U2F is a technology that can enhance security of user authentication on websites that use only passwords.

**Proposed Scheme**

Figure 3 generates rhythmic beating and maintains it without the help of the nervous system. The heart is a pump consisting of muscles, with the ultimate goal of providing blood to all organs and tissue within the body. The heart is divided into four sections. Of the four chambers, the two upper ones that are divided...
by the interatrial septum are called the right atrium and left atrium. The chambers located in the lower part of the heart and divided by the interventricular septum are called the right ventricle and left ventricle. The heart cells conduct electric stimuli to the nearby heart cells at a rapid pace to promote the depolarization of all parts of the heart.

ECG bio-information is unique to each individual and therefore can be used as an authentication value. Unlike static bio-information, it is difficult to counterfeit it, unlike static bio-information such as fingerprints. As such, this paper seeks to digitize the random characteristic points extracted from the P wave and T wave, in addition to the characteristic points of QRS group unique to each individual, convert them into a binary code and generate an authentication key based on P and T values so that each time a different key is used for authentication by the server. The user requests an authentication through the wearable device on his wrist. The service provider uses the Certificate Authority (CA) server to authenticate the user, it is convenient yet secure and easy to use. The P wave and T wave extracted from the ECG, unlike the QRS group, are characteristic points that differ every time, which prevents re-use attacks. The key generated is stored after having a one-way hashtag.

An analysis of ECG shows inflection points P, Q, R, S, T that regularly occur as in Figure 4. Most ECG waves beat in accordance with the electric signals that are regularly generated. ECG is a graph that shows such electronic changes. Basically, the P wave, QRS group and T wave are recorded. By analyzing them, abnormal conduction, changes in the size of the atrium and chamber and issues with heart beat can be identified. Although diagnosis on ECG is done subjectively, basic data on the P wave, QRS group, T wave, intervals between the waves, length, frequency and shape of wave are also needed. P wave needed to calculate the heart beat, the R-R interval, Q-T Interval used for calculating the time from depolarization to re-polarization in the two atriums and P-R interval needed to check the depolarization of the chamber and conduction are some leading data needed. The QRS group shows unique waves even when the person walks or runs.

ECG bio-information is unique to each individual and therefore can be used as an authentication value. Unlike static bio-information, it is difficult to counterfeit it, unlike static bio-information such as fingerprints. As such, this paper seeks to digitize the random characteristic points extracted from the P wave and T wave, in addition to the characteristic points of QRS group unique to each individual, convert them into a binary code and generate an authentication key based on P and T values so that each time a different key is used for authentication by the server. The user requests an authentication through the wearable device on his wrist. The service provider uses the Certificate Authority (CA) server to authenticate the user, it is convenient yet secure and easy to use. The P wave and T wave extracted from the ECG, unlike the QRS group, are characteristic points that differ every time, which prevents re-use attacks. The key generated is stored after having a one-way hashtag.
applied so that the service provider who is not the owner of the key value cannot decrypt it. However, when a simple hash function is applied, security is low. Therefore salt value is added for application. The salt value used plays the role of increasing stability for the bio-information and key value. As such, this value is stored in a separate area physically far away. The suggested authentication method applies FIDO technologies as in Figure 5 to register and authenticate so that a secure user authentication can be offered. It is difficult to counterfeit and therefore it can replace the existing static bio-information. Moreover, by using wearable devices on the wrist, the technology can be widely applied to various services such as health care and finance technology.

CONCLUSION

With the distribution of smart devices and progress in communication technologies, the need for next generation authentication method is increasing. However, the password policy that differs from service to service confuses users if the existing ID and password method is used. Users end up using the same password for various institutions as they cannot remember an infinite number of passwords. This makes the potential damage of leaked passwords huge. Authentication using passwords are vulnerable in that the passwords are managed by being saved in the server. It is also difficult to verify whether the user is the person he claims to be. As such, this paper suggested a bio-information-based method that uses ECG to fit the FIDO technology. The suggested method extracts characteristic points generated from the heart beat of the user to generate a user key. Compared to existing dynamic bio-information authentication information, a secure user authentication is made possible. The new method is expected to bring about positive changes in online and mobile commerce, as well as health care.

Ethical clearance: Taken from Soongsil University

Conflict of Interest: NA

Source of Funding: Self

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Development of Water Leisure Sports Shoes with High Ground Contact Force, Reinforced Wear Resistance and Water Drainage

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ABSTRACT

Background/Objectives: In the shoes market of Korea, casual leisure sports found in cities are receiving the spotlight over traditional outdoor areas such as mountain climbing. With the increasing need for the development and market release of water leisure sports shows due to expansion of water leisure sports market and government policy, the purpose of this study is to develop water leisure sports shoes that includes structure and design for midsole with improved water drainage, structure and design for high contact outsole, and strap locking system with increased stability.

Method/Statistical analysis: To maintain high ground contact force in diverse inland water environments, increase wear resistance and secure stable walkability, optimal rubber mix was completed by considering different outsole structure designs, outsole characteristics and friction characteristics. Upper structure was optimized to enhance ground contact force, satisfy individual demands of consumers enjoying leisure activities, increase wearing comfort and improve stability (prevention of being taken off). Inclined water drainage was applied to improve water drainage and minimize internal and external inflow of foreign matters.

Findings: Marine sports are characterized by long-term exposure to underwater environment, which can easily cause foot diseases because pleasant conditions inside shoes cannot be maintained. This study added the fact that feet are always exposed to injuries from sand and foreign matters. Water leisure sports shoes technology with increased stability and convenience was applied to achieve high grip, wear resistance and wearing comfort in various water leisure sports environments.

Improvements/Applications: The developed technology can be used to increase demand for outdoor leisure activities and pioneer potential markets and undiscovered leisure areas.

Keywords: Leisure Sports, Aqua Shoes, Foot Pressure, Drainage Channels, Strap Locking System, Water Leisure Sports Shoes

INTRODUCTION

Water leisure industry is rapidly rising as a strategic growth engine industry of Korea in connection with national policies, resulting from a maritime nation surrounded by sea on three sides, easy access to nearby streams and valleys, preference of waterside plays due to distinctive weather of four seasons in the temperate climate, increased leisure activities according to implementation of five-day workweek, increased leisure time shared by family members, increased national interest in projects to expand marine industries, and transition of domestic and overseas tourism from passive tourism focused on sightseeing and shopping to active tourism involving experience and activity. Water leisure population is rapidly increasing because of expanded geographical, economic, cultural and environmental infrastructures that can help transform the leisure industry into an industry with high added value and functions of sports.
Outdoor sports brands are keeping pace with such trend of marine sports, developing water leisure sports items such as essential beachwear and aqua shoes. The market for 'aqua shoes' developed as shoes appropriate for outdoor marine activities is showing remarkable expansion. Aqua shoes are designed as multi products that can be worn during daily life by improving fashion in addition to utility in water environment. On the other hand, level of technology for user convenience and needs is still inadequate. Users are simply wearing shoes on the beach or swimming pool[1].

With the changing trend of leisure and well-being culture, rapid growth of functional shoes, reorganization of global shoes market, and high competence of technology and planning ability, the shoes industry is transforming from a traditional labor-intensive industry into an industry of new growth engine and future strategy. The entire world is enthusiastic about functionality of shoes, and demand is increasing continuously. In Korea, the focus is placed on the development of new functional shoes with light styles based on production experience and knowledge.

There are 30 marines in Korea. Assemblyman Seong Lin Na explained, "Marine leisure industry has great potential for growth. The government foresees that the marine industry will create 12,000 new jobs and added value of 1.52 trillion Korean won until 2020. However, our marine industry is still in infancy compared to 570 marinas in Japan and 89 marinas in China." [2]

By combining frog grip outsole with frog-step structure, cool and quick-drying lining, stable strap locking system, basic impact absorption and water drainage, and high drainage midsole with arch support function, highly functional water leisure sports shoes (aqua shoes) can be developed to enjoy water leisure sports and daily leisure activities at the same time. Such shoes are expected to show expansion of the export market and income substitution effect according to increase of global sales, greatly contributing to the diversification of the shoes market, expansion of demand for shoes, and creation of jobs.

MATERIALS AND METHOD

Since aqua shoes are lighter and dry quicker than ordinary sneakers, they allow for free water activities, quick drainage of water after coming to land, and excellent wearing comfort. They protect the feet from injuries caused by slippery ground contact surface, rough gravels, stones, shells, broken glasses and marine garbage. Accordingly, this study aimed to develop water leisure sports shoes with reinforced stability and water drainage appropriate for different environments.

Application of Frog-Step Structure to Reinforce Ground Contact Force

Instead of using flat outsole structure of the conventional walking shoes and running shoes suited for flat on-road, an outsole structure with high ground contact force that uses diverse patterns and height differences to improve ground contact and secure walkability on rough water surface was designed shown in Figure 1.

![Fig. 1. Frog-step outsole structure design](image)

Frog-step structure can improve ground contact force and satisfy the demand of leisure consumers for individualization by designing diverse structures, bumps and arrangements depending on the environment of use.

Different factors affect frictional characteristics of shoes. In general, they include mixing of materials such as base material, additive, filler and non-slip agent, crosslink density, specimen characteristics like hardness, floor material, surface roughness, and foreign matters between shoes and floor. [3,4]

Hardness of specimen according to silica content, pattern structure, frictional characteristics according to floor roughness were comparatively analyzed. Correlation and tendency among factors and frictional characteristics were derived. The derived tendency can be used to predict frictional characteristics according to changes in material mix and environment based on
the results of friction experiment under specific conditions.[5,6,7]

Different silica contents were applied to NR rubber mix to make specimens with different hardness and patterns. By combining 5 types of hardness and 8 types of pattern, 40 specimens were made.

Pattern structure of specimen is a factor related to characteristics of measurement surface that has great impact on friction coefficient. There are two basic structural elements of pattern design. ‘Relief’ pattern has the center projecting out compared to the surroundings, and ‘intaglio’ pattern has the center dented in compared to th surroundings. Pattern structures were designed by classifying them into relief type (a) and intaglio type (b). For relief type specimens, 4 structures with different length, width and height of the bump were designed. For intaglio type specimens, 4 structures with different thickness, length and depth of the wall were designed. Molds were made using the designed structures.

Each rubber mix was formed in the molds to make 40 specimens for friction coefficient measurement with varying hardness and pattern structures.

Friction coefficient of the specimens was measured at same load and speed using a friction coefficient measuring device. Floors during measurement were divided into two types, flat marble and rough tile. Each measurement was repeated 5 times or more to find the mean and determine friction coefficient.

Flat marble floor for measurement was used after polishing the surface.

On the one hand, friction coefficient is expressed according to vertical load as shown in Figure 2.

Friction coefficient (μ) = friction force (f) / normal force (N)

Here, μ is friction coefficient, f is friction force, N is normal force, m is mass, g is gravitational acceleration, and F is external force. Friction coefficient is automatically calculated in real-time using normal force and friction force measured by the measuring device.

The Figure 3 shows Pattern of specimens for measurement of friction coefficient.

Application of Strap Locking System for Increased Wearing Comfort and Stability (Non-Slip)

To improve wearing comfort by increasing adhesion between aqua shoes and feet in sea water and fresh water and to prevent danger from exposure of feet when shoes are taken off, a system that reinforces adhesion between aqua shoes and feet by combining outsole and upper was introduced as shown Figure 4.
'X' shaped SLS structure, which was originally limited to the upper part in the early stage of development, was extended to include outsole and increase adhesion of feet with upper and outsole. Tension of SLS was dispersed throughout upper and outsole, thereby improving wearing comfort.

Application of Inclined Drainage Channels Improving Water Drainage and Minimizing Internal and External Inflow of Foreign Matters

The design was intended to prevent inflow of external foreign matters and protect feet from dangerous objects like broken glasses using bottom inclined water drainage and side water drainage structureas shown in Figure 5.

As a result of evaluating characteristics of different rubber types, SBR showed best slip resistance. Accordingly, characteristics of different SBR types were evaluated. SBR is divided into emulsion SBR and solution SBR according to method of polymerization.[8,9]

Whereas emulsion SBR (ESBR) has a standard bonding structure of styrene and butadiene, solution SBR (SSBR) has an advantage of easily adjusting contents of styrene and cis, trans and vinyl bonding structures of butadiene. Especially, vinyl bonding structure of butadiene was reported to have great effect on viscoelasticityas shown in Figure 6.[10,11]

![Fig. 5. Conventional water drainage structure and inclined water drainage structure](image)

![Fig. 6. Comparison of ESBR and SSBR](image)

Application of SSBR Outsole Material to Secure Optimal Ground Contact Force under Irregular and Diverse Uses of Aqua Shoes

In general, rubbers used to make outsole of shoes include Natural Rubber (NR), Stadiene-Butadiene Rubber (SBR), Butadiene Rubber (BR), and Acrylonitrile-Butadiene Rubber (NBR). Compared to SBR, a conventional synthetic rubber, SSBR (Solution SBR) has up to 45% of rolling resistance and road surface contact force. SSBR has recently drawn great attention as a tread materialas shown in Table l, and it was applied to outsole of shoes to optimize slip resistance and durability balance of aqua shoes. By increasing the utility of SSBR receiving the spotlight as an environment-friendly tire material, the new shoes can help shared growth of domestic material industry and shoes part industry.

<table>
<thead>
<tr>
<th>Outsole Material</th>
<th>Slip Resistance (Friction Coefficient Measurement)</th>
<th>Wear Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dry (Land)</td>
<td>Wet (Water)</td>
</tr>
<tr>
<td>SBR</td>
<td>O</td>
<td>Δ</td>
</tr>
<tr>
<td>IIR</td>
<td>O</td>
<td>Δ</td>
</tr>
<tr>
<td>SSBR</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

○ Excellent □ Satisfactory △ Normal × Poor

![Fig. 7. Friction coefficient according to hardness and pattern structure of silica filled rubber (floor: marble, condition: DRY)](image)

**RESULTS AND DISCUSSION**

Based on measurement of friction coefficient according to hardness, friction coefficient decreased with increasing hardness of relief type. Highest friction coefficient of intaglio type was shown with hardness of 62A, and friction coefficient decreased above and below this hardness.

Therefore, on a marble floor with relatively smooth surface, the specimen with M2 pattern structure having small deformation and broad contact area under vertical load and horizontal movement was verified to be the best specimen. On the one hand, best friction coefficient was found with low hardness in relief type and at specific hardness in intaglio type. Accordingly, highest friction coefficient was secured by combining appropriate hardness and pattern structureas shown in Figure 7.
When friction coefficient is measured on the same floor using the same pattern, friction coefficient does not always turn out to be higher with low hardness. Best frictional characteristics were achieved at specific hardness. Although the 62A specimen showed best characteristics in this study, this can differ according to type of base rubber and additive.

As a result of measuring friction coefficient according to pattern on the same floor using the same mix, intaglio structures generally showed excellent frictional characteristics. Relief type showed smaller deviation of friction coefficient according to hardness compared to intaglio type. It was confirmed that friction coefficient is greatly affected by structure in addition to material mix. This probably results from deformation of pattern structure by friction and contact surface area of the floor. Hardness of material mix and deformation resistance of pattern structure seem to take part in this.

In conclusion, non-slip characteristics of outsole rubber structure on shoes are affected by material characteristics (hardness, etc.) and pattern structure of rubber mix. Best frictional characteristics can be obtained through optimal combination of different factors.\[12,13]\n
NR, SBR, BR and NBR were mixed to identify basic characteristics of each material. Mechanical characteristics such as tensile strength and tearing strength were best in NR and worst in BR. However, BR showed best wear resistance of 700% or above. NR and SBR showed excellent mechanical characteristics like tensile strength and tearing strength, but they did not show desirable wear resistance. Friction coefficient, which represents slip resistance, was best in DBR and worst in BR.

### Table 2: Characteristics according to SSBR type

<table>
<thead>
<tr>
<th>SSBR Type</th>
<th>B-1</th>
<th>B-2</th>
<th>B-3</th>
<th>B-4</th>
<th>B-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardness (Shore A)</td>
<td>59–60</td>
<td>61–62</td>
<td>53–54</td>
<td>53–54</td>
<td>52–53</td>
</tr>
<tr>
<td>Tensile Strength (kgf/cm²)</td>
<td>94.4</td>
<td>169</td>
<td>96.4</td>
<td>106</td>
<td>139.4</td>
</tr>
<tr>
<td>Elongation (%)</td>
<td>300</td>
<td>400</td>
<td>400</td>
<td>450</td>
<td>300</td>
</tr>
<tr>
<td>Tear Strength (kgf/cm)</td>
<td>32</td>
<td>47</td>
<td>32.6</td>
<td>35</td>
<td>36.7</td>
</tr>
<tr>
<td>NBS (%)</td>
<td>145</td>
<td>125</td>
<td>117</td>
<td>107</td>
<td>86</td>
</tr>
<tr>
<td>Friction Coefficient</td>
<td>DRY 1.63</td>
<td>1.57</td>
<td>1.55</td>
<td>1.49</td>
<td>1.47</td>
</tr>
<tr>
<td></td>
<td>WET 0.83</td>
<td>0.77</td>
<td>0.97</td>
<td>0.94</td>
<td>0.94</td>
</tr>
</tbody>
</table>

As shown in Table 2, mechanical characteristics such as tensile strength and tearing strength increased and wear resistance decreased according to increase of styrene content. Increase of vinyl bonding structure of butadiene resulted in increase of friction coefficient. Therefore, slip resistance and wear resistance can be controlled using structural characteristics of SSBR.\[14]\n
When containing oil, slip resistance decreased in dry state and increased in wet state. Wear resistance was generally decreased with oil content. As for change of wear resistance according to styrene content and bonding structure of butadiene, same tendency was shown regardless of oil content. This suggests that slip characteristics in wet state can be adjusted without decreasing wear resistance by adjusting oil content and characteristics of material according to composition of hydrocarbon. This material is appropriate for satisfying slip resistance required for water leisure sports shoes.

### CONCLUSION

Water leisure sports shoes refer to shoes worn during underwater and water leisure activities such as sea, river, valley and swimming pool. Aqua shoes refer to shoes appropriate for waterside play.

Having convenience of quick drying and slip prevention and protection of feet from danger of
external environment, the domestic and overseas marine sports shoes market is continuously growing with the change of trend according to the rise of the marine leisure market. Water leisure sports shoes that have outsole structure with high ground contact force, SSBR outsole material and strap locking system can help prevent diseases and injuries during marine sports and leisure activities.

**Ethical Clearance:** Taken from Hansung University.

**Conflict of Interest:** NA

**ACKNOWLEDGMENT**

This research was financially supported by Hansung University.

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Drain off System in Oil Product and Chemical Tankers

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ABSTRACT

The stripping tank incorporates channels and fittings which are mounted in the load tank. The most extreme weight of the Nitrogen or packed air is 8 bar. Packed air might be utilized as a part of understanding with the class rules. Amid investigating, it was discovered that the tank couldn’t withstand the vacuum being made and would in the long run clasp. Along these lines, another tank must be manufactured and this time a tube shaped one was made. At long last, all parts were painted and the venture barricade was hung appropriate alongside the area of the venture. We chose to do this part to begin with, in order to manufacture a tank and a pipeline as per the release rate of the ejector. We at that point manufactured a tank of measurement 50X50X50 cm³. The limit of the tank is 125 litres. The plates that were utilized were 50X50 cm² in measurement with a thickness of 2mm. Stiffeners were added to give the tank added quality to evade any odds of clasp of the tank.

Keywords: Stripping Tank, Chemical Tankers, Petroleum Products, Drain off System, Ejector.

INTRODUCTION

An opening was sliced in the tank to encourage a level gage. The stand was made prepared by boring a gap in it to encourage the suction pipe of the tank. In the interim two solenoid valves were likewise requested [1-3]. The solenoid valves are for programmed operation of the framework. The gage glass was then fitted in the tank and with gaskets [4-5]. We at that point arranged out and developed an electric circuit for the programmed activation of the valves. The electric control board was then tried for appropriate working and was observed to be attractive.

Proposed Framework

Level gage and gasket were fitted in the stripping tank Funnels and fittings were acquired and plumbing work was done. Once the pipes work was done, we had considered that the work was done; however, a level gage was to be fitted in the principle freight tank (Sintex tank close to the hydrophore tank). Along these lines 2 openings were penetrated in the principle payload tank and a level gage was fitted. A trial run was then done to check the correct working of the framework and investigating was additionally done.
The proposed framework must have following components, Security Confidential and true correspondence. Indeed, even consummately outlined frameworks can come up short if the presumptions about the workload and conceivable mistakes end up being incorrectly. The framework is more productive, Energy administration, Code-measure effective (particularly for frameworks on a chip), Run-time proficient and cost effective. The framework is designed to limit assets and to boost power. It is UI. (No mouse, console and screen). It is much of the time associated with physical condition through sensors and actuators, Dortmund.

Ethical clearance - Taken from, AMET University.
Source of funding - Self
Conflict of Interest - NA

REFERENCES

Study on Renewable Energy and Hydrogen on A Sailing Boat

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ABSTRACT

The Darwin venture is a six months travel on the cruising watercraft that takes after, in the retrogressive heading, the Darwin’s course towards Galapagos Islands on board Beagle. Enel is adding to the venture preparing pontoon, i.e. the 22m/50tons cruising watercraft that will take after Darwin’s course, with sustainable power source era frameworks permitting a sensible reduction of diesel fuel utilization required for on board benefits, together with a hydrogen stockpiling framework in view of metal hydrides. The fundamental objective of the venture is to concentrate the appropriateness of the coupled utilization of sustainable power sources and hydrogen stockpiling to be utilized for vitality supply in separated conditions, with specific reference to a cruising watercraft, which has extremely strict prerequisites as far as volume accessibility and wellbeing directions.

Keywords: Hydrogen Storage on Board, Renewable Energy Generation

INTRODUCTION

The primary objective of the venture is to concentrate the appropriateness of the coupled utilization of sustainable power sources and hydrogen stockpiling to be utilized for vitality supply in disengaged situations, with specific reference to a cruising vessel, which has exceptionally strict prerequisites regarding volume accessibility and security controls, yet with prompt augmentation to isles not associated with the electric matrix. Hydrogen era/stockpiling/usage frameworks introduced models, in this manner aftereffects of the test crusade will be helpful to advance their vitality effectiveness and their outline for applications like cruising and speedboats. This paper portrays the sustainable power source era framework and the hydrogen era, stockpiling and use hardware that are introduced locally available vessel, and in addition the principle comes about because of the initial segment of the excursion.

Articles related to renewable energy conceptualization, Reactive power optimization using firefly algorithm,[11] intercepts connection oriented between power system in an organized manner to get renewable energy resources from it using firefly algorithm. Reactive Power Pricing Using Group Search Optimization in Deregulated Electricity Market,[12] integrates the electricity board regarding amount of electricity consumer in particular rural area to convert those excess into moderate level of price ratio according to the consume ratios. Impact of parameter variations on the steady state behaviour of grid connected renewable energy conversion systems,[13] investigates formal relation between grid power system to converting renewable energy resource in the form of electricity to balance resources among several power systems.

System Installation

Establishment has been performed in two consequent strides, all together not to change the timetable of pontoon trek. The initial step occurred amid the watercraft upkeep in Curacao (Netherland Antilles); where the sustainable power source era frameworks have been introduced and the electric association required for the hydrogen generation, stockpiling and usage frameworks where set up. The second step happened in Chile, where a high-effectiveness PV module supplanted the two thin
modules as of now on board and all the hydrogen-related hardware were introduced and started operation.

Renewable Energy Generation Systems

Air generators and the PV board are introduced on a move bar welded to the back piece of the vessel (Figure 1), while the hydro generator is hindered to the pontoon structure in a position that enables the pivoting propeller to be tossed into the water when the watercraft is moving (Figure 2).

The generators are associated with an electric board containing battery charge controllers and insurance breakers, and in addition voltage and current measuring hardware. The satellite receiving wire (containing additionally a gps beneficiary) was mounted on the move bar (figure 1). It is associated with the tablet sited in the primary deck, and the information control and obtaining framework, set into a waterproof (IP65) confine mounted the afterpeak. Ethernet interface gives information transmission amongst portable workstation and information securing framework. All the power and information links have been mounted along the pontoon vessel and associated regarding the marine wellbeing controls.

RESULTS AND DISCUSSIONS

A diagram demonstrating the total power commitment of sustainable, together with kept away from CO2, is accounted for in figure 3. The measure of vitality provided as of not long ago is lower than anticipated day by day normal, however this reality was predicted, since more concentrated supply, particularly shape air generators, is normal in the following piece of the excursion, because of the far more grounded winds at higher scopes.

CONCLUSIONS

During the trip of the Adriatica yacht, logical exercises and analyses are completed concentrating on the Earth’s and mankind advancement and on future prospects. Enel added to the venture by furnishing the pontoon with sustainable power source era frameworks permitting a sensible lessening of diesel fuel utilization together with a hydrogen stockpiling framework in light of metal hydrides. The initial segment of the excursion gave intriguing outcomes for
what concerns the framework dependability, keeping in mind the end goal to assess the utilization of such framework for vitality supply in detached conditions, with specific reference to a cruising pontoon, which has extremely strict prerequisites as far as volume accessibility and wellbeing directions. Application to conditions not associated with the electric matrix (i.e. islands) is being assessed, considering the aftereffects of this experimentation.

**Ethical Clearance:** Taken from , AMET University.

**Source of Funding:** Self

**Conflict of Interest:** NA

**REFERENCES**

Effect of Flat and Inclined Gait on Ankle Muscle Activity

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ABSTRACT

Background/Objectives: The purpose of this study is to investigate how the ankle muscles of the anterior and posterior cooperate and smoothly gait in the uphill and downhill sloping situations. The subjects were 20 young college students (M =10, F =10) who were 21 to 25 years old at S university located in Dangjin, Chungnam, Republic of Korea.

Methods/Statistical analysis: The subjects were measured MVIC(Maximum Voluntary Isomeric Contraction) of the tibialis anterior and medial gastrocnemius and measured the muscle activity of the tibialis anterior and medial gastrocnemius after gait at flat, downhill10, uphill10°on the treadmill. Statistical analysis was performed using repeated measures ANOVA and SPSS 12.0 version was used.

Findings: There was no difference in the tibialis anterior and medial gastrocnemius in the flat and downhill10. There was a statistically significant difference (P<0.05) between the flat and the uphill10, downhill10°and uphill10. The tibialis anterior and gastrocnemius showed more muscle activity when walking uphill10°compared with walking on flat and downhill10.

Improvements/Applications: Coordinated muscle action of the tibialis anterior and medial gastrocnemius is essential for a functional and stable gait that can walk on rugged, uneven ground.

Keywords: Gait, Wireless surface EMG, Tibialis anterior , Treadmill, uphill and downhill sloping

INTRODUCTION

Gait is a complex movement that integrates and controls the musculoskeletal system and the nervous system, and moves the entire body by moving the human body in a stepwise manner by maintaining the speed in a constant direction [1]. Gait is performed by 100 or more skeletal muscles coordinating with the upper and lower joints [2], making the body safe and efficient, making the hill or ramp down safely [3], and maintains the posture by minimizing unnecessary movement of the body posture [4]. Gait is also a necessary condition for everyday life and functional activities. Gait in daily life is repeated and occurs in various situations including flat, sloping, and stairs. The body moves through the working, especially the functional coordination of the ankle muscles overcomes various types of ground conditions.

Gait is accomplished through the interaction of flexion and extension muscles of the hip joints, knee joints, ankle joints [5]. The flexion and extension of the ankle joints are particularly important when walking on sloping surfaces. Gait on a sloping surface requires more concentric contraction of the agonist and eccentric contraction of the antagonist than the flat surface. Prosser et al. [6] Used the treadmill, bicycle, and elliptical instruments for gait training to find out the most effective gait training methods. Wolfon et al. [7] Reported that not only the muscles that tilt the knee in gait but also the muscles that undergo flexion muscles of the ankle joint are connected to balance during gait and are an important factor for interaction between the foot and the ground. In particular, treadmill gait is used as a therapeutic means for patients and elderly patients who need to use indoor or narrow space and difficulty in gait or specificity [8].

Muscles that occupy the anterior and posterior of the ankle joints exert greater force when their physiological cross-sectional area is larger [9]. Typical anterior muscles the ankle joints are the tibialis anterior muscles, and the typical posterior muscles the ankle joints are the calf muscles and the gastrocnemius muscles. The muscles that constitute the anterior and
posterior of the ankle joint are important muscles that move the body in the flat area. Moreover, in the sloping place, it helps to walk smoothly through interaction.

Therefore, in this study, we investigate how the ankle muscles of the anterior and posterior muscles cooperate with each other smoothly in a flat, sloping uphill or downhill situation.

**MATERIALS AND METHOD**

**Subjects**

The subjects were college students from Shinsung University in Dangjin, Chungnam, South Korea. The subjects were 20 young college students (M = 10, F = 10) who were 21 ~ 25 years old who had no orthopedic and neurological lesions and had no problems in gait. The subjects of the study were asked to explain and consent to the protection of personal information, to explain the experimental method, purpose, and safety issues and agreed in writing to participate voluntarily. This study adheres to the Helsinki Declaration of Medical Research Ethics.

**Research design**

The subjects measured MVIC(Maximum Voluntary Isomeric Contraction) of the tibialis anterior and medial gastrocnemius and measured the muscle activity of the anterior tibialis and medial gastrocnemius after walking on the treadmill at downhill10°, flat and uphill 10°.

%MVIC was calculated using generalized muscle activity(muscle activity / MVIC ×100), and %MVIC of the tibialis anterior and medial gastrocnemius were compared at downhill10°, flat and uphill 10° in Table1.

**Table 1. Research design**

<table>
<thead>
<tr>
<th>Group</th>
<th>Recruitment</th>
<th>MVIC</th>
<th>Muscle activity</th>
<th>Standardization</th>
<th>Data analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>One group</td>
<td>n=20</td>
<td>Phase1 (5sec)</td>
<td>Relaxation 3 (30sec)</td>
<td>Treadmill (60sec)</td>
<td>%MVIC</td>
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<tr>
<td></td>
<td></td>
<td>Tibialis anterior</td>
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<td>Repeated measures ANOVA</td>
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<tr>
<td></td>
<td></td>
<td>Medial gastrocnemius</td>
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<td></td>
<td>Downhill10°</td>
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<tr>
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<td></td>
<td></td>
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<td>15~20sec</td>
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<td>20~25sec</td>
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<td></td>
<td>30~35sec</td>
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<td></td>
<td></td>
<td></td>
<td>Flat10°</td>
<td>15~20sec</td>
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<td>Uphill 10°</td>
<td>15~20sec</td>
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<td></td>
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<td>30~35sec</td>
</tr>
</tbody>
</table>

**Intervention**

The subjects first attached electrodes for MVIC(Maximum Voluntary Isomeric Contraction) measurement of the anterior tibialis muscle and medial gastrocnemius muscle. In order to measure the MVIC of the tibialis anterior, the medial gastrocnemius was fixed on the floor while sitting on a chair, and exercises were performed five times to dorsiflexion and plantarflexion of the foot. Then, the maximal dorsiflexion and plantarflexion were performed in the fixed state of the foot, and the muscle activity was measured for 5 seconds. The average value of 3 seconds except for 1 second before and after the measured value was used, and the average value measured 3 times was used in the same way and 60 seconds rest interval between measurements was given.

To measure the MVIC of the medial gastrocnemius muscle, the ankle joint was flexion 90° with the flexion 90° of the hips with the ground fixed to the wall. After this, the muscle activity was measured for 5 seconds after 5 exercises so that the plantarflexion of the ground was maximized. At this time, the chair was fixed so as
not to be pushed backward. The average value of 3 seconds except for 1 second before and after the measured value was used, and the average value measured 3 times was used in the same way and 60 seconds rest interval between measurements was given. The subjects then measured the muscle activity of the tibialis anterior and medial gastrocnemius muscles at downhill10°, flat and uphill10° on the treadmill. At this time, the subjects were randomly mixed downhill10°, flat, uphill10°. Subjects walked on the treadmill for 1 minute. Electromyogram signals were collected between 15 and 20 seconds, 20 to 25 seconds, and 30 to 35 seconds after the gait, and the average of 3 seconds was used except 1 second for each of the front and back. The mean value was used after three measurements with the same procedure.

Measurement of muscle signals

For this study, myoRESEARCH 3(Noraxon, Arizona USA) was used as a wireless surface EMG system as seen in Figure 1. The surface EMG electrode was attached to two active electrodes and one reference electrode, one 40 mm wide and 20 mm long disposable electrodes. The surface of the skin to which the electrode was to be attached was shaved, and then the electrode was attached after wiping with alcohol cotton. The active electrode of the tibialis anterior was attached to the 5cm area beneath the tibia tuberosity at intervals of 2cm, and the reference electrode was attached to the 3cm side of the active electrode. The active electrode of the medial gastrocnemius was attached to the 9 cm area under the medial condyle at intervals of 2 cm, and the reference electrode was attached to the 3 cm side of the active electrode. The sampling rate of the EMG signal was set to 1,000 Hz and the frequency bandwidth was 10 to 350 Hz. The raw data were rectified and the RMS values were measured by smoothing.

Statistical analysis

The purpose of this study was to analyze the activity of the ankle muscle during uphill, downhill, and flat walking, using one way repeated measure ANOVA and the statistical program was SPSS 12. 0 (SPSS Inc. USA, Chicago, IL). Statistical significance was 0.05

RESULTS AND DISCUSSION

Subject characteristics

A total of 20 participants were male and 10 female. The average age of male was 22.20±2.29 years, the average weight was 68.90±12.56 kg, the average height was 175.10±5.98 cm, the average age of female was 21.95±1.70 years, the average weight was 60.70±6.61 kg, and the average height was 161.30±4.21 cm.

Comparison of ankle joint muscle activity during gate downhill 10°, flat and uphill 10°

The comparison of muscle activity at downhill 10°, flat, uphill 10° for the subjects was as follows. There was no difference in the tibialis anterior and medial gastrocnemius in the flat and downhill 10°. There was a statistically significant difference between the flat and uphill 10°, downhill 10° and uphill 10°(P<0.05) in Table 2, Figure 2.

Table 2: Comparison of muscle activity downhill10°, Flat, Uphill10°

<table>
<thead>
<tr>
<th></th>
<th>Downhill10°</th>
<th>Flat</th>
<th>Uphill10°</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tibialis anterior</td>
<td>10.61±6.09</td>
<td>10.20±6.51</td>
<td>14.23±8.19</td>
<td>10.679*</td>
</tr>
<tr>
<td>Medial gastrocnemius</td>
<td>27.56±25.22</td>
<td>30.61±24.29</td>
<td>37.35±29.73</td>
<td>12.490*</td>
</tr>
</tbody>
</table>

*p<0.05

Fig. 1. Surface ENG system(myoRESEARCH 3, Noraxon, Arizona USA)

Fig. 2. Comparison of muscle activities(%MVIC) downhill 10°, flat and uphill10°
DISCUSSION

This study was carried out to investigate the activity of the ankle muscles according to the slope of the ground during walking. The ankle muscles must interact essentially for balance and movement during walking, and the coordination of the ankle muscles plays a role in controlling the fine movement in standing postures so that the center of gravity does not deviate from the body [10]. It has been reported that there is a significant difference in the strength of the flexion muscles of the ankle joints of those who experienced and those who did not experience falling [11]. In particular, gastrocnemius, an ankle plantarflexion muscle and tibialis anterior, an ankle dorsiflexion muscle, which cooperate with each other, affect the quality and quantity of gait. Therefore, in this study, we compared the muscle activity of the anterior tibialis and gastrocnemius.

Treadmills are widely used for gait measurement and training. Treadmill walking is commonly used for the study of constant gait speed and different ground slope or pattern, and it is used as a rehabilitation tool especially for the elderly and patients. Treadmill training, which is widely used for gait training, is applied as a weight training gait training. Weight training treadmill is used not only for standing but also reinforcement of strength, balance [12] the subjects who were able to walk independently at the time of treatment reported that weight-bearing treadmill walking was effective in improving walking [13]. The treadmill has been mainly used in various experiments because it can control the exercise load by changing the rotation speed or the inclination, so that it can control the exercise load accurately and repeated measurements have been used for various experiments because of the advantage of being able to apply a resistance at the start of the test [14]. In this study, we also investigated the activity of ankle joint muscles by changing the slope of the support surface using a treadmill.

In this study, muscle activities of the tibialis anterior and medial gastrocnemius were measured by using the treadmill slope to the flat and uphill and downhill conditions during gait. The tibialis anterior showed 10.61% MVIC at downhill 10° and 14.23% MVIC at uphill 10° at 10.20% MVIC in the flat 10°. There was no difference tibialis anterior %MVIC between flat 10° and downhill 10°. Because the main action of the tibialis anterior is the flexion and inversion of the ankle joint, it is thought that there was no difference between the flat surface and the downhill 10°. However, there was a significant increase in the uphill 10° from the flat and the downhill 10° (P<0.05). This shows an increased %MVIC compared to the flat and downhill due to an increase in concentric contraction force for the dorsiflexion. These results suggest that the tibialis anterior requires more muscle contraction force when walking uphill than the flat and downhill. Kim et al. [15] compared muscle activity with treadmill inclination and foot arches, and increased tibialis anterior activity at uphill 5°, 10°, and 15°. Especially, it showed the highest muscle activity at uphill 15°. Han et al. [16] and Kim et al. [17] and Na et al. [18] also showed that the tibialis anterior activity in the uphill increased. Yoon et al. [19] found that the dynamic range of motion of the ankle joint was significantly different according to the slope. Especially, the dynamic range of motion of the ankle joint was significantly increased with the increase of the ascending slope. These results show that the dynamic range of motion is increased by increasing the tibialis anterior activity during the ascending slope.

The medial gastrocnemius showed 27.56% MVIC at downhill 10° and 37.35% MVIC at uphill 10° at 30.61% MVIC in the flat. The %MVIC decreased on the downhill 10° compared to the flat, but it was not statistically significant. However, there was a significant increase in the flat and downhill 10° compared to the uphill 10° (P<0.05). In the study of Kim et al. [15] the muscle activity of gastrocnemius was slightly increased in the downhill, but it was not statistically different. The main action of gastrocnemius is to plantarflexion. Gastrocnemius is thought to gently contract to increase balance and stability rather than to exercise with strong contractile force, especially on walking downhill. It also shows increased muscle activity when compared to downhill 10° and uphill 10°. This suggests that the gastrocnemius is antagonist muscles to the eccentric contraction and increases the stability of the back of the ankle joint.

It is essential to understand the factors for falling risk because downhill gait can cause the possibility of slipping and loss of balance and the risk of falling [20].
the one hand, uphill walking requires a lot of energy and requires the union of several joints. In this study, % MVIC of the tibialis anterior and medial gastrocnemius was used to compare muscle activity in the flat and downhill, uphill. It shows that the tibialis anterior and medial gastrocnemius muscular activity is increased at uphill10° as compared with flat and downhill10°. This shows that the muscles around the ankle joint require more muscle activity during the uphill. Therefore, normal interactions between the anterior tibialis and the medial gastrocnemius may be necessary for uphill walking.

CONCLUSION

This study compared the muscle activity of the tibialis anterior and the medial gastrocnemius at the flat, uphill10° and downhill10°. The tibialis anterior and gastrocnemius showed more muscle activity when walking uphill10° compared with walking on flat and downhill10°. Therefore, coordinated muscle action of the tibialis anterior and medial gastrocnemius is essential for a functional and stable gait that can walk on rugged, uneven ground.

Ethical Clearance: Taken from Shinsung University

Conflict of Interest: NA

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REFERENCES


Empowering Information Subject to Control Information Use to Protect Personal Information

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ABSTRACT

Background/Objectives: The development of IoT contributes to individual's generating diversified information, who is the subject of the information, and providing various services by analyzing generated information.

Method/Statistical analysis: As sensitive information, such as medical record, preferences, and gene information is not easy to be managed by individuals, it should be administered depending on trusted authority. However, in the case of entrustment of one's information to an authority, there is possibility for the user on the authority to abuse the information. Besides, when stored information is leaked, second and third damages can be incurred.

Findings: For security, personal information is encrypted using symmetric key but there is possibility of leakage and access from insiders because the key has to be stored inside to be decrypted. Providing sensitive and important information in an encrypted form to an authority and authorizing information subject to decrypt the information, we propose a method that allows one to access only when there is consent of the individual and the use of the information is requested by the authority.

Improvements/Applications: Four methods to protect personal information stored in the ways based on symmetric and public key are presented. We compare and analyze four methods to allow an authority to choose a method suitable to its characteristics.

Keywords: Personal Information, Encryption, Public Key, Privacy Protection, Subject Control

INTRODUCTION

In the era of IoT, communication among many electric devices has been vitalized. With this, diversified personal information is generated and new information has been continually increasing with combination of information. With analysis of data, individual's character and preferences can be inferred and predicted. Moreover, the development of technology and usage of gene information opened an age where a disease can be predicted. As information generated in this way is sensitive and difficult for an individual to manage, personal information is stored, managed, and served by an organization or a company that generate information.

However, there is an issue how to administer stored information with possible second and third damages by information leakage and violation of privacy. Also, there have been studies whether to authorize an individual with subject control on stored information¹.

In particular, with news of hacking and information leakage, mistrust in authorities that administer and store sensitive and important personal information has been increasing. Since there are many cases of personal information leakage by insiders of organizations, they apply encryption and access control technologies to important personal information. However, as the key is managed in the organization, encrypted, there is possible leakage by a user authorized to have the key²,³. When personal information is encrypted not by symmetric key but public key, as personal information is encrypted with public key and the personal key is managed by an individual, it can be safely managed.
There is necessity to consider not only security across all the process in developing a system but privacy 4. Figure 1 shows an architecture considering privacy with an emphasis on the method and related technologies necessary for all the process to collect, store, use, and discard information4-6.

Proposed method provides important and sensitive information of an individual, who is the information subject, for an organization after encoding and the organization doesn’t have decoding key; Access to information is difficult and when the organization needs to use information it requests information from the information subject.

Chapter 2 describes related studies of encryption technologies and privacy, Chapter 3 introduces a method to encrypt personal information and to authorize the information subject to have control, Chapter 4 compares and analyzes proposed method with others, and we make a conclusion in the end.

RELATED WORK

Encryption Technology

Symmetric encryption algorithm with its simple computing has fast decoding speed and it is usually used in encoding data; typical algorithms include DES and AES7. The key a sender use to encrypt and a receiver to decrypt is identical (Figure 2). Because the safety of encrypted information depends on the length of the key, for high safety, the length tends to be longer. However, as the length gets longer, the speed to encrypt and decrypt gets slower.

The organization to store and manage information usually generates symmetric key to encrypt information and separately manages the used key. As separately managed, it is safe from unauthorized users and information leakage because of encryption but the leakage by an insider who has the authority to access the key.

Public encryption algorithm, which was suggested to solve key exchange problem of symmetric key encryption algorithm, generates two different keys to encrypt or decrypt information7. In other words, two keys generated by an individual are paired: public key to be provided for the opponent and private key secretly managed by the individual.

Public key encryption algorithm is used in sending symmetric key or in particular situation such as electronic signature. That is because the length is extended for security and the speed to encrypt and decrypt is slow because of difficult encryption method. When a sender transmits information with receiver’s public key to safely transmit the information, the receiver can confirm the information after decoding with his private key (Figure 3).
Considering specificity of personal information, protection methods to differently deal with personal policies from other information have been studied. There is a method to efficiently generate personal policy based on service.

**Proposed Method**

Utilizing encryption technologies, we try to propose a model to authorize an individual, the information subject, to control to decrypt sensitive information that is decrypted with the aim of administration. As an individual originally has the key to decrypt with this proposed method, encrypted sensitive information can only be accessed under clear consent of the individual. When encrypted information is required to be used in an organization and the individual consents, the individual decrypts with his private key and transmits decrypted information to the organization so that the information is safely used.

**SBKT (Symmetric key based Key-Transmission Method)**

Figure 4 shows the method that decrypts personal information by symmetric key to provide it for an organization and the organization requests the key from an individual.

The individual, who is the information subject, generates symmetric key to decrypt personal information and it is provided for the organization with the hash value of the key. The organization stores personal ID, hash value, and encrypted information. In order for the organization to provide services for the individual, the organization requests the key from the individual, the information subject. The individual provides the organization with the symmetric key via secure channel using SSL protocol. After comparing provided key with the hash value, decrypted personal information is used. After using, encrypted information and symmetric key are discarded.

![Fig. 4.Decryption method of encrypted information base on symmetric key in organization](image)

**SBIT (Symmetric key based Information-Transmission Method)**

Figure 5 is the method to provide important information by encrypting for an organization and to provide information by encrypting information without individual’s transmitting of the key in the case of information usage.

Figure 5 decrypts generating the key shown as Figure 4 and encrypted information is stored in the organization.

When the organization needs to use information, it does not request the key but provides personal information and hash value for the individual. The individual decrypts encrypted information only when they match after comparing his key with the hash value. Decrypted personal information is provided for the organization via secure channel. The organization discards personal information after using information.

![Fig. 5.Method to transmit information encrypted based on symmetric key by decoding](image)

**PBKT (Public key based Key-Transmission Method)**

Figure 6 is the method with which an individual encrypts with symmetric key and provides information by encoding the key with public key to block symmetric key leakage and provides information for an organization by decoding the symmetric key when using information.

The individual, information subject, generates a symmetric key and a private key. Generating a symmetric key to encrypt important personal
information, he encrypts his information with the key and provides the key for the organization after encrypting it with his public key. In other words, he provides encrypted personal information and encrypted key. The organization stores two encrypted texts into DB and provides encrypted symmetric key for the individual when information usage is needed and requests decryption of the key. The individual decrypts encrypted symmetric key with his private key. The individual provides the organization with decrypted symmetric key via secure channel. The organization discards personal information and the key after using information decrypted by the symmetric key.

In Figure 7, like Figure 6, the individual, who is the information subject, encrypts his information with symmetric key and the key is encrypted with his public key. Encrypted information including personal information and the key is provided for the organization. Using information, the organization presents two encrypted texts to the individual. The individual decrypts encrypted symmetric key with his private key. The individual decrypts personal information encrypted using decrypted symmetric key. Decrypted personal information is provided for the organization via secure channel. The organization discards personal information after using information.

**PBIT (Public key based Information-Transmission Method)**

Figure 7 is the method with which an individual decrypts information with symmetric key, provides the key encrypted by his public key, and provides important information in using information.

**Comparative Analysis and Discussion**

As technologies of organizations and companies that store and manage personal information to protect information, there are policy based access control and DB encryption technologies.

Table 1 is comparative analysis on RBAC technology, which is access control technology based on user role, with four methods.

<table>
<thead>
<tr>
<th></th>
<th>RBAC</th>
<th>SBKT</th>
<th>SBIT</th>
<th>PBKT</th>
<th>PBIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information Encryption</td>
<td>Optional</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Against leakage by insider</td>
<td>weak</td>
<td>Strong</td>
<td>strong</td>
<td>strong</td>
<td>Strong</td>
</tr>
<tr>
<td>Consent of information subject</td>
<td>Optional</td>
<td>Necessary</td>
<td>Necessary</td>
<td>Necessary</td>
<td>Necessary</td>
</tr>
<tr>
<td>Encrypted key transmission</td>
<td>X</td>
<td>O</td>
<td>X</td>
<td>O</td>
<td>X</td>
</tr>
<tr>
<td>Personal PW key management</td>
<td>-</td>
<td>weak</td>
<td>weak</td>
<td>strong</td>
<td>Strong</td>
</tr>
</tbody>
</table>
In the case of the leakage, existing models are optional to encrypt stored information but proposed model basically provides information encrypted by the individual for the organization.

Because information is encrypted, abuse by insiders is not possible unless the key is obtained. In addition, when using information, as for the procedure to ask for the consent of the individual, the information subject, although RBAC which is one of existing models requires consent in the information collection step or in using important information, information use without the consent of the individual is not possible because, with the proposed method, the key and information should be given by the individual. Depending on the proposed method, he may provide encryption key or decryption information. When encrypting with symmetric key based method, there is necessity for the individual to manage used symmetric key. However, because symmetric key is encrypted by public key, the symmetric key is identified by personal private key.

CONCLUSION

Sensitive personal information generated with ICT development is provided, stored, and managed by organizations considering convenience, security, credibility of administration. However, as abuse of personal information stored in organizations and leakage cases by insiders have occurred, people worry about privacy violation.

It is the moment to develop a method by which an individual solves the problem to manage important information like gene information, provides it for the organization, and the organization is able to use it under the consent of the individual. It is necessary to study a method to conform whether the organization discards information and used key after using information. If personal sensitive and important information once were encrypted and managed without any change, the fixed key could be decrypted.

As a future study, technology to verify whether an organization discards the information and the key after using information and a disposable key usage method should be dealt with.

Ethical Clearance: Taken from Kangwon National University.

Conflict of Interest: NA

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Global Warming and Carbon Sequestration: Role of Carbonic Anhydrase in Carbon Capturing

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ABSTRACT

Developing countries in the world are in the process of raising their economy and need more energy. As a result the exploitation of fossil fuels, mostly huge coal reserves, is becoming unavoidable, leading to the anthropogenic emission of major greenhouse gases, mainly carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), ozone (O3), and chlorofluorocarbons (Intergovernmental Panel on Climate Change [IPCC], 2007). These greenhouse gases are strongly and steadily contributing toward the warming of earth’s surface by the absorption of infrared radiations. CO2 is one of the major contributors to the warming of the earth among all the greenhouse gases. Anthropogenic emission of CO2 is continuously rising all over the world. Hence this review is focused on carbon emission and carbon sequestration by microalgae.

Keywords: Microalgae; Carbon Sequestration; Global Warming.

INTRODUCTION

During the decade of 1990–1999, an average increase in atmospheric CO2 level was 1.1% per year, and it rose to over 3% per year from 2000 to 2004. Recent literature envisages that the global temperature is expected to rise by 4°C by 2100. According to the Intergovernmental Panel on Climate Change (IPCC) report, warming of about 0.1°C per decade would be expected even if the concentrations of entire greenhouse gases and aerosols had been kept constant at the levels reported for the year 2000.

It is generally recognized that the visual effects of the constantly increasing CO2 concentration on the earth can be seen in the form of more violent storms, changes in the course of Gulf stream, increasing temperature of the earth, melting of the polar ice sheets, and elevated sea levels. These climatic changes are likely to affect human health with respect to cardiorespiratory disorders and heat wave–related disorders. In addition, psychological and social instability may possibly rise in the affected areas. Geographical distribution of vector organisms such as malaria mosquitoes may increase because of increase in ambient temperature (McMichael et al., 2006). Therefore, an immediate and considerable reduction in CO2 emission through carbon management is required to prevent a worst case situation pertaining to global climate change.

Carbon capture mechanism

In the past decade, various carbon management strategies have been employed and the same can be achieved using three different but complimentary approaches such as (a) efficient energy conversion, (b) utilization of low-carbon or carbon-devoid energy sources, and (c) CO2 capture and its sequestration. It is commonly accepted that the first two options will only provide incremental improvements. Therefore, there is an urgent need to develop appropriate and efficient carbon sequestration technologies to reduce CO2 emissions in the environment (Maroto-Valer et al., 2005).

The most common CO2 sequestration approaches include use of chemical/physical solvents, adsorption onto solids, membranes, cryogenic/condensation
systems, geological sequestration, and deep ocean sequestration. The utilization cost has proven to be highly expensive for the previously mentioned approaches. Therefore, scientists are focusing more on the development of economic and sustainable technologies for CO$_2$ sequestration. In this regard, the enzymatic sequestration of CO$_2$ into the mineral carbonation seems to be one possible promising approach.

Sequestration of CO$_2$ to mineral carbonates offers the prospect of a safe, steady, and environmentally friendly product for long-term carbon sequestration, as considerable carbonate mineral reservoirs have existed for millions of years, provided the cheap and large-scale appropriate cation supplies (e.g., Ca, Mg) are available. On a geological time frame, CO$_2$ sequestration into mineral carbonates is a laborious and slow process. In order to make the reaction faster under a conducive environment, which progresses through the hydration of CO$_2$, an enzyme known as carbonic anhydrase (CA) is employed. CA is a metalloenzyme containing zinc (Zn$^{+2}$) metal ion in its active site, encoded by almost all organisms including eukaryotes and prokaryotes, and catalyzes the reversible hydration of carbon dioxide (CO$_2$) into bicarbonate ions (HCO$_3^-$). This enzyme accelerates CO$_2$ hydration dramatically provided the pH is above the pKa of CO$_2$/HCO$_3^-$ equilibrium. The most active CA hydrates CO$_2$ at rates as high as $k_{cat}= 10^6$ s$^{-1}$, or a million times a second.

**Carbonic anhydrase: historical and recent progress**

CA is an ancient enzyme, widespread among the entire prokaryotic and eukaryotic domain, and has been known to catalyze the reversible hydration of carbon dioxide (Tripp et al., 2001) as follows:

$$[\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{HCO}_3^- + \text{H}^+]$$

The discovery of the CA enzyme is attributed to Meldrum and Roughton who characterized the enzyme for the first time as a result of curiosity for knowing the factors responsible for the rapid transit of the HCO$_3^-$ from erythrocytes to the pulmonary capillary. Even though CA was discovered in 1933, the absolute purification was achieved only in the late 1930s from bovine erythrocytes (Keilin and Mann, 1944). The entire discoveries and advancements regarding the fundamental studies of CA were not in the domain of scientific community working with bioenvironmental sciences until the 1990s.

Keilin and Mann (1944) identified that CA is the first zinc metalloenzyme containing zinc metal ions in its active site and Zn ions has the specific role in the reaction(s) catalyzed by CA. A +2 charge on Zn ion attracts the oxygen of water molecule and thus helps in bringing the water and carbon dioxide in close proximity with each other. Binding of water molecules to zinc lowers the pKa of water and promotes removal of proton, leaving zinc bound to a hydroxide ion, which is a strong nucleophile (Berg et al., 2007; Campbell and Reece, 2005). It has been reported that the CA of plant origin has no similarities to previously known classes of CA with respect to the size. However, this enzyme has shown decreased sensitivity to sulfonamide inhibitors.

Three decades after the discovery of CA in eukaryotes, Veitch and Blankenship (1963) for the first time, reported the CA enzyme in prokaryotes. This enzyme was found to share the properties with human CA. Advancements in the prokaryotic CA related studies were very slow and it took almost a decade when the first prokaryotic CA was reported to be purified from *Neisseria sicca* in 1972. It took another two decades for availability of the first report on sequence of CA from microbial origin. The first sequence of CA in prokaryotes was reported in 1992 from *Escherichia coli* (Guilloton et al., 1992). *cynT* has been identified as the gene encoding for CA in *E. coli* and found to be the active element of cynate operon along with the two other genes (*cynS* and *cynX*). The gene encoding for cyanase (*cynS*) and gene encoding for the protein of unknown function (*cynX*) collectively catalyze the cyanate conversion to NH$_4$ and CO$_2$. The first product (NH$_4^+$) is utilized as the source of nitrogen and the second product (CO$_2$) is made available for the cellular processes and for making HCO$_3^-$ accessible for the catalysis of cyanate. In the previous reaction, CA plays an important role in catalyzing the hydration of CO$_2$ to HCO$_3^-$ and thus helps in maintaining the cellular function and prevents the growth inhibition by cyanate.

Further research led to the discovery of new classes of CA. Carboxysomal CA, designated as CsoS3, was
purified and sequenced from the carboxysomal shell of the chemolithoautotroph *Halothiobacillus neapolitanus*. The molecular weight of the enzyme, calculated from its primary structure, was 57.3 kDa. This enzyme was found to have two domains as a result of gene duplication and only one of the domains was characterized for the functional Zn²⁺ binding site. This shell protein was initially classified as the δ-class of CA because it showed significant difference in sequence compared to the previously known classes of CAs such as α, β, γ, and δ (Tripp et al., 2001; Anthony et al., 2004). On the contrary, crystal structure of the same revealed that it is a new subclass of δ-CA representing the distinct active site as is confined to only a single domain of the enzyme, while in other δ-CA, pair of active sites is organized within the two different domains. Despite this divergence in active site confinement, there is remarkable structural similarity among active site regions of CAs and hence it is suggested that the CAs have common catalytical mechanism for the interconversion of HCO₃⁻ and CO₂ (Sawaya et al., 2006). Marine cyanobacteria *Prochlorococcus* sp., and *Synechococcus* sp. also contain these CAs in their carboxysomal shells. There is a diffusion barrier to gases because of carboxysomal shells. CA in the shell plays an important role in transporting and converting the HCO₃⁻ into CO₂ inside the carboxysome where the CO₂ is used by ribulosebiphosphate carboxylase (Rubisco) (Heinhorst et al., 2006).

**Carbonic anhydrase: mechanism of action**

The catalytic mechanism of the CAs, especially alpha-CAs, has been extensively studied. It follows a two-step isomechanism. From the evidences it has been suggested that CO₂ hydration is initiated by the nucleophilic attack of zinc-bound hydroxide ion on the carbon atom of CO₂. In the next step, the enzyme undergoes regeneration of active site by the ionization of zinc bound water molecule and causes removal of proton from the active site. Active site consists of a Zn (II) ion coordinated by three histidine residues and a water molecule/hydroxide ion. The latter is the active species, which acts as a potent nucleophile. Although some β-class enzymes do not have water directly coordinated to the metal ion[19] the zinc hydroxide mechanism is also valid for β and β CAs (Domsic, 2010; Supuran, 2008).

The stepwise catalytical mechanism of CA for hydration of CO₂ is explained as follows:

- A zinc prosthetic group in the enzyme is coordinated in three positions by histidine side chains. The fourth coordination position is occupied by water. This causes polarization of the hydrogen-oxygen bond, making the oxygen slightly more negative, thereby weakening the bond.

- The fourth histidine (not coordinated to Zn) is placed close to the substrate of water (Zn-water ligand) and accepts a proton—an example of general acid–general base catalysis. This leaves a hydroxide attached to the zinc.

- The active site also contains specificity pocket for carbon dioxide, bringing it close to the hydroxide group. This allows the electron-rich hydroxide to attack the carbon dioxide, forming a bicarbonate ion (Domsic, 2009).

**Carbonic anhydrase alternative tool for CO₂ sequestration**

The industrial revolution is leading to the emission of CO₂, one of the major anthropogenic greenhouse gases. The concentration of CO₂ has increased by 40% from the preindustrial level, which is analogous to a concentration rise from 280 to 360 ppm (Mirjafari et al., 2007). CO₂ is the reaction by-product of combustion, without any fuel value, and is of environmental concern because it has been identified as the major contributor to the phenomenon of global warming, on which humanity may be able to have an action[20]. Therefore, the issue of reducing the emission of CO₂ to the atmosphere is of serious concern.

Various methods available for reducing the emission and sequestration of CO₂ to the atmosphere are proving costly. An eco-friendly and cost-effective approach for CO₂ sequestration has been developed by exploiting the ability of CA to catalyze the reversible hydration of CO₂. The hydration reaction of the aqueous CO₂ occurs independently without the use of CA. As a result, solid calcium carbonate is produced in the presence of calcium ion. The reactions are depicted as follows:
1. The aqueous CO\(_2\) and water react to give proton and bicarbonate ion:

\[
\text{CO}_2 (\text{aq.}) + \text{H}_2\text{O} \rightarrow \text{H}^+ + \text{HCO}_3^- \quad (1)
\]

Where, \(K_1 = [\text{CO}_2] / [\text{H}^+] \cdot [\text{HCO}_3^-]\)

\(K_1 = k_1 / k^{-1}\).

2. Carbonic acid then dissociates to bicarbonate and carbonate ions:

\[
\text{HCO}_3^- \rightarrow \text{H}^+ + \text{CO}_3^{2-} \quad (2)
\]

3. In the presence of Ca\(^{2+}\) cations, CaCO\(_3\) precipitates as follows:

\[
\text{Ca}^{2+} + \text{CO}_3^{2-} \rightarrow \text{CaCO}_3 \quad (3)
\]

At 37\(^\circ\)C near neutral pH, the second-order rate constant (\(K_1\)) is 0.0026 M\(^{-1}\) s\(^{-1}\) where \(k_1\) and \(k^{-1}\) values are 6.2 \(\times\) 10\(^{-2}\) s\(^{-1}\) and 23.7 s\(^{-1}\), respectively. Whereas the equilibrium constant of reaction 2 (\(K_2\)) is equal to 1.7 \(\times\) 10\(^{4}\) (Mirjafari et al., 2007). Among the entire reaction series for the precipitation of CaCO\(_3\) (Reactions 1–3), the hydration of CO\(_2\) to form carbonate ion and proton (Reaction 1) forwards with an extremely slow pace and is the ratelimiting step. When the biocatalyst CA is employed to catalyze the hydration of CO\(_2\) (Reaction 1), the rate of hydration increases dramatically, making the reaction much faster, and hydrating CO\(_2\) at rates as high as 1.4 \(\times\) 10\(^6\) M/s\(^{-1}\). Likewise, the CA enzyme plays a major role in making the reaction much faster and thus plays a vital role for CO\(_2\) sequestration.

**CONCLUSION**

On an industrial scale, algae are usually grown in either open ponds, including raceway ponds, or photobioreactors. Open ponds are simpler to design and construct, however, they are limited by large surface area requirement, high cultivation costs, low biomass productivity, and contamination. To overcome these problems, the use of closed system cultivation such as photobioreactors has been proposed (Kumar et al., 2011). Kumar et al. (2011) provided a detailed review on photobioreactor design and challenges of industrial-scale algal cultivation. Fue gas constitutes one of the main sources of CO\(_2\) for algal cultivation but its high temperature, varying composition and the presence of sulfur and nitrogen oxides pose major problems for efficient culture. Such operating conditions also necessitate careful selection of a suitable algal strain. Light intensity is another major consideration as insufficient amount of light results in poor growth while excessive light intensity is likely to induce photo inhibition. Even when the intensity of incident light is fully optimized, individual cells are exposed to varying amounts of light unless adequate mixing is provided. The mixing of cell culture requires a considerable energy input and, consequently, constitutes a significant portion of the total operating cost. Oxygen accumulation can be problematic as trapped oxygen is likely to reduce photosynthetic efficiency. These are only a few examples of the challenges that we face in order to improve the economic viability of the bioprocess.

**Ethical Clearance:** Taken from, AMET University.

**Source of Funding:** Self

**Conflict of Interest:** NA

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Biocatalytic capture of CO$_2$ with carbonic anhydrase and its transformation to solid carbonate. *Journal of Molecular Catalysis B: Enzymatic*, 60, 163–170.


Halophytes and their Salt Adaptation in Different Marine Ecosystems

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ABSTRACT

Halophytes are a term used to indicate the plants adapted in salty habitat include Coastal sand dunes, saltmarsh, mangrove and deserts. This type of adaptation induces the secondary metabolite production in halophytes. Among these some halophytes were utilized as traditional medicine. Therefore the study of halophytes of different habitat is important in current research.

Keywords: Halophyts, Coastal Sand Dune, Saltmarsh, Mangrove, Secondary Metabolites

INTRODUCTION

The fundamental thing every organism to survive, they adapt themselves to current environmental changes. Hence organisms evolved with different characteristics compared with ancestor of these same organisms. Likewise, plants adapted to salt enriched environment which occurred during fluctuation of environmental factors (e.g. flood of sea water into the inland of earth, increasing dry and temperature condition of climate). The adaptation can be anatomical changes of plants or biochemical changes of plants to tolerate in that salt habitat. Such plants are generally known as halophytes. The halophytes occur in three subclasses of angiosperms of plant taxonomic divisions [1]. In monocotyledons, halophytes are rare in the Alismatidae and clustered in a few related families in the Commelinidae; in the remaining angiosperms (dicotyledons), halophytes are found in fewer than 50% of families in the Carophyllidae (primarily within the Chenopodiaceae). Euhalophytic members of the Chenopodiaceae include Suaeda and Atriplex. The salt tolerance among monocotyledonae and dicotyledonae angiosperms evolved frequently and separately. Adaptation to salinity has repeatedly occurred due to the palaeoclimate and environmental history of the earth selective pressure involved.

Halophytes and types

The term halophytes are defined as the plants that can complete their life cycles [2] in habitats that have moderate to high concentrations of salts in their soils and the scientists divide the growth response to salinity of plants into four groups [3] (Table.1). Halophytes grow in a wide variety of saline habitats, from coastal sand dunes, salt marshes and mudflats to inland deserts, salt flats and steppes [4].

Table.1. Halophytes described as four groups by Greenway and Munns, (1980).

<table>
<thead>
<tr>
<th>Group IA</th>
<th>Group IB</th>
<th>Group II</th>
<th>Group III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Euhalophytes</td>
<td>Miohalophytes</td>
<td>Halophytes and salt-sensitive nonhalophytes</td>
<td>Salt-sensitive nonhalophytes</td>
</tr>
<tr>
<td>It have optimal growth (i.e., salt-stimulated growth) at moderate salinities (100–300 mmol/L NaCl) and continue to grow and survive in salinities up to 700 mmol/L.</td>
<td>It has optimal growth at very low salinities and continues to grow at reduced rates even at higher salinities.</td>
<td>Halophytes and nonhalophytes, growth is greatly reduced even at moderate salinity, and salinities over 300 mmol/L are lethal.</td>
<td>It cannot survive when grown at salinities over 100 mmol/L.</td>
</tr>
</tbody>
</table>

Halophytes origin and their adaptation to salt habitats

Paleontological and molecular evidence suggest embryophytes arose from the Streptophyta rather than the Chlorophyta; from charophyte green algae [5] in the Ordovician period, some 450 million years ago which are supported to understand the halophytes evolution. The origin of these early embryophytes is crucial to the origin of salt tolerance in land plants as
it could have evolved from species that lived in fresh or salt water: by the time the first transition of plants to a terrestrial environment occurred, the seas were saline \[6\], even if a little less so (26–29 g per 1000 g seawater) than today’s oceans (30–40 g per 1000 g seawater).

Coastal salt marshes represent saline habitat with tidal flooding by sea water. Likewise, hot and dry conditions occurred repeatedly and possibly with long duration, caused increased soil salinity in huge inland areas of the continents. During that period of arid climate, soil salinity exceeding salinity levels of sea water approximately 500mM NaCl may have triggered evolution of high-salt tolerance in Salicornioideae, Chenopodioideae\[7\]. As per Flowers et al. 1977 contribution, the basic nature of halophyte salt tolerance was described in a review article in 1997 and it has been updated in 1986 – 1988 respectively. Halophytes use the controlled mechanism of uptake Na+ ions into cell vacuoles by balanced Cl– ions and other anions to drive water into the plant against low external water potential. The most common observation is that functional salt tolerance requires a series of integrated adaptations connecting cellular systems, tissues and the whole plant (Cheeseman, 1988; Leach et al., 1990; Flowers and Yeo, 1995). The removal of sodium from the cytoplasm or compartmentalization in the vacuoles is done by a salt-inducible enzyme Na+/H+ antiporter (Apse et al. 1999). Inclusion of ions in the cytoplasm can lead to osmotic adjustment that is generally accepted as an important adaptation to salinity (Guerrier, 1996). Molecular biologists predict basic biochemical tolerance mechanisms, related through the effects of water deficit and osmotic stress on cellular processes, may be sufficient to give tolerance (Bohnert et al., 1995; Serrano, 1996; Serrano and Gaxiola, 1994; Zhu et al., 1997).

Coastal Sand dune habitat

Coastal sand dune habitats are exclusive ecosystem due to their ecological diversity and the occurrence of many rare and endemic species (Carboni et al., 2009; Feagin et al., 2005). Coastal dune formation ultimately depends on the size and prevailing wind energy. CSD constitute a variety of habitats of vital ecological and economic importance. Soil is the ultimate reservoir of plant nutrients and their availability decide the diversity, distribution and abundance of the native vegetation (Kurtbo et al., 2007; Zuo et al., 2007; Wilson, 1989).

Salt marsh habitat

In salt marshes coastal plants do not just survive at certain salinity levels. They also grow and reproduce vegetatively and sexually and generally there is distinct species zonation from lower to upper parts of the salt marshes (Cooper, 1982; Schat, 1982; Rozema et al., 1985). Ranked along an elevational gradient, plant species from the lower marsh have often been found more salt and flood tolerant than plants from the middle and upper marsh. The halophytes are out
competed by faster growing non-halophytes (glycophytes). Therefore, lower salt marsh species (halophytes) not occur at the upper marsh or on less saline and non-saline inland sites (Flowers et al., 1977, 1986a,b; Rozema, 1978; Cooper, 1982; Rozema et al., 1985; van Diggelen, 1988; Colmer and Flowers, 2008).

Habitat of Mangrove

The mangroves are woody plants that grow at the interface between land and sea in tropical and subtropical latitudes. The term “mangrove” often refers to both the plants and the forest community. Mangroves are circumtropical distribution, occurring in 112 countries and territories. Global coverage has been variously estimated at 10 million hectares (Bunt, 1992). Mangrove forests are among the world’s most productive ecosystems of the world. They enrich coastal waters, yield commercial forest products, protect coastlines, and support coastal fisheries. Conversely, mangroves stay alive under circumstances of high salinity, extreme tides, strong winds, high temperatures and muddy, anaerobic soils. There may be no other group of plants with such highly developed morphological, biological, ecological and physiological adaptation to extreme conditions. Mangrove ecosystem is found in tropical and subtropical tidal areas, which have a high level of salinity. Mangroves protect coastal areas from erosion, storm surge, especially during hurricanes and tsunamis (Mazda et al., 2005; Danielsen et al., 2005).

Fig. 1. Halophytes grow in variety of saline habitats

CONCLUSION

Salty habitat is extreme environment for the halophytes survival. Therefore halophytes shows the physical and chemical adaptation in their tissues which is responsible for halophytes survival. Hence, to explore the application of these kind of plants further research into application level is needed.

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Conflict of Interest: NA

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Hazardous and Noxious Substance Detection by Hyperspectral Imagery for Marine Pollution Application

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ABSTRACT

In this paper we demonstrate that hyperspectral imaging frameworks can enhance the identification and portrayal Hazardous and Noxious Substances (HNS) on account of marine contamination. We dissected nadir hyperspectral picture acquisitions from 0.4 to 12?m relating to two unique battles: (i) HNS discharge at the surface of an ocean water pool; (ii) HNS discharge in the Mediterranean Sea under genuine conditions where hyperspectral sensors were utilized as a part of expansion to existing frameworks operationally conveyed for beach front overview. The spatial and transient development of hyperspectral information of HNS slicks procured from these crusades demonstrate that hyperspectral imaging from noticeable to longwave infrared is touchy to different synthetic items because of their refractive list, particular ingestion, or dissipating gas. Such affectability is by all accounts exceptionally accommodating to recognize the different items or to gather proof of chemical pollution.

Keywords: Hyperspectral Imagery, Hazardous and Noxious substances, Detection, Identification

INTRODUCTION

Dangerous and Noxious Substances (HNS) compare to any substances, other than oil, which are probably going to make risks to human well being, damage to living life forms and marine life, harm to luxuries, or obstruction with other true blue employments of the ocean if presented in the marine condition (OPRC-HNS Protocol). HNS speak to a non irrevocable piece of ship discharges all through the world [1] and, due to the related dangers, have turned into a need for worldwide sea overview [2]. Existing instruments, for example, SAR or wide band warm symbolism tuned to distinguish or gather proof of oil slicks [3, 4] are not suited to recognize or, then again describe fluid HNS adrift. However a few reviews have as of now demonstrated that hyperspectral airborne imaging can enhance oil slick location and portrayal by including ghostly data connected to the physical properties of the item (e.g., thickness, sort) [3, 4]. Molecular Modelling and Structure analysis of S-ribosylhomocysteinase from Aeromonashydrophila was proposed and discussed in [3]. Production of Bioethanol from Papaya and Pineapple Wastes using Marine Associated Microorganisms was implemented in [6] and their results are discussed. Using polymers the water control analysis on production enhancement along with permeability modification was done and their process was explained in [7].

This paper goes for assessing the possibility of the airborne hyperspectral imaging method from noticeable to longwave infrared to gather proof of sea contamination from toxic fluid substances as a supplement to existing frameworks. We introduce in the first place comes about about because of the hyperspectral imaging identification and recognizable proof of different fluid HNS for the ocean situation from an investigation of estimations produced using a debased pool and an airborne crusade acknowledged amid the POLLUPROOF extend financed by ANR ECO-TECH 2013.

ANALYSIS METHOD

Reflective domain radiative transfer model

A simple radiative transfer model in the reflective domain can be written as follows
where \( L \) is the at sensor brilliance, \( L \) is the brilliance at surface level, \( T \) is the climatic transmission from the ground to the sensor and \( L \) is the upwelling way brilliance also, \( R \) is the surface lambertien ghastly reflectance. After air way brilliance and upwelling transmission remuneration, we can undoubtedly express the reflectance proportion between the HNS and reference water utilizing just sensor radiances:

\[
\frac{L_{\text{HNS}}(\lambda)}{L_{\text{ref}}(\lambda)} = \frac{R_{\text{HNS}}(\lambda)}{R_{\text{ref}}(\lambda)}
\]

Where \( \lambda \) remains for the wavelength. On account of nadir seeing, effect of the fluid spill on the reflectance can be approximated to first request utilizing the Fresnel law as takes after:

\[
\frac{R_{\text{HNS}}(\lambda)}{R_{\text{ref}}(\lambda)} = \alpha(\lambda) + \beta(\lambda)\tau^2
\]

Where alpha is the reflectance of the HNS above water and beta is the sea reference reflectance, alpha and beta can be easily determined using the real part of the air, HNS and water refractive index, and \( \Delta \) is the transmission of the pure HNS slick containing the absorption features. Therefore, HN impact on the spectrum will have a spectrally smooth effect due to the real part of refractive index and in some cases some spectral absorption features due to its transmission.

**Thermal infrared radiative transfer model**

In the thermal domain, the at sensor radiance is related to temperature \( T \) through the Planck function \( B \) and the lambertien emissivity:

\[
L = (L_0, (1 - \varepsilon) + \varepsilon B(T)) \cdot T \uparrow + L_{\text{env}}
\]

After air way brilliance and upwelling transmission remuneration, we can express the brilliance differential because of a change of emissivity or temperature by the accompanying expression:

\[
dL = d\varepsilon(B(T) - L_0) + \varepsilon dT \left( \frac{\partial B}{\partial T} \right)
\]

The deliberate brilliance will be a blend of a level ghastly variety because of temperature variety and particular climatic components because of progress of emissivity (or reflectance) instigated by the genuine piece of refractive file of the HNS. In the accompanying, we will express this brilliance variety in splendor temperature utilizing the opposite of the Planck work. At long last, on account of vanishing items, gasses present an adjustment in the past expression:

\[
dL' = dL + \rho \cdot k \cdot (B(T_{\text{atm}}) - L)
\]

where \( \rho \) is the gas concentration, \( k \) is the spectral absorbance of the gas and \( T_{\text{atm}} \) is the gas temperature. Impact on the radiance of the HNS evaporation correspondsto the specific features of the gas spectral absorption.

**MARINEPOOL EXPERIMENT**

**Experiment descriptions**

Amid this initially try 8 distinct HNS (benzene, toluene, xylene, diethyl ether (DEE), rapeseed oil (colza), propanol, methanol, and heptane) were discharged into ocean water inside a skimming aluminum outline that was introduced in the CEDRE pool as displayed in Figure 1. For every item, distinctive spill volumes were utilized from 300mL up to 5L, and the ocean water was altogether cleaned after each spill.

Hyperspectral imaging cameras were sent inside an aeronautical lift at a tallness of 12m over the pool with a nadir looking geometry.

**Hyperspectral instrument characteristics**

Three diverse hyperspectral imaging frameworks from 0.4 to 12m were utilized amid this crusade: two intelligent sensors (NEO HySpex cameras) from 0.4 to 1m (VNIR) furthermore, from 1 to 2.5m (SWIR), and a warm longwave (LWIR) sensor from 8 to 12m (Telops Hypercam). Table 1 demonstrates instrumental attributes and tuned parameters utilized amid the acquisitions.
Airborne Measurements

We present here the preliminary results from the hyperspectral airborne campaign in the Mediterranean Sea in May 2015.

Instrumentation

HNS discharges were performed from a rescue, protect and oil spill reaction vessel of the French Navy under the course of CEPPOL (Center of Practical Expertise in Pollution Reaction) and CEDRE. HNS discharges were done from a one-cubic-meter-tank conveyed adrift or specifically from a pipe on the edge of the ship. Two airborne hyperspectral (LWIR and SWIR) cameras were utilized on two air ship. Other airborne sensors were tried amid this battle, which included SAR, UV and IR cameras.

Preliminary hyperspectral results

Figures 8 and 9 demonstrate cases of results for SWIR and LWIR hyperspectral airborne acquisitions on account of a rapeseed oil discharge adrift. The SWIR rapeseed oil range in Figure 8 is reliable with the pool perceptions: the clear reflectance is higher than water yet displays an ingestion include around 1700nm normal for a C-H assimilation include.

CONCLUSIONS

In this paper, we demonstrate that hyperspectral imaging frameworks can possibly enhance the airborne discovery and portrayal of HNS spills. In reality, hyperspectral imaging from the noticeable to longwave infrared is delicate to refractive record, transmission, and gas vanishing. In expansion to existing frameworks, for example, SAR, IR or UV camera, hyperspectral imaging builds the perceptibility of HNS what’s more, can be extremely useful to recognize the different items and gather confirmation of compound contamination. Additionally work is still important to enhance airborne hyperspectral information investigation what’s more, the connection between the physical and optical properties of HNS.

REFERENCES


Implementation of Gyro based Cost-Effective Hand Tremor

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ABSTRACT

Gyro-LIFT is an imaginative hostile to tremor settling handle to help individuals with hand tremor eat, lift and convey utensils effortlessly. The device compensates for the shaking and allows the food to stay on the spoon or fork without spilling. The device senses the hand tremor motion and automatically stabilizes the attached utensil. The utensil can be a spoon, fork or larger dining and kitchen vessels. This project needs a very low power microcontroller but with high performance signal processing requirements. STM32L476 from STMicroelectronics meets this needs and thus chosen as the main MCU. It is an ultra low power ARM Cortex-M4 based microcontroller that can run upto 80MHz. It has got 1MB of Flash memory and 128 KB RAM memory.

Keywords: Gyro, ARM, Cortex-M4, STM32, Atollic.

INTRODUCTION

People with neurological conditions are suffering with involuntary shaking of the hands, including essential tremor, Parkinson’s disease and multiple sclerosis. Getting the food from the plate or bowl to their mouth without spilling is the primary trouble they face. Lifting objects and utensils is also a major problem for them. This makes them loss their independence and become depressed, and they don’t go out in public because of embarrassment.

Introduction

One of the greatest difficulties for individuals living with Parkinson’s is the trouble - and some of the time powerlessness - to nourish themselves, because of the shaking tremors related with the infection[1]. Be that as it may, help may be headed. Another, cutting edge, “shrewd” spoon guarantees to balance out the vibrations. For individuals experiencing Parkinson’s sickness, a confusion of the focal sensory system, basically eating a dinner can be a trial. The most widely recognized side effects of the infection are identified with development[2]. The essential demonstration of getting sustenance from plate to mouth can be troublesome and baffling. Be that as it may, now there may be an answer which has been created a little gadget that tracks and adjusts for little vibrations and tremors. What we have done is taken that same idea and connected it to a handheld gadget, which would help individuals with a great deal bigger nerves[3]. So some person with a neurological issue may climb to an inch [2.5 centimetres] in extent. There is a little PC inside that is running a calculation that would essentially detect the individual’s movement, decide whether that was purposeful or unintended, and on the off chance that it was unintended, move inverse to what that movement does[4]. The outcome is the gadget stays smooth and level, notwithstanding the development of the client’s arm or hand. Nourishment that ordinarily would take off stays on the spoon[5]. Having the capacity to see some person eat all alone interestingly, or even simply eat better, has been a colossal impactful thing. Application of machine learning for real-time evaluation of salinity (or TDS) in drinking water using photonic sensors is discussed in [6].
Related Works and Methodologies used

The device consists of an inbuilt 9-axis motion sensor, a low power ARM Cortex-M4 microcontroller and 2-axis motor mechanism that distinguishes unwanted tremor from the intended movement of the hand and counteract the tremor. To stabilize the utensil, the controller directs two motors in the handle to move the attached utensil in the opposite direction of any detected tremor\(^\text{[2]}\). The device can also act as medical testing equipment and can be controlled and monitored from a smartphone app.

The overall system design for Cost-Effective Hand-Tremor as shown in Fig.1

a) Sensor Processing and Control System

A 3-axis gyroscope measures the angular velocity and direction of the hand movement. A 6-axis compass, combination of 3-axis accelerometer and a 3-axis magnetometer measures the position and orientation of the hand as shown in Fig.2 (a). The onboard digital signal microcontroller combines the information from these sensors, finds the precise movement of the handle and calculates the speed and force of the necessary reaction\(^\text{[3]}\). The microcontroller controls the movement of onboard dual servo motors in a precise manner to counteract and cancel the original hand movement. This control process runs in a loop every few hundred milliseconds, so that the levelling of the object is kept smooth and steady.

b) Smart User Interface

The device can be paired with an android smartphone using a bluetooth transceiver. This is the primary user interface that helps to view the sensor data, both real-time and recorded, and also to control and configure the device as shown in Fig.2 (b). A Joystick button is used to enter user input and also helps to calibrate the sensors and servo motors before using the device for the first time. This helps to diagnose the patient when there is no smartphone available.
c) Sensor Data Logger

The device has 16 MB of onboard Quad-SPI flash memory, used to record the data generated by different motion sensors while using the device. This helps a neurologist to analyze the tremor condition during the device usage period. The recorded data can be transferred and viewed on the Smartphone app.

d) Tremor Frequency Measurement

The device can measure tremor frequency and tremor baseline amplitude data and show the results on the onboard display. This parameter represents the tremor stage of the patient and gets recorded in the onboard memory to be viewed on the smartphone app.

e) Animated Movement

The device can memorize the servo motor movements made by the user and can later playback it to create an animation effect. Both the servo motors movement are recorded with the help of joystick. In this mode, the device acts as a robotic handle that can help the user to carry out some of the long and laborious chores he/she might have to do.

System Software Design

Atollic TrueSTUDIO is a professional C/C++ compiler and debugger toolsuite with unique features helping improve your software quality such as parallel compilation, with support for Cortex-M/R/A. It also support Static code analysis including MISRA-C and code complexity analysis with Source code review features. It contains powerful multi-core debugger with RTOS and tracing support with inbuilt Cortex-M crash analyzer and Version control and bug database GUI clients.

CONCLUSION

In this work we proposed a method to quantify Parkinson Disease inducedhand tremor based on a smartphone mobile platform. Although the clinical trial was relatively small, it is larger than others on the same topic, it offers encouraging results and serves as proof of concept; the statistical analyses we conducted show that our proposed method for quantifyingupper limb Parkinson an tremor can be used both in a clinical setting to facilitate the physician’s work by offering her an accurate assessment tool, and at home by the patientsthemsevles to self-monitor their progress.

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Importance of Barcoding and Molecular Systematics of Marine Ascidians: A Mini Review

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ABSTRACT

Species identification and classifications has traditionally been the specialist domain of taxonomists, providing a nomenclatural backbone and a key prerequisite for numerous biological studies. Indeed, today’s society has to resolve many crucial biological issues like need to maintain biodiversity, to ensure bio-security, to protect species and to avoid pandemics. The achievement of such goals and the success of subsequent action programs require efficient global networks and rely on our capacity to identify any described species.

Keywords: Ascidian, Barcoding, Mitochondrial DNA, India

INTRODUCTION

Mitochondrial DNA (mtDNA) analysis has been employed in the evolutionary study of the animal species for more than 30 years[1]. Its higher mutational rate and lower effective population size than the nuclear DNA make mtDNA a powerful tool to probe for evolutionary studies. This fact provoked a proposal to standardize DNA-based species identification by analyzing a uniform segment of the mitochondrial genome. A library of sequences from taxonomically verified voucher specimens could be built with this approach which could serve as DNA identifiers for species, in short, DNA barcodes[2]. Ascidians have few external characteristics that are species specific and can easily be mistaken with similar looking ascidians. Many colonial ascidians exhibit remarkable variation in colony color and form, and colony appearance is sometimes substantially different within the same species and/or very similar among different species. Thus, to accurately identify the species, colonies must be dissected under a stereo microscope to examine their zooid morphology. Zooids are often simple in morphology and do not provide many features for taxonomic identification. However, the integration of molecular and morphological identification techniques can provide a stronger taxonomic confirmation of organisms.

Ascidians

The Ascidians, commonly called as sea squirts (Subphylum: Urochordata, Class Asciidae) are dominant fouling organisms in many marine communities, having a wide geographic distribution. Ascidians are filter feeders found all over the world, usually in shallow water with salinities over 2.5%. While members of the Thaliacea and Larvacea swim freely like plankton, sea squirts are sessile animals found near shore and typically on hard bottoms, but they also occur down to the deep sea where they are typically found on soft bottoms. There are 2,300 species of ascidians and three main types: solitary ascidians, social ascidians that form clumped communities by attaching at their bases and compound ascidians that consist of many small individuals (each individual is called a zooid) forming colonies up to several meters in diameter. Tetrahydroisoquinolone alkaloid ‘Ecteinascidin 743’ from Ecteinascidiaturbinita, cyclic depsipeptides ‘Dehydrodidemmin B’ and ‘Didemmin B’ from Trididemnumsolidum, cyclic peptide ‘Vitilevuamide’ from Didemnincuculiferum and ‘Diazonamide’ from Diazonaangulata are a few tunicate compounds in anticancer preclinical or clinical trials[3].

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Increased monitoring efforts over the past 15 to 20 years have found that non-indigenous species are conspicuous components of marine communities throughout the world[19]. Invasive species are ought to be among the most important causes for decline of native species[20]. Even though a number of marine organisms translocate from various parts of the world, little information exists from Indian coastal waters regarding the distribution of invasive/alien ascidian species.

Important of evolutionary study

Traditionally, for the identification of species, morphological characters are used. Morphology-based tunicate taxonomy is a highly specialized discipline and the misidentification of species is a frequent problem[4]. In particular, small and/or inconspicuous organisms have been poorly described, despite their abundance across a wide distribution range. Moreover, specific identification is difficult in such species and often requires microscopic observation. Many colonial ascidians exhibit remarkable variation in colony color and form, and colony appearance is sometimes substantially different within the same species and/or very similar among different species. Thus, to accurately identify the species, colonies must be dissected under a stereo microscope to examine their zooid morphology. Specifically, such errors are known to have a significant impact on the population assessment of overfished species. The capability to correctly identify species is crucial in order to minimize “error cascades” resulting from the use of bad taxonomy in science. However, the development of molecular biology created a new set of useful tools to identify species.

Important of mitochondrial DNA (mtDNA) analysis

Recently, the role of mitochondrial DNA (mtDNA) sequences in taxonomy and phylogenetic inference has become contentious and two extreme viewpoints have emerged, one position criticizes the use of mtDNA because the marker suggests misleading patterns of variation; specifically, phylogenies that are inconsistent with those derived from nuclear gene sequences in the context of species relationships among closely related taxa[8]. The other extreme, the DNA “barcode” movement, espouses the sole use of small fragments of a single mtDNA gene, cytochrome Oxidase I (COI), to identify most of life[19]. A library of sequences from taxonomically verified voucher specimens could be built with this approach which could serve as DNA identifiers for species, in short, DNA barcodes (Herbert et al., 2003). For animals, 648 bp segment of the mitochondrial gene cytochrome C oxidase I (COI), which can be readily recovered from diverse species with a limited set of primers, was declared as a DNA barcode[3].

Interestingly, the morphological similarity of the adult forms of C. intestinalis and C. savignyi belies the long separation of their lineages which were estimated, from genomic data[10]. However, the integration of molecular and morphological identification techniques can provide a stronger taxonomic confirmation of organisms.

The use of DNA sequence data to identify marine species is proved to be useful especially in situations where traditional morphology-based discrimination of taxa is very difficult and/or controversial[7]. Indeed the successes of this approach have led to the development of internationally standardized molecular methodologies and associated public access databases explicitly for DNA sequence based species identification, most notably the much discussed Barcode of Life project (http://www.boldsystems.org)[11].

National scenario

Knowledge on diversity of ascidians in the waters around India is very less. In particular, scale and ecological significance of the establishment of non-native marine invertebrate species is poorly understood or quantified. The Indian coast, being dotted with 12 major ports and a number of minor ports is susceptible for bioinvasions which hence warrants a close watch. Little information exists from marine ecosystems of India regarding the presence and distribution of alien and cryptogenic ascidians. This clearly indicates that a taxonomical study on ascidians in India has been expanded. However, distributional information of alien ascidians is lacking. Some information is available on the impact of ascidians as marine fouling species[6] but these ascidians have not been categorized as either alien or native species.[12] studied Mitochondrial Cytochrome Oxidase I gene sequences of Ascidian Polyclinum madrasensis from the Gulf of Mannar, Southeast coast of India.[13] studied molecular identification of four ascidians from the Palk Bay Region, southeast coast of India. [14] studied the distribution and invasiveness of a colonial ascidian, Didemnumpsammathodes, along the southern Indian coastal waters.[15] analysed non-indigenous ascidians
of the Andaman and Nicobar Islands,[10] studied non-indigenous ascidians from V. O. Chidambaram port, Thoothukudi.[17] have barcoded the DNA of two solitary ascidians, *Herdmaniannomus* and *Microcosmus squamiger* from Thoothukudi coast, India.

**International scenario**

DNA (mtDNA) analysis has been employed in the evolutionary study of the animal species for more than 30 years (Avise and Walker, 1999). Several researchers have suggested the use of DNA barcoding in taxonomy as a method to achieve rapid species descriptions in the context of the current biodiversity crisis (Hebert et al. 2003; Ball and Armstrong, 2006). There are many reports on the barcoding on ascidians.[21] observed the portions of the COI genes of two non-indigenous ascidians (*Botryllusschlosseri* and *Botrylloides violaceus*) and two indigenous ascidians (*Boltenia echinata* and *Halocynthia pyriformis*) cloned and sequenced and then determined the intraspecific and interspecific COI sequence variations.[22] reported the first recording of the solitary ascidian, *Cionasavignyi* in the Southern Hemisphere. Thus, the molecular methods are the perfect way of identifying some ascidian species. [9] investigated the genetic structure of an ascidian, *Clavelinalepadiformis*, in harbours and rocky reefs with the COI gene. COI gene analysis of *Ciona* specimens from New Zealand revealed for the first time, the existence of solitary ascidian *Cionasavignyi* in the Southern Hemisphere (Smith et al. 2012). A new ascidian species belonging to the genus *Diplosoma* has been revealed through DNA barcoding, from the Ryukyu Archipelago of Japan[24]. Thus, comparison of the evolutionary patterns of both nuclear and mt-genes in vertebrates and urochordates (ascidians) could be an interesting line of investigation.

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along the southern Indian coastal water, Oceanologia (2016) 58, 212—220.
Analysis of Brain Connectivity using Real-Time FMRI Neurofeedback Experiments

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ABSTRACT

Functional MRI has evolved to become one of the most innovative methods to study the human brain. With a real-time fMRI system, it is possible to perform neurofeedback experiments, where stimuli are adapted in real time to the participants' measured brain activity. Cognitive processes depend on the communication between regions of the brain, and so the analysis of connectivity before, during and after a neurofeedback experiment is of great interest. This work analyses and benchmarks some of the methods currently used on fMRI data: Correlation, Coherence and Granger Causality Mapping. Tests performed on simulated datasets showed that coherence presents robustness to downsampling, unlike correlation and Granger causality. Preliminary analysis of connectivity on an experimental dataset allowed for interesting insights on the working memory network functioning. The work developed has raised a number of questions related to the application of connectivity methods to fMRI data, results validation and optimisation of fMRI experimental setups, as well as a number of challenges to be surpassed in future work.

Keywords: Brain Connectivity, Functional MRI, GCM

INTRODUCTION

Oxygenation Level-Dependent (BOLD) responses as an indirect measure of neuroelectric activity. Recent advances allowed the real-time implementation of fMRI (rt-fMRI) and the development of neurofeedback (NF), in which neural activity is measured and a sensory representation (e.g. visual, auditory) of this activity is presented to the participant to facilitate the manipulation of the neural correlates of specific behaviours: self-regulation is acquired through learning and based on a causal dependency between the behaviour and the activation patterns feedback. Neurofeedback and neuro modulation techniques and Functional and effective connectivity are explained by[1, 2].

There is increasing evidence that successful self-regulation in distinct cortical or subcortical Regions of Interest (ROIs) is possible. Despite of the encouraging preliminary results, the approach is yet to be validated in clinical trial setup. The understanding of the underlying mechanisms and neuroplasticity is fundamental.

One important advantage of fMRI is the ability to look at an entire network of distributed brain regions involved in a specific function/behaviour and the spatiotemporal dynamics of the BOLD signal during the neurofeedback training. Impact of real-time fMRI working memory feedback training on the interactions between three core brain networks is discussed by [3]. The communication between brain regions, as a measure of network organisation, is usually assessed based on metrics of functional connectivity (temporal correlations between remote neurophysiological events) and effective connectivity (influence that one neural system exerts over another). fMRI feedback enhances emotion regulation as evidenced by a reduced amygdala response is described by[4]. Analysing connectivity between regions can provide a more complete characterisation of the functioning...
brain than activation patterns: function relies not on a single, isolated region, but on a network of regions working together. Using real-time fMRI to influence differential effective connectivity in the developing emotion regulation network is explained by [5]. The analysis of these connectivity patterns before, during and after a neurofeedback session is of major importance and constitutes the main motivation for this work.

Changes in functional connectivity resulting from neurofeedback training of single regions have been previously reported. The authors aimed to investigate the dynamic functional connectivity between three networks engaged in working memory training, during rt-fMRI neurofeedback. Granger causality analysis of fMRI BOLD signals is invariant to hemodynamic convolution but not downsampling is discussed by [6]. Results showed that exclusively in the experimental group, the functional connectivity of selected ROI pairs increased significantly in the last training run compared to the first training run reports an effect of feedback modulation on functional connectivity, when statistical tests revealed clusters of ROIs with increased connectivity values, measured with Pearson’s correlation. Lag-based effective connectivity applied to fMRI is explained by [7]. Analysed rt-fMRI neurofeedback training of the emotion regulation network in adolescence, using Granger Causality (GC) as a measure of effective connectivity. Results show significant variations between conditions, sustaining the hypothesis that neurofeedback training has a differential effect on the Granger information flow within the emotion regulation network. Mapping directed influence over the brain using Granger causality and fMRI is discussed by [8].

There are a number of methods to assess neural connectivity in fMRI data, and an even larger number of implementations. However, several limitations have been discussed concerning the use of these measures in fMRI data. The identification of an appropriate framework for the use of connectivity measures is still matter of debate.

METHODS

A. Functional Connectivity

The Pearson product-moment correlation is a measure of strength of the linear relationship between two variables. It is used on fMRI data as a measure of functional connectivity between two areas. If two areas show strong correlation when performing a specific task, it is an indication that they might be connected and working together to perform the referred task. Coherence measures the linear time-invariant relationship between two time series at a given frequency. The assumption is that two regions in the brain have the same underlying neural activity will be highly coherent, even if they present very different haemodynamic response shapes.

B. Effective Connectivity

Granger Causality Mapping (GCM) is a method that aims to explore the influences between neuronal populations and their directions. The method does not require prior assumptions of a model, nodes or connections among them. The mathematical formulation relies on GC to establish the existence and direction of influence from information data. In other words, the GCM maps are established based on the temporal precedence of the information, and identify the sets of voxels, ROIs or nodes that are connected (source or target).

Simulated fMRIDataset

The simulated dataset is based on a Vector Autoregressive (VAR) model originally defined with the objective of testing GC against haemodynamic convolution and downsampling. The model is described by the following equations:

\[
\begin{align*}
  x_1(t) &= 0.95\sqrt{2}x_1(t-1) - 0.9025x_1(t-2l) + w_1(t) \\
  x_2(t) &= 0.5x_1(t-2l) + w_2(t) \\
  x_3(t) &= -0.4x_1(t-3l) + w_3(t) \\
  x_4(t) &= -0.5x_1(t-2l) + 0.25\sqrt{2}x_4(t-l) + 0.25\sqrt{2}x_5(t-l) + w_4(t) \\
  x_5(t) &= -0.25\sqrt{2}x_4(t-l) + 0.25\sqrt{2}x_5(t-l) + w_5(t)
\end{align*}
\]

Experimental Dataset

The experiment aimed to study the impact of neurofeedback training on the working memory network. Seventeen adult volunteers, with no history of neurological or psychiatric diseases, were included in the study, and performed a single session of rt-fMRI neurofeedback training. During the five imagery runs, the participants were instructed to imagine a sequence of numbers and then recall the sequence in inverse order, while seeing a thermometer and the written
instruction. On the first and last run (train and transfer) the thermometer

DISCUSSION

Simulated fMRI Dataset

The main goal of the dataset created with processes in the order of the millisecond was to replicate and extend. Additionally, functional connectivity methods correlation and coherence - were implemented to assess their capability of recovering the causal relations and therefore validating their application on fMRI data. Pearson’s correlation was unable to distinguish the model relations. On the other hand, the distinction between coherence values for the true model relations and the remaining ones is very clear (differences around 0.1 and higher), for both signals. When evaluating GC results, the implementation of the method seems valid, since after 100 tests the method is able to recover 4 out of the 5 model relations for the BOLD 250 Hz signals, and a causality inversion is observed for the BOLD 0.5 Hz signal. After several tests, while varying some parameters, it was not possible to recover the causal relation from node 5 to 4, unlike in the mentioned paper. The reason for this absence was not confirmed.

By creating a dataset where the causality dynamics was in the order of the second, the objective was to prove that the application of the three connectivity methods is valid for real fMRI data, assuming that in these the causality dynamics is not only present in the order of neural communications, but also in the order of fMRI acquisition rate. Pearson’s correlation fails again to provide any information about the connectivity of the data, but coherence manages to retrieve all true model relations in the signal of interest BOLD 0.5 Hz, revealing some independence to the sampling rate of the signal and therefore validating its application to real fMRI data. Regarding GC results, the lower than expected accuracy value is clear. For the signal of interest BOLD 0.5 Hz, the method manages to recover 4 of the 5 model relations, but also fails by recovering other 4 relations that are not from the model. These results tend to show that even with a clear causal dynamics in the order of the second it is not immediate for the method to recover the data connectivity.

The method that shows greater potential to be applied on real fMRI data is coherence. Both for the datasets with dynamics in the order of the millisecond and the second, the method managed to retrieve the true model relations. Serious doubts are placed for Pearson’s correlation and GC, based on these results. The studies of state specific limitations of GC, one of them clearly identified down sampling.

B. Experimental Dataset

1) Localiser Run: The results of Pearson’s correlation analysis are surprisingly informative. In figure 5a, most of the theoretically expected connections show higher correlation values: between the left IPS and left DLPFC (1 ! 5) and interhemispheric IPS and DLPFC, among others such as the motor areas FEF, SMA and premotor cortex, that are fully explainable. Note the substantially lower correlation values for the connections with the pSTS (control node purposely outside the network). The higher number of connections with the left DLPFC seems to suggest that this region is an important integrating hub. The results for the analysis with the three ROI sizes were equivalent.

The results of GC analysis are considerably more disperse. Even so, the matrices display a causal influence of the left IPS on the left DLPFC (1 ! 5) and interhemispheric connections from the left to the right DLPFC (5 ! 6) and from the left to the

---
right Insula. Other less expected relations appear, including three with the control region, the pSTS.

2) Comparison Train vs Transfer Runs: It has been shown that the effect of neurofeedback is more evident after a significant number of sessions. The subjects of this experiment only performed one neurofeedback session, and as such, large connectivity changes are not expected when comparing the metrics before and after the single neurofeedback session.

Regarding correlation results, the variations are in fact low: the highest increase in correlation - around 0.2 - is shown for connection 3 "7 in figure 5b. The highest decrease is shown for connection 7 "1 9. Denote also that the correlation for the connection of interest 1 "7 decreases slightly, on average, from the Train to the Transfer run, which is rather unexpected.

B. Method Comparison

A general concordance between the results given by the different connectivity methods is expected, even with the metrics of functional and effective connectivity looking at different properties of the signal. Coherence proved to be the only method to retrieve the model connectivity of the simulated dataset, regardless of the sampling rate. However, on real fMRI data, correlation also returns surprisingly interesting results, in relative accordance to the coherence analysis and the theoretical model. This discrepancy could indicate that the simulated dataset does not capture a realistic data correlation structure. Regarding effective connectivity, GC is the most widely used method, but in this study, it showed to be highly influenceable by a number of parameters, while failing to return expected results. Additionally, the relations found by this metric have no meaningful similarity with the ones found by correlation and coherence. Mainly because of this fact, it was not possible to define a clear network of communication for the working memory task in study. Supporting the results, this metric shows no evident promise of application to data with this temporal resolution, which precludes naive application of the metric to fMRI data in general.

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Changing Petroleum Based Fuels for Fuel Cell Vehicles: Composition - Execution Relationships

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ABSTRACT
Petroleum-based fuels reforming the gasoline, may assist ease the foreword of hydrogen fuel cell in the vehicle. Even though gasoline can be transformed, it is optimized to convene the stress of internal combustion engines. These optimizations consist of unification to raise the addition of oxygenates and detergents to decrease the vehicle emissions and also develop octanenumber. The needs for petroleum for reforming to hydrogen gas are moderately diverse than the combustion. Reasons are flamespeed is not essential and octane number; but, reasons such as catalyst-fuel interactions and hydrogen density become supreme. In categorize to find the reasons for hydrocarbon fuel to generate hydrogen gas. And also plan to test different machinery of petrol and intermingle of machinery below an auto temperature reforming environment. The consequences point out that petrol masterpiece can have a more consequence on generating manners. The possessions of sulfur dirtiness were reliant on themedium. Sulfur was damaging for Ru, Ni and Co channel. Sulfur was helpful generation with channel; though, the causes were reliant on the S8 meditation.

Keywords: WGS, Fuel An, Fuel B, Fuel C.

INTRODUCTION
Generate the petroleum-based fuels, may aid simplicity the opening of hydrogen gas fuel cell for automobile. Mechanical, Thermal, Linear and Nonlinear optical properties of Barium L-Tartrate single crystal is determined in [1]. Mechanical, Thermal, Linear and Nonlinear optical properties of Barium L-Tartrate single crystal, The utilization of petrol reversed merits coupled with refueling communications in lay and supply a high hydrogen storage capacities fuels are generated, although petrol has been renewed, gasoline formulations optimized to congregate the stress of present IC engines. Study Of Wear In Chrome Plated Cylinder Liner In Two Stroke Marine Diesel Engine Lubricated is described in [2]. Study Of Wear In Chrome Plated Cylinder Liner In Two Stroke Marine Diesel Engine Lubricated By Hans Jensen Swirl Injection Principle, The needs for a fuel for generate hydrogen gases are various and a fuel generate for ignition. Ignition is a chain of hydrogen gas reactions, prohibited by the essential chemistry. Investigation of Enhanced Oil Recovery (EOR) Surfactants on Clay Mixed Sandstone Reservoirs for Adsorption is discussed in [3]. Investigation of Enhanced Oil Recovery (EOR) Surfactants on Clay Mixed Sandstone Reservoirs for Adsorption. Generate is commonly execute catalytically and is prohibited by rejoinder happening on the catalyst exterior. Reasons are octane quantity interrelated.torecital in IC engines, are not anticipated to be pertinent for generation. A New Route for Fuel Cells is illustrated in [4]. A New Route for Fuel Cells, To adjust from hydrogen gas burning chemistry to outer side-catalyzed effects proposeentreirefresh set of reasons determine what makes a good fuel for reforming and reactivity. Catalyst fresh set of reasons determine what makes a good fuel for reforming and reactivity. Catalyst poisoning is expected to be paramount. In addition, factors such as hydrogen density of the fuel assume new importance.

Reformer execution, as characterized by hydrogen generation and hydrocarbon change, has been considered as an element of fuel creation. Fuel Processing for Fuel Cells: Effects on Catalyst Durability and Carbon Formation is explained in [5]. Fuel Processing for Fuel Cells: Effects on Catalyst Durability and Carbon Formation, These reviews concentrate on
reformer execution in administrations where coke arrangement ought not happen and is for the most part not watched. An analysis on the modeling of container terminal operations is said in [6]. Prior we thought about execution information for a few individual segments of gas sort energizes. This work found that Trim methylbenzene required the most extreme changing states of the parts tried, requiring both high temperature and low space speeds to change. Isooctane and n-octane could be transformed at lower temperatures, while methyl hexane, methyl pentane, and 1-octane could be changed at higher space speeds than trim ethyl benzene. The present work takes a gander at blends to acquire understanding into organization/execution connections for auto warm transforming. An investigation on synthesis, structural, surface morphological, optical, and thermal properties of copper oxide nanofluids is illustrated in [7]. An analysis on the modeling of container terminal operations is . This ought to help figure out what an ideal fuel for locally available changing would be and help figure out what the punishments in improving productivity would be utilizing current gas definitions.

**Experimental**

Impacts of creation were explored by testing fills arranged from refinery streams and by testing blends of isooctane with various parts. Three unique powers were readied utilizing promptly accessible refinery streams and methodically fluctuating the convergence of aromatics and naphthenes. The powers structures, as controlled by PIONA investigations, are appeared in Table I. To additionally research execution arrangement impacts, blends of isooctane with xylene, methylcyclohexane, benzothiophene and isobutyl amine were transformed.

The energizes were tried at Argonne National Laboratory (ANL) offices under autothermal improving conditions to gauge fuel reformability, including hydrogen yield and hydrocarbon change. The transforming temperature was in the scope of 650-800°C with gas hourly space speeds (GHSV) going in the vicinity of 15,000 and 150,000 h⁻¹. This relates to living arrangement times in the reformer of around 200 to 20 milliseconds. The impetus molecule mean distance across was 0.5–0.75 mm. Improving was performed with a consistent H2O:C proportion of 1.43 and an O2:C proportion of 0.42, for changing conditions which are close autothermal transforming conditions however are marginally exothermic.

Analyses were directed in a microreactor framework comprising of a 1/4-in. reactor tube housed in a temperature-controlled heater. The reactor tube contains four inspecting ports that permit gas tests to be pulled back over the span of the investigation and infused specifically into a mass analyzer. One advantage of this examining course of action is that it permits gas tests that have contrasting contact times to be dissected without changing the reactant encourage rate. Around 2 g of impetus was stacked into the reactor tube and found to such an extent that lone two of the four inspecting ports are situated inside the impetus bed. Of the staying two testing ports, one was situated over the impetus bed, to break down the sustain synthesis, and the other was situated underneath the impetus bed, to examine the item gas. A little bit (<1%) of the gas stream was occupied through one of these ports to the leftover gas analyzer for examination. The rest of the gas stream proceeded through the reactor bed to the leave stream. Unless noted generally, the ATR impetus utilized as a part of these tests was created by ANL and comprised of a gathering VIII metal on an oxide particle channel. To give a standard to examination between the distinctive synthetic mixes and impetuses tried, constantmolar encourage proportions were utilized (O2/C=0.42 and H2O/C=1.4). A high-weight fluid chromatographic (HPLC) pump was utilized to infuse fuel and water into a warmed zone, where they were vaporized preceding being brought into the reactor tube. Gas stream rates were controlled by mass stream controllers. Long haul tests (>1000h) were performed in a different reactor using a ½-in. reactor tube and containing around 20 g of impetus. This reactor was outfitted with a strong state on-line hydrogen sensor and infrared carbon monoxide and carbon dioxide identifiers. Cluster testing was performed at the leave stream, and the gas investigated utilizing a HP 5890 GC with the gushing stream split and sent to a TCD and a HP 5970 MSD. This framework enabled us to decide the toughness of the autothermal transforming impetus and to decide whether there were any long haul issues (harming, coking) caused by the fuel segments.

**RESULT**

We have explored the impacts of changing three fuel mixes; a mix which is mostly parafincc (fuel An), a mix which is for the most part parafincc with ~20% naphthenes included (fuel B), and a mix which is fundamentally parafincc with ~20% aromatics
The fills were changed at temperatures of 650, 700, 750, and 800°C and GHSVs of 15,000, 25,000, 30,000, 50,000, 75,000 and 150,000 h⁻¹ to decide the temperature-space speed parameter space where these energizes might be useable. Fig. 1 demonstrates a 3D plot of the hydrogen yield after water gas move (WGS), appeared as the rate of the most extreme hypothetical hydrogen yield, versus temperature and GHSV for fuel A.

CONCLUSION

The outcomes show that fuel creation can largely affect transforming conduct. Energizes with high fragrant substance and high naphthenic substance were more hard to change. Both the naphthenic and sweet-smelling fills were more touchy to temperature than the parafinic fuel. Aromatics and naphthenes were additionally found to affect the changing of paraffins in the mix, and abatement the effectiveness for paraffin transformation. The impacts of sulfur pollutions were reliant on the impetus. Sulfur was hindering for Ni, Co, and Ru impetuses. Sulfur was helpful for changing with Pt impetuses; nonetheless, the impact was subject to the sulfur focus.

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Examine on the System Construction of the Continuing Education for the Physical

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ABSTRACT

With a specific end goal to prepare great physical instruction educators, advance the change of school physical instruction and accelerate to prepare sports abilities at all levels, we examine and dissect the status and improvement of instructor proceeding with training, build the hypothetical framework structure of the instructor proceeding with training in the physical training foundations in light of the hypothetical investigation, investigation, and breaking down the main consideration of instructor proceeding with instruction, consolidating the present status of the proceeding with training in physical training establishments to outlined out the fundamental system for the proceeding with instruction in physical training organizations, accordingly guarantee the deliberate advancement of the proceeding with training in physical training organizations.

Keywords: Continuing Education; System Construction; Physical Education Teacher; Physical Education Institutes.

INTRODUCTION

The expert advancement of the instructor proficient in the physical training foundations is the procedure of the nonstop advancement and ceaseless change during the time spent specialization of individual of physical training educators and the way toward advancing proficient ability development on the introduce of the constant acknowledge new information[1]. On the off chance that new instructors in divisions and foundations of p.e. need to be proficient with specialization of high degree, they have to extend the expansiveness and profundity of their expert information[2-4]. For enhancing the expert nature of the instructors in offices and organizations of p.e., finish and point by point pre-work preparing is critical, yet the proceeding with training after the entering the showing calling of the educators in divisions and establishments of p.e. can advance their self-coordinated learning exercises and completely meet the extraordinary needs of their expert development and improvement of the instructors in divisions and foundations of p.e. from the idea of deep rooted learning[5].

This paper also review those articles, Connect among employee engagement and three key of organizational commitment level - An empirical exploration AMID techs[7]. Analyzing the motivational spirit of employees after training period in mahanagar telephone nigam limited (MTNL)[8]. Culture Shock on Learning of International Students in India[9]. Analyzing women empowerment in working conditions: A study on women employees[10].

The Principle of the System Construction

The integrity principle

The integrity principle refers to both focusing on improving the quality of all teachers in the process of building the continuing education system for teachers in departments and institutes of p.e., considering the comprehensive development of the individual teachers quality, and overall planning the continuing education management system.

The scientific principle

The scientific principle refers to that teacher in departments and institutes of p.e. should objectively and correctly reflect the influencing factors of the continuing education at present, and the content and methods of the continuing education should promote the positive improvement of the present situation.
construction level of the system should be established on the scientific classification, the constituent elements of the system should continuously improve with the development of the times, and the system should achieve its operational capabilities based on the scientific construction.

The operational principle

The operational principle refers to that the construction of the system should adapt the school’s development status and the current level of teachers, be easy to implement in practice, avoid the manipulation of the staff and the impact of objective conditions as far as possible, and ensure the efficiency of the system operation at the same time.

The general principle

The general principle refers to that the construction of the system should adapt to various sports institutions and different types of teachers, and make schools and teachers can find their own way of continuing education within the framework of the system.

The Construction of the System

A. The policy system of the continuing education for the teachers in p.e. departments and institutes

The policy system of the continuing education in the teacher in the in p.e. departments and institutes is composed of three parts: the first is national policies and regulations; the second is the appropriate regulatory system formulated by the government departments at all levels; the third is a series of rules and regulations formulated by departments and institutes of p.e. according the characteristics and the actual situation of the school based on the laws and regulations of the continuing education established by the education department.

The hierarchical arrangement of the proceeding with instruction for the instructors in p.e. divisions and establishments

The hierarchical arrangement of the proceeding with training for the instructors in p.e. offices and foundations incorporates: initiative choice level, workforce administration level, authoritative administration level, and security division four levels as appeared in figure 2. The initiative choice level proposes the improvement arranges and preparing targets for the educators in different expert controls as per the advancement objectives and the truth of school, and facilitates and speaks with security office about the related security issues, for example, proceeding with training

The substance arrangement of the proceeding with training for physical instruction educator

The learning level and structure of the physical instruction educator straightforwardly affect on educating, preparing, research and group sports exercises. A qualified physical instruction educator should consistently learn keeping in mind the end goal to advance his training profession with the important information of instructors; the workforce administration level proposes improvement plan and preparing targets concuring the authority choice level, creates strategy standards and directions; the authoritative administration level creates particular usage arranges and preparing programs in view of the division’s staff improvement arranging and preparing destinations and related guidelines and regulations[2]. Regardless of whether the execution and preparing arrangement is sensible and practical is specifically identified with whether the improvement arranges and preparing objectives can be accomplished; and security division gives security and support to the educators for the proceeding with training to make the fitting measures created by all offices assume its part.

The development of the proceeding with instruction framework for physical training instructor

The proceeding with instruction framework for physical training instructor incorporates many elements, for example, defining the strategies, building up association and administration, the instructing and successful execution of the of the proceeding with instruction as appeared in figure 2. In the event that we need to execute the proceeding with instruction of educators successfully, we should actualize the pertinent strategies and controls entirely, build up an
assortment of guidelines and directions which adjust to the improvement status of the schools and instructors, mastermind the work obligation and specialist scope of the initiative, instructor administration, authoritative administration, security divisions and different angles in the hierarchical framework, make all perspectives serve the proceeding with training congruously and organized, decide the substance and techniques for proceeding with training in light of the attributes of educators at various levels to guarantee the substance and strategies for proceeding with instruction of instructors to adjust to the requirements of the instructors at various levels. Proceeding with training at various levels, diverse learning content, learning styles embraced by various assessment strategies and measures are not the same, the utilization of logical and powerful assessment techniques to comprehend the educator’s learning, and for proceeding with instruction and showing issues give opportune input to proceed to arrange and execute the suitable offices in a convenient way to enhance to guarantee the smooth advance of proceeding with instruction.

Fig. 2. The construction of the continuing education system for physical education teacher

CONCLUSIONS

The instructors of P. E. foundations are assuming the critical part for how to cause the P. E. foundations to wind up noticeably the essential bases which advance the games improvement of our nation and prepare the abilities who meet the national needs. The concurrent advancement and persistent change of the instructors’ quality rely on upon the powerful reconciliation of every single applicable variable, for example, the approach direction, the school’s way of life and their own endeavors. Thusly we can state that preparation and enhancing the physical training educator is a standout amongst the most central work for The solid advancement industry to accomplish the improvement objectives of games. In this paper, we set up a hypothetical structure framework which adjusts to the present advancement status of China’s games schools, and furthermore have sure forward-searching for the proceeding with instruction of the physical training instructor to draw out the fundamental system for growing exhaustively and precise and guarantee the methodical improvement of the proceeding with instruction of the physical training educator.

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REFERENCES


A Study of Iron Based Superconductor

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ABSTRACT
Exploratory union endeavors for iron based superconductors (FeSC) have been driven by any desires for enhancing superconducting basic temperatures (TCs), giving astounding examples to top to bottom investigations of inborn properties, and investigating potential superconductivity in comparable groups of materials. This original copy condenses the combination courses that are utilized for creating FeSC and their undoped guardians, in single precious stone and polycrystalline structures. A couple of the materials difficulties are abridged.

Keywords: FeSC, TCs, Bridgman Technique.

INTRODUCTION
High temperature superconductivity is among the most secretive and tricky properties in dense matter material science. The outline of better than ever superconducting materials is of significant significance both for understanding the essential way of the superconducting state and for satisfying the guarantee of superconducting materials for boundless use in vitality related needs, for example, generators and transmission lines. The sensibly high TCs, high upper basic fields (HC2), moderately little anisotropy, and long cognizance length make the FeSC empowering for high-field applications. Be that as it may, better properties are as yet required keeping in mind the end goal to make superconductors across the board. The inadvertent disclosure of Fe-based superconductors in an oxyarsenide, which took after that of Ni-and Fe-based oxyphosphides with a similar gem structure, induced broad research endeavors for understanding the reasons for HTS, finding new FeSC, and for chasing for HTS in comparable structure sorts without iron. Synthesis, optical and dielectric studies on novel semi organic nonlinear optical crystal by solution growth technique described the improvements of the semi-organic crystal.

PROPOSED METHODOLOGY
So as to accomplish an exact, right, and profound understanding into the reasons for high temperature superconductivity, great crystalline quality and non formless materials are exceptionally attractive. In a non-shapeless specimen, the constituent iotas are orchestrated in a deliberate example holding on over separations significantly bigger than the extent of the unit cell. The Corrosion behaviour of mild steel in acidic medium in presence of aqueous extract of Allamandablanchetii described the extractions of the acidic contents. Regardless of whether the material is gotten as a solitary gem or in polycrystalline shape relies on upon the amalgamation conditions utilized. Despite the fact that a gem can be integrated in a perfect frame, little takeoffs from normality may exist in the types of little flaws and polluting influence incorporations. These deformities can bring about varieties in synthesis and structure, prompting deviation from the characteristic mass transport and attractive properties of the precious stone.

SOLID STATE METHOD
This is the most usually utilized technique for the arrangement of a material with multielements,
particularly if no earlier learning of blend conditions exists. This strategy includes raised and delayed warming of the right molar extents of the proper strong reactants in powder shapes. Non unadulterated, hygroscopic, non-stoichiometric, and unpredictable reactants ought to be kept away from, as polluting influences are difficult to evacuate toward the finish of the response. This method empowers the blend of principally thermodynamically stable stages, since the response happens in the strong express and requires the dispersion of particles over the grains’ purposes of contacts. New structures can frame at the stage limit between the grains. With a specific end goal to accelerate the responses in the strong state technique, the temperature can be expanded to enhance dispersion; the blend can be ground to enhance homogeneity and diminish molecule measure, and the powder blend can be pelletized to enhance grain contacts and to reduce voids.

**Bridgman Technique**

In this union strategy, harmoniously liquefying blends of components or doubles are warmed to somewhat over their dissolving point in a fixed dormant pot, and precious stones are developed by moderate cooling from the soften. There exists a temperature slope over the response with the end goal that precious stones nucleate in the colder piece of the pot, becoming gradually out of the liquefy. This technique can’t be utilized to develop materials that have high softening focuses as holders and tubes for containing the response might be elusive; likewise there might be troubles in accomplishing and controlling the high temperatures required for the liquefy.

**Flux Strategy**

This technique is utilized for developing gems by moderate cooling a supersaturated arrangement. Materials that dissolve incongruently or at high temperatures, or that disintegrate before liquefying; can be become out of a flux. The utilization of a flux takes into consideration short precious stone development time scales and essentially brought down response temperatures. A flux is a low liquefying temperature dissolvable that is utilized to break up reactants; the flux can be made out of metal components eutectic salts or doubles. A decent flux offers sensible dissolvability and diffusivity for the reactants, and can be effectively isolated from the items; it doesn’t enter the precious stone as considerations or concoction substitutions, nor does it from contending stable mixes with reactants.

**High Pressure Method**

This technique offers the blend of met as table structures, develops the solvency furthest reaches of constituent components, and produces materials with low oxidation states. The utilization of weight likewise takes into consideration impressively abbreviated response times and lessened vanishing of unstable components. The primary hindrances of this strategy are that it is hard to work, little specimen space brings about little item yields, and little response times frequently result in unreached reactants or side items.

**CONCLUSIONS**

While applications are at varying levels of development, the technological landscape is already being reshaped by new superconductors. We look forward to the discovery of room temperature superconductors. They will significantly impact our lives. Continuous union endeavors are vital, as is obvious from the fortunate disclosure of HTS in both container rates and iron-based superconductors, then the arrangements of their numerous families. The accessibility and learning of such a wide assortment of engineered procedures, consolidated with a superior comprehension of precious stone science, electronic structure, and thermodynamic and active parts of union, will in the end empower the discerning plan of superconductors. Since TC is basically controlled by synthetic synthesis and precious stone structure, it might even be that superconductivity in iron-based superconductors will inevitably surpass that of the container rates.
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Study of Smart Learning System for Efficient English Learning

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ABSTRACT

Background/Objectives: As supply and spread of Smart phones has emerged recently, a personalized Learning system with needed education resources obtained has been provided consistently in real time at anytime and anywhere.

Methods/Statistical analysis: Previous e-Learning system based on PC (Personal Computer) and web service is extending to the Smart Learning System which is based on movable u-Devices (Smart phones, tablet-PCs, laptops, etc.) and mobile applications. Smart Learning System using Internet of Things gathers location information of students within a 200m radius from the school campus. Then in real time, it provides a sentence (or a question) for English learning through smart phone and grades the answer submitted in a certain limited time.

Findings: This paper suggests the appliance of moving, flash, document-based, and tool-based contents on Smart Learning System, which previously was provided at web-based environment. For this purpose, we provided an English-learning content to the students based on previously developed approach of English learning, in real time by gathering location information of students in the campus.

Improvements/Applications: We enabled them to study English through customized system based on their ability. Smart Learning is an education environment in which the learning can be approached in autonomous and proactive way through various devices, and the user can communicate or cooperate interactively with other users.

Keywords: Smart Learning, IOT, u-Learning, GCM, Smart Campus

INTRODUCTION

A rapid development of IT technology has brought revolutionary changes throughout many parts of our society. Influenced by explosive spread and constant improvement of Smart devices, the paradigm of education is also greatly changing. As Smart Learning has risen as a new educational paradigm of the 21st century, it is also strongly demanded by the field of college education. This demand is not a blind acceptance of new technology but an efficient tool of education in the age of Smart Learning¹. Therefore active seeking of a way to apply the latest technology on education is advisable, promptly satisfying the needs of the times. Thus, for improvement of in-campus English learning ability, this paper suggests the Smart Learning System using Internet of Things (IoT)².
[Figure 1] is the structure of Smart Learning System based on the web. It was designed regarding the production and usage of various contents in web-based environment of various platforms that also operates for requests of comparative High resource. On smart phones, you can study in real time through data streaming and concurrently download related resources. We developed a smart phone application for such facility, and adopted Internet of Things so that by gathering the in-time location information of the user, the user can be provided a brief English-learning quiz during the way to and from school. This facility can also be applied for laptop and tablet-PC, but we focused on the smart phone for its convenience of mobility and portability. Smart Learning is an education environment in which the learning can be approached in autonomous and proactive way through various devices, and the user can communicate or cooperate interactively with other users.

Fig. 1. The structure of Smart Learning System based on the web

Fig. 2. Architecture of LMS Interactive

[Figure 2] shows internal structures of various contents and synchronous types between LMS (Learning Management System) and the contents. Through LMS, the contents served by the server are transformed to be independent from platform and then provided to each user. A suitable environment construction for the platform of user is interlocked enabling a continuous learning of the user.

Smart Learning System using Internet of Things gathers location information of students within a 200m radius from the school campus. Then in real time, it provides a sentence (or a question) for English learning through smart phone and grades the answer submitted in a certain limited time. Also, by gathering school timetable of the students through the school affairs supporting system, it provides resources for English learning of speaking and listening so that the users would write and submit a proper sentence about the resources. The second chapter of this paper will introduce related studies, the third chapter will introduce the design of Smart Learning System, and the fourth chapter will propose the conclusion and future tasks.

**RELATED WORK**

**Internet of Things**

Extension of smart devices, smart phones in particular, has brought out a hyper connectivity in which network communication is enabled at any time and at any place continuously. The core components of this hyper connectivity environment are the intelligent communication systems between objects including M2M (machine to machine), IoT (Internet of Things), and IoE (Internet of Everything).

Advent of this hyper connected society, started from people-oriented communication, has extended to the linkages of human-object and object-object. Development of Internet of Things has changed people’s lives, radically bringing innovation in various industries of medicine, transportation, manufacturing, and distribution: it is accomplishing the ultimate Smart Life.

Fig. 3. Structure of M2M, IoT, IoE based on Hyper Connected Environment

[Figure 3] shows a diagram of M2M (Machine to Machine), IoT (Internet of Things), and IoE (Internet of Everything) which are the components of hyper connected environment. The hyper connective technology provides several types of links between devices using various network technologies (RFID,
NFC, WIFI, Bluetooth, Zigbee, GPS, 4G, or LTE-A. Through these links it creates new ideas of services integrated with other industries. Especially a new paradigm of educational information based on ICT such like Smart Learning is emerging. Also recently, its time, space, learning contents, and approaches are keeping extending through the Smart Learning based on wire-wireless network and multi-device platform.7

Internet of Things is an intellectual environment based on ICT (Internet Communication Technology) which connects all the objects within wire-wireless network and intercommunicate information of user to object, or object to object. Gartner, an American market survey agency, has chosen Internet of Things as the most popular and advanced field of technology. Internet of Things is broadly segmented into three areas: device (user device and sensor), network (wire and wireless), and service interface (platform and application). The area of device transfer a data collected and extracted from certain object to the other object by embedded communication function. The area of network is a wire-wireless gate which transmits and receives the data sent from user to object, or object to object. The area of service interface deals with the data to create information, control devices, and administrate devices.

Domestic and Foreign case of Smart Learning

A domestic introduction of Smart Learning started as ‘Smart Education Strategies’ was established in 2011 for deduction of private education deduction, improvement of in-class education, and overall enhancement of education satisfaction. The government focused on laying the groundwork for smart education through infrastructure construction and digital textbook development but failed to bring noticeable achievement. They succeeded to develop the digital textbook but could not introduce them to the spot of education, for there was no proper content nor learning model suitable for smart learning and stable communication infrastructure was not secured. Therefore for a successful settlement of smart learning, an establishment of new policy regarding present of public education, characteristics of smart learning, and its users is suggested. On the other hand, there is a case which such system developed by a company is being used8.

Fig. 4. Structure of Hyper Connected Environment

[Figure 4] shows a structure of hyper connected environment. As technology infrastructure of wireless network, communication module, communication sensor, and smart device has greatly enhanced and spread, influence of hyper connected environment is expected to be widely extended upon overall industries and daily lives. Existing service methodology will be progressively changed with this hyper connected environment applied on various fields of medicine, transportation, manufacturing, distribution, and education. The integrating linkage of device, network, and service, and its spread through reproduction links smart technology and smart service to related industries. This leads to the radical innovation of industrial ecosystem, which changes the shape of human life and actualizes the ultimate smart life.

Fig. 5. TED Learning Service in Web/Mobile Environment

[Figure 5] shows the interface of TED learning service in web/mobile environment. TED is an informative conference hosted by an American non-profit foundation that provides qualified lectures of celebrities from each fields. Its video media is free to use in web and mobile environment, and also provides translation service for users so that they can share ‘ideas worth spreading’ globally.

[Figure 6] shows the interface of edX learning service in web environment. edX is a non-profit educational institution established by MIT College of
Engineering and Harvard University. As a social learning service, it provides about 40 lectures of natural science and computer theory from the world’s most famous seats of learning. For over 900,000 people worldwide using the system, it provides interactive system in which the users can inquire to the instructor or have discussion with each other. It also issues a certification through a test.

Fig. 6. edX Learning Service in Web Environment

Design of the system

The Smart Learning System using Internet of Things supports real-time English learning for the students through smart phone application during their way to school or absence of class. The student would learn English following customized level or the level chosen by the user.

Fig. 7. Structure of Smart Learning System

[Figure 7] is a structure of Smart Learning System in which the user can access the English learning system based on server. MySql DB is used as a database, composed with 6 tables. Mobile access of the user can be recognized by gathering location information within a 200m radius from the school campus by Geo-Fence based on Android. The recognized data is transferred to the user in real time through the server. In this user-based Android environment, the user can work through various vocabulary practices, sentence quizzes, and real-time speech service. These various user information is transferred to the server in real time through Google Cloud Message (GCM). The data sent is saved and cumulated as a score for each user, and base on this data, the system serves English tests of customized level.

Fig. 8. Flow Chart of Smart Learning Data

[Figure 8] shows the flow chart of Smart Learning System for efficient English learning. Through the server, with the location recognized by GCM, the system send tasks to the user in real time and the data sent is transferred to the server by the user through the application. If the user is in the campus, the answer for the task can also be sent to the server through kiosk. During the lecture, its mid-term test, final test, and quizzes can be sent to the server in real time. According to all these data collected by the server, the system distinguishes user-customized level of learning through big data analysis.

Basic prototype of Smart Learning System is broadly classified into three types. First type is a LMS prototype based on geofencing. LMS (Learning Management System) is a system that manages overall academic affairs through network. It shows progress, score, and attendance of the user. As a solution of offline attendance management system, various ways including ID card, NFC, and QR code tagging have been suggested. However an offline system inevitably includes inconvenience in process from the viewpoint of UX, such like time loss for attendance checking and cheated attendance. To solve such problem of previous LMS, geofencing- a technology that collect information of user access in certain designated area, which is a compound word of ‘grographic’ and ‘fencing’- is used. Once a range of area is designated by GPS, access of user in the area is turned into data by convenient
simple registration using smart phone. A Smart Learning System based on geofencing Internet of Things collects the attendance data automatically through link between personal device and LMS.

Second type is a N-screen LCMS prototype based on beacon. LCMS(Learning Contents Management System) manages various learning contents that are used for communication of those online-offline learning through network. Education is composed of tutor, tutee, and learning contents. The contents have developed by being translated into digital data, applying ICT, but its method of transmission is still remaining as unilateral transfer, which is quite classic. Extension of transmission method using beacon-based N-screen is a connected learning system in which interaction between tutor and tutee is strongly linked.

Third type is a cooperative learning prototype based on social network. Through Smart Learning based on social network, the user not only simply studies the informative contents provided but also reproduces and provides new contents to the others. This academic cooperation and sharing of collective intelligence are enabled by the technique of ICT, which let the users to become productive consumers, and so the system involves a property of ‘prosuming’. Through the sharing of various learning contents, the user can reinforce self-directed learning capability, information necessity sorting capability, active reception, and creative appliance capability. Also, using the supporting infrastructure, multi-communication, expansion of contents, and constant approach can be guaranteed through real-time interactive network.

In this paper, we designed the Smart Learning System prototype using only the strengths of geofencing-based and beacon-based prototypes.

Conclusion and Future Works

We designed a system that presents English sentence (question) and speech to the students who access near the school campus within a 200m radius, in real time by collecting location information of the students. Then we designed an intellectual system that classifies level of the users with the information collected by the server, the answers submitted by the students in limited time. For further studies, if a mobile application cannot provide the answer information due to network error, constructing a real-time information serving system through kiosk in campus can be considered.

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Conflict of Interest: nil
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A Study on Impact of Perceived Environmental Cues on Festival Satisfaction and Behavior Intention

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ABSTRACT

Background/Objectives: The purpose of this study is to investigate which factors among the perceived environmental cues affect the satisfaction and behavioral intentions of visitors to the 2016 Dam Yang Bamboo Festival, in order to perform a theoretical study on perceived festival environmental cues.

Method/Statistical analysis: The survey was conducted on 300 visitors who visited the 2016 Dam Yang Bamboo Festival during the festival period from May 3, 2016 to May 8, 2016. 300 responses were collected, with 270 used for the analysis, excluding incomplete responses. Statistical processing of the collected data was performed through data coding, and frequency analysis, reliability analysis, factor analysis and multiple regression analysis were performed using SPSS 12.0 for Windows.

Findings: The results of this study are as follows: First, the environmental cues factor of Bamboo Festival varied according to three levels of satisfaction. Food was the most influential factor in festival satisfaction. Second, for environmental cues of the Bamboo Festival, convenience facilities, and accessibility and marketing were important factors for revisit intention, a behavioral intention which is a follow-up variable of satisfaction. For recommendation intention, PR and advertising was the important factor. On the other hand, food did not have any statistically significant impact. Third, analysis results for the impact of festival satisfaction on revisit intention and recommendation intention, which are behavioral intentions, showed that festival satisfaction was the important factor.

Improvements/Applications: The aim of this study is to present a sustainable development strategy for the 2016 Dam Yang bamboo festival. It is a research needed for the future strategy of the environmentally friendly Bamboo festival, and believe that it will be of great resource in promoting a sense of direction for development for environmentally friendly festivals.

Keywords: Local festival, Perceived Environmental Clues, Satisfaction, Behavioral Intention, Recommendation intention, Revisit intention

INTRODUCTION

There are various festivals in Korea for the purpose of regional development and general interest in festival environments and in revitalizing the local economy is increasing. The Dam Yang Bamboo Festival has excellent natural scenery and an environment for sustainable development with the theme of ‘Bamboo’, which is a local culture and local resource. It is visited mainly by tourists together with Juknokwon, Gwanbangjerim Forest and the Metasequoia-lined Road. Tourists nowadays are showing great interest in unique and differentiated tourism resources that can be seen and experienced only in that specific region.

Local governments are developing tourism festivals and with hopes for socio-cultural, economic and environmental effects. The purpose of this study is to empirically analyze the structural relationship between festival environmental cue factors, visitor satisfaction, and behavioral intentions of the 2016 Damyang Bamboo Festival. In particular, we empirically analyzed which factors among festival environmental cue factors affect visitor satisfaction, and whether or not visitor satisfaction directly impacts behavioral intentions. We also analyzed the perceived differences of festival environmental cues, visitor satisfaction and visitors’ behavioral intention according to the different visitor types.
MATERIALS AND METHOD

The concept of local festivals

After the local self-governing system was implemented, the heads of local governments are holding local festivals as strategic projects to revitalize the local economy. Local governments are rushing to present leading local festivals beyond using festivals as a way to invigorate and promote local culture. They showed interest in local festivals because they thought that festivals have a big impact on restructuring and developing the local society.

Local festivals are excellent means to instill identity and pride to local residents, to build reputation about the area to visitors, and to promote comprehensive regional development in all areas including politics, economy, culture and society. Local festivals refer to popular events with themes that are based on the cultural identity of the local community, or refer to events where tourists can have a wide variety of experiences that fulfill their needs based on the things to see, play, eat and learn that are offered at the festival.

Festival Environmental Cues

In this study, the definition of perceived environmental cues is widely used in the broad concept of cues, which are often used to refer to stimuli, attributes, or information. Cues are being studied in various fields including educational psychology and environmental psychology. Environmental psychologists regard environmental cues as the stimulus that affects emotion that the consumer experiences in a set environment, and claimed that these emotions lead to approach and avoidance behaviors. Cues can be divided into two categories – intrinsic cues or extrinsic cues. When discussing festivals, it is mainly understood as the concept of physical environment factors and various environmental cues are used according to the characteristics of the festival.

Visitor Festival Satisfaction

Visitor festival satisfaction can be defined as the overall psychological, emotional assessment that an individual makes after the visitor perceives information about the festival and experiences it. It is being widely researched as it is an important factor in future behavioral intentions which appear in the form of revisits or positive word of mouth for the respective festival. Looking at the relationship between the psychological experience of tourism and satisfaction and the relationship between tourism experience according to tourist spot and follow up evaluation, the relationship between variables that affect action intentions after evaluation on each tourist spots appears to be different due to the comprehensive but unique images of each destination that are subject to the evaluation. The Ministry of Culture, Sports and Tourism places importance on visitor satisfaction and requests professional rating agencies for evaluations of each festival, and engages in research and analysis for visitor satisfaction using objective and scientific methods. Preceding studies indicate that if festival satisfaction was to be defined, it would be the overall subjective evaluation response that a visitor makes about one’s own experience after participating in activities or attending the festival.

Behavioral Intentions

Behavioral intention is the subjective possibility of beliefs and attitudes being actuated, and its intention is perceived as an intermediate variable between an individual’s attitude and behavior. Therefore, behavioral intention can be defined as the will and belief of a person who wants to express a certain future action after consumers forms an attitude toward an object. Behavioral intention is important as a predictor of consumption behavior and can be thought of as a plan to implement to achieve a certain purpose. In related studies, behavioral intentions is consisted of revisit intention and the intent to provide positive recommendation intention. In this study, revisit intention is defined as the intention to revisit the festival by the visitor that has already attended the festival, which was measured using a single question. Recommendation intention can be defined as the willingness to inform others of the services and detailed experiences based on the positive experiences by the visitors themselves.
Statistical analysis

The purpose of this study is to clarify how festival environment cues affect festival satisfaction, behavioral intentions (revisit intention, recommendation intention). Therefore, the following research model and hypotheses were selected as shown in <Insert figure> based on the study related to festival environment cues, festival satisfaction and behavioral intentions (revisit intention, recommendation intention)14,15.

Fig. 1. Research Model

H 1. Perceived festival environmental cues will have a positive effect on visitor satisfaction.

H 2. Perceived festival environmental cues will have a significantly positive effect on revisit intention, a behavioral intention.

H 3. Perceived festival environmental cues will have a significantly positive effect on recommendation intention, a behavioral intention.

H 4. Visitor festival satisfaction will have a positive effect on revisit, a behavioral intention.

H 5. Visitor festival satisfaction will have a positive effect on recommendation intention, a behavioral intention.

In order to accomplish the purpose of this study, literature reviews and empirical research were both used. Through literature review, previous studies on perceived festival environmental cues and visitors festival satisfaction were examined using related books, reports, papers, and website data. The items for the questionnaire were based on the plan for comprehensive evaluation for culture and tourism festivals (Ministry of Culture and Tourism). The survey was conducted on 300 visitors who visited the 2016 Dam Yang Bamboo Festival during the festival period from May 3, 2016 to May 8, 2016. 300 responses were collected, with 270 used for the analysis, excluding incomplete responses. Statistical processing of the collected data was performed through data coding, and frequency analysis, reliability analysis, factor analysis and multiple regression analysis were performed using SPSS 12.0 for Windows.

In this study, 18 questions including 1 question on accessibility, 4 questions on festival PR and advertising, 4 questions on festival contents, 3 questions on festival merchandise, 2 questions on food, 1 question on use of surrounding tourist places, 3 questions on convenience facilities were measured using a scale from 1 to 7 with 1 being ‘very unsatisfied’, and 7 being ‘very satisfied’. Also, satisfaction was measured with the question on overall satisfaction of the festival using a scale from 1 to 7 with 1 being ‘very unsatisfied’ and 7 being ‘very satisfied’. With visitors’ behavioral intention (revisit intention, recommendation intention), 2 questions were asked, ‘I will visit the local festival again’, and ‘I will recommend it to friends’, and they were measured using a scale from 1 to 7 with 1 being ‘very unsatisfied’ and 7 being ‘very satisfied’.

RESULTS AND DISCUSSION

Step 1

The demographic profile of the sample is shown in Table 1. There were more female respondents with 161 respondents (59.9%) and 109 male respondents (40.1%). The most frequent age group was people in their 20s with 114 respondents (42.4%), and for occupation students accounted for the largest percentage with 135 respondents (50.2%). Characteristics of the samples are shown in table 1.
Table 1: Characteristics of the samples

<table>
<thead>
<tr>
<th>Item</th>
<th>Contents</th>
<th>Percent (%)</th>
<th>Item</th>
<th>Contents</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>108(40.1)</td>
<td>Job</td>
<td>Festival related business</td>
<td>8(3.0)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>161(59.9)</td>
<td>Business</td>
<td>(event, broadcasting, press, design)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Profession</td>
<td></td>
<td>38(14.1)</td>
</tr>
<tr>
<td>Age</td>
<td>10</td>
<td>78(29.0)</td>
<td>Unworthy</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>114(42.4)</td>
<td>Production</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>44(16.4)</td>
<td>Farming</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>40</td>
<td>28(10.4)</td>
<td>Student</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>50~</td>
<td>4(1.5)</td>
<td>Other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td>1 million won</td>
<td></td>
<td>101~200</td>
<td>80(26.0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>1(.4)</td>
<td>201~300</td>
<td>30(11.2)</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>High school</td>
<td>37(13.8)</td>
<td>301~400</td>
<td>9(3.7)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>College</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graduation</td>
<td>42(15.6)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>University Graduation</td>
<td>80(29.7)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Graduate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>School Graduation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>108(40.1)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In order to examine the perceived festival environmental cues measured using 18 items, and to examine the validity and reliability of the study units of visitor satisfaction, recommendation intention, and revisit intention, principal component analysis using the orthogonal rotation method was performed as shown in Table 2. For the final selection of items, factors were selected only when the eigenvalue was greater than 1, the factor loading was 0.4 or more and when the commonality was 0.4 or more. A factor analysis on perceived festival environmental cues resulted in 6 common factors with eigenvalues greater than 1. The explained variance by the 6 common factors was 78.182%. In addition, the KMO value confirming the selection of each measurement variable for the factor analysis was .904, and Bartlett’s Test of Sphericity for determining the model fit of the factor analysis gave a significant value of 2815.514 (p-value: 0.000). Meanwhile, the reliability analysis on generated factors using Cronbach’s alpha showed .880 for festival contents, .890 for festival merchandise, .853 for convenience facilities, .814 for PR and advertising, .824 for food and .550 for accessibility and marketing.

Table 2: Verification result of validity and reliability

<table>
<thead>
<tr>
<th>Factor &amp; Item</th>
<th>Factor loading</th>
<th>Commonality</th>
<th>Variance</th>
<th>Reliability Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contents of events</td>
<td>Variety of events</td>
<td>.807</td>
<td>.826</td>
<td>2.941 (17.299)</td>
</tr>
<tr>
<td></td>
<td>Program Satisfaction</td>
<td>.794</td>
<td>.827</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Event fun</td>
<td>.717</td>
<td>.743</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Understanding Culture</td>
<td>.707</td>
<td>.728</td>
<td></td>
</tr>
<tr>
<td>Products of festivals</td>
<td>Souvenir quality</td>
<td>.817</td>
<td>.855</td>
<td>2.511 (14.773)</td>
</tr>
<tr>
<td></td>
<td>Souvenir price</td>
<td>.765</td>
<td>.834</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Souvenir type</td>
<td>.731</td>
<td>.795</td>
<td></td>
</tr>
<tr>
<td>Convenience of use</td>
<td>Seating area</td>
<td>.813</td>
<td>.823</td>
<td>2.376 (13.979)</td>
</tr>
<tr>
<td></td>
<td>Restroom</td>
<td>.806</td>
<td>.793</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Parking facilities</td>
<td>.706</td>
<td>.739</td>
<td></td>
</tr>
</tbody>
</table>
Table 2: Verification result of validity and reliability (Contd.)

<table>
<thead>
<tr>
<th>Factor &amp; Item</th>
<th>Factor loading</th>
<th>Commonality</th>
<th>Variance</th>
<th>Reliability Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>PR Information</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pamphlet</td>
<td>.759</td>
<td>.791</td>
<td>2.041</td>
<td>.814</td>
</tr>
<tr>
<td>Guide</td>
<td>.713</td>
<td>.719</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information facilities</td>
<td>.678</td>
<td>.784</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food diversity</td>
<td>.802</td>
<td>.850</td>
<td>1.724</td>
<td>.824</td>
</tr>
<tr>
<td>Food price</td>
<td>.766</td>
<td>.816</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accessibility and Pre-promotion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accessibility</td>
<td>.810</td>
<td>.710</td>
<td>1.698</td>
<td>.550</td>
</tr>
<tr>
<td>Pre-promotion</td>
<td>.755</td>
<td>.659</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total description: 78.182%

KMO: .904

Bartlett: 2815.514 (p-value: 0.000)

Step 2

H1. Perceived festival environmental cues will have a positive effect on visitor satisfaction.

After performing a multiple regression analysis with perceived festival environmental cues as the independent variable, and festival satisfaction as the dependent variable to test Hypothesis 1, as show in Table 1, the F value of the variance analysis was 27.460 and the adjusted R2 was .372. Also, the T test on the regression coefficients of the variables that were added to the regression equation showed that it had an effect. Analysis results showed that food had the greatest effect on the festival satisfaction, and 3 factors including convenience facilities, and festival contents had an effect on festival satisfaction at p<0.05 and p<0.01 significance level. Multiple Regression Analysis Results on Perceived Festival Environmental Cues and Festival Satisfaction are shown in table 3.

Table 3: Multiple Regression Analysis Results on Perceived Festival Environmental Cues and Festival Satisfaction

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Independent Variable</th>
<th>Unstandardized Coefficient B</th>
<th>Std Error</th>
<th>Standardized Coefficient</th>
<th>T</th>
<th>p-value</th>
<th>Tolerance Limit</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Festival Satisfaction</td>
<td>Constant</td>
<td>1.576</td>
<td>.287</td>
<td>5.497</td>
<td>.000</td>
<td></td>
<td>.760</td>
<td>1.316</td>
</tr>
<tr>
<td></td>
<td>Accessibility and Marketing</td>
<td>.909</td>
<td>.050</td>
<td>1.00</td>
<td>1.795</td>
<td>.074</td>
<td>.462</td>
<td>2.165</td>
</tr>
<tr>
<td></td>
<td>PR and Advertising</td>
<td>.122</td>
<td>.068</td>
<td>.128</td>
<td>1.794</td>
<td>.074</td>
<td>.471</td>
<td>2.123</td>
</tr>
<tr>
<td></td>
<td>Festival Contents</td>
<td>.131</td>
<td>.063</td>
<td>.142</td>
<td>2.014</td>
<td>.045**</td>
<td>.471</td>
<td>2.123</td>
</tr>
<tr>
<td></td>
<td>Festival Merchandise</td>
<td>.087</td>
<td>.061</td>
<td>.102</td>
<td>1.417</td>
<td>.158</td>
<td>.455</td>
<td>2.200</td>
</tr>
<tr>
<td></td>
<td>Food</td>
<td>.160</td>
<td>.056</td>
<td>.189</td>
<td>2.835</td>
<td>.005**</td>
<td>.526</td>
<td>1.900</td>
</tr>
<tr>
<td></td>
<td>Convenience Facilties</td>
<td>.121</td>
<td>.055</td>
<td>.149</td>
<td>2.214</td>
<td>.028*</td>
<td>.520</td>
<td>1.924</td>
</tr>
</tbody>
</table>

R2 = .386  Adjusted R2 = .372  F = 27.460  p=.000**

Notes * Shows significance at the p<0.05, ** Shows significance at p<0.01 level
H 2. Perceived festival environmental cues will have a significantly positive effect on revisit intention, a behavioral intention.

As shown in Table 4, the F value of the variance analysis was 9.351 and the adjusted R² was .158. Also, the T test on the regression coefficients of the variables that were added to the regression equation showed that it had an effect. Analysis results showed that convenience facilities had the greatest effect on the revisit intention, and it affected revisit intention at the p <0.01 significance level. Such results show that various benefits can be attained through convenience facilities and that accessibility and marketing factors are important factors for revisit intention. However, it showed that food, festival merchandise and festival contents did not have an effect on revisit intention. Among these 3 factors, an interesting result was that festival contents on revisit intention are negative. Therefore, there is a need to increase the revisit rate through differentiated experimental and participatory festival contents.

Table 4: Multiple Regression Analysis Results on Perceived Festival Environmental Cues and Revisit Intention

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Independent Variable</th>
<th>Unstandardized Coefficient</th>
<th>Standardized Coefficient</th>
<th>T</th>
<th>p-value</th>
<th>Tolerance Limit</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revisit Intention</td>
<td>Constant</td>
<td>2.603</td>
<td>.394</td>
<td>6.602</td>
<td>.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Accessibility and Marketing</td>
<td>.134</td>
<td>.068</td>
<td>.125</td>
<td>1.945</td>
<td>.053</td>
<td>.760</td>
</tr>
<tr>
<td></td>
<td>PR and Advertising</td>
<td>.173</td>
<td>.094</td>
<td>.152</td>
<td>1.846</td>
<td>.066</td>
<td>.462</td>
</tr>
<tr>
<td></td>
<td>Festival Contents</td>
<td>-.011</td>
<td>.089</td>
<td>-.010</td>
<td>-.119</td>
<td>.905</td>
<td>.471</td>
</tr>
<tr>
<td></td>
<td>Festival Merchandise</td>
<td>-.018</td>
<td>.084</td>
<td>-.017</td>
<td>-.210</td>
<td>.834</td>
<td>.455</td>
</tr>
<tr>
<td></td>
<td>Food</td>
<td>.020</td>
<td>.078</td>
<td>.020</td>
<td>.261</td>
<td>.795</td>
<td>.526</td>
</tr>
<tr>
<td></td>
<td>Convenience Facilities</td>
<td>.243</td>
<td>.075</td>
<td>.251</td>
<td>3.224</td>
<td>.001**</td>
<td>.520</td>
</tr>
</tbody>
</table>

R² = .176   Adjusted R² = .158   F = 9.351   p=.000**

Notes: * Shows significance at the p<0.05, ** Shows significance at p<0.01 level

H 3. Perceived festival environmental cues will have a significantly positive effect on recommendation intention, a behavioral intention.

As shown in Table 5, the F value of the variance analysis was 10.554 and the adjusted R² was .176. Also, the T test on the regression coefficients of the variables that were added to the regression equation showed that it had an effect. Analysis results showed that PR and advertising had the greatest effect on the recommendation intention, and 3 factors including convenience facilities, accessibility and marketing affected recommendation intention at p<0.05 and p <0.01 significance level. Such results show that various benefits can be attained through the PR and advertising factor, and those convenience facilities, accessibility and marketing factors are important factors for recommendation intention.

Table 5: Multiple Regression Analysis Results on Perceived Festival Environmental Cues and Recommendation Intention

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Independent Variable</th>
<th>Unstandardized Coefficient</th>
<th>Standardized Coefficient</th>
<th>T</th>
<th>p-value</th>
<th>Tolerance Limit</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recommendation Intention</td>
<td>Constant</td>
<td>3.184</td>
<td>.342</td>
<td>9.299</td>
<td>.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Accessibility and Marketing</td>
<td>.111</td>
<td>.060</td>
<td>.118</td>
<td>1.854</td>
<td>.065</td>
<td>.760</td>
</tr>
<tr>
<td></td>
<td>PR and Advertising</td>
<td>.221</td>
<td>.082</td>
<td>.221</td>
<td>2.713</td>
<td>.007**</td>
<td>.462</td>
</tr>
<tr>
<td></td>
<td>Festival Contents</td>
<td>-.067</td>
<td>.078</td>
<td>-.069</td>
<td>-.858</td>
<td>.392</td>
<td>.471</td>
</tr>
</tbody>
</table>
Table 5: Multiple Regression Analysis Results on Perceived Festival Environmental Cues and Recommendation Intention (Contd.)

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Independent Variable</th>
<th>Unstandardized Coefficient</th>
<th>Standardized Coefficient</th>
<th>T</th>
<th>p-value</th>
<th>Tolerance</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Festival Merchandise</td>
<td>.111 (.073)</td>
<td>.125 (.130)</td>
<td>1.519</td>
<td>.130</td>
<td>.455</td>
<td>2.200</td>
</tr>
<tr>
<td></td>
<td>Food</td>
<td>-.002 (.067)</td>
<td>-.002 (.980)</td>
<td>-.025</td>
<td>.980</td>
<td>.526</td>
<td>1.900</td>
</tr>
<tr>
<td></td>
<td>Convenience Facilities</td>
<td>.129 (.065)</td>
<td>.152 (.049)</td>
<td>1.976</td>
<td>.049*</td>
<td>.520</td>
<td>1.924</td>
</tr>
</tbody>
</table>

R2 = .195 Adjusted R2 = .176 F = 10.554 p=.000**

Notes: * Shows significance at the p<0.05, ** Shows significance at p<0.01 level

H 4. Visitor festival satisfaction will have a positive effect on revisit, a behavioral intention.

As shown in Table 6, the F value of the variance analysis was 40.569 and the adjusted R2 was .129. Also, the T test on the regression coefficients of the variables that were added to the regression equation showed that it had an effect. Analysis results showed that the festival satisfaction had a great effect on revisit intention, and festival satisfaction factor affected revisit intention at p < 0.01 significance level.

Table 6: Multiple Regression Analysis Results on Visitor Satisfaction Factors and Revisit Intention

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Independent Variable</th>
<th>Unstandardized Coefficient</th>
<th>Standardized Coefficient</th>
<th>T</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revisit Intention</td>
<td>Constant</td>
<td>2.981 (.332)</td>
<td>8.969 (.000)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Festival Satisfaction</td>
<td>.431 (.068)</td>
<td>.363 (6.369)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

R2 = .132 Adjusted R2 = .129 F = 40.569 p=.000**

Notes: * Shows significance at the p<0.05, ** Shows significance at p<0.01 level

H 5. Visitor festival satisfaction will have a positive effect on recommendation intention, a behavioral intention.

As shown in Table 7, the F value of the variance analysis was 48.465 and the adjusted R2 was .150. Also, the T test on the regression coefficients of the variables that were added to the regression equation showed that it had an effect. Analysis results showed that the festival satisfaction had a great effect on recommendation intention, and festival satisfaction factor affected recommendation intention at p < 0.01 significance level. It can be inferred that festival satisfaction is an important factor of recommendation intention.

Table 7: Multiple Regression Analysis Results on Festival Satisfaction Factors and Recommendation Intention

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Independent Variable</th>
<th>Unstandardized Coefficient</th>
<th>Standardized Coefficient</th>
<th>T</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recommendation Intention</td>
<td>Constant</td>
<td>3.509 (.288)</td>
<td>12.173 (.000)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Festival</td>
<td>.409 (.392)</td>
<td>6.962 (.000)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

R2 = .154 Adjusted R2 = .150 F = 48.465 p=.000**

Notes: * Shows significance at the p<0.05, ** Shows significance at the p<0.01 level
CONCLUSION

This study investigates which factors among perceived festival environmental cues affect visitors’ festival satisfaction and behavioral intentions (revisit intention, recommendation intention) for the 2016 Dam Yang Bamboo Festival. The aim of this study is to contribute in developing a comprehensive marketing communication strategy for a sustainable festival.

The summary and implications of this study are as follows. First, results of the factor analysis on perceived environmental cues lead to the selection of 6 factors: accessibility and marketing, PR and advertising, festival contents, food, and convenience facilities. Second, festival visitors do not visit just with the sole purpose of visiting the festival. A big factor for visitors was the food experience. They could experience the nature and the lively streets of Dam Yang through diverse foods, suggesting that the visitors do not visit for the purpose of simply participating in local festivals. The limitations of this study are as follows. First, the sample of this study tried to cover all visitors who visited the 2016 Dam Yang Bamboo Festival, but it is hard to confirm that the sample reflected all the visitors who visited the festival. Second, there are limitations in evaluating the perceived festival environmental cues of the entire festival using only the selected factors in this study. Therefore, a scale of measurement that can comprehensively evaluate environmentally friendly festivals needs to be developed by implementing various evaluation methods to evaluate perceived festival environmental cues. Last but not least, in order for the Bamboo Festival to reform into a differentiated environmentally friendly festival by linking the tourism development business, there needs to be differentiated programs and tourism packages to attract active and continuous visits for the sustainable development of the Dam Yang Bamboo Festival.

ACKNOWLEDGMENT

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Ethical Clearance: Taken from Gwangju University

Conflict of Interest: Nil

REFERENCES

Survey on Methane Hydrate Detection with Marine Electromagnetic

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ABSTRACT

Methane hydrate (MH) is required to be another vitality asset in light of the fact that a lot of methane gas might be contained in the MH layer. MH has high resistive element, so that the marine EM studies will be a valuable apparatus for recognizing subseafloor MH. We present two contextual investigations of marine electromagnetic overviews off Japan drift to identify MH beneath the ocean bottom. The primary case is done in the Sea of Japan, 2005. Our marine profound towed EM streamer link could picture the subseafloor resistivity dissemination to the profundity of 100m beneath the ocean bottom, and effectively distinguished MH zones as high resistivity. The second case, a marine CSEM try, with a profound towed link and a sea base electromagnetometer (OBEM), is done off the Tokai territory, along the Pacific side of Japan, 2006. A thin and profound MH zone (with thickness of around 30m and profundity of around 200m beneath the ocean bottom) perceived in the borehole is not obviously imaged by our overview. The reason is principally because of variance of the track and bearing of profound towed source dipole. Further and cautious investigation of CSEM information with acoustic route information will enable us to picture the profound MH zone.

Keywords: MH, EM, OBEM, CSEM.

INTRODUCTION

Methane hydrates (MHs) are actually happening solids comprising of methane and water at low temperature and high weight, frequently found in sedimentary layers along mainland edges. A lot of methane gas might be contained in the MH layer, so that MH is relied upon to be another vitality asset (e.g., Kvenvolden, 1993⁹). Then again, MH will significantly affect a worldwide temperature alteration, since methane is one of the nursery gasses.

Seismic reflection studies are frequently utilized for mapping the MH zone. Reflectors around parallel to the ocean bottom (called as base reproducing reflectors: BSRs) are frequently distinguished underneath mainland edges, and are translated as a stage limit between strong hydrate and free gas beneath the MH zone (Shipley et al., 1979⁹). Be that as it may, there are for the most part no reasonable seismic reflectors at the top limit of the MH zone, and the upper bound of the MH zone has not been settled well. Now and again, the presence of much gas hydrate has been induced where no BSR was discovered (Paull et al., 2000⁹).

In this paper, we concentrate on another geophysical instrument, delicate to MH layers: a marine electromagnetic (EM) overview framework. As abridged in Goldberg et al. (2000)⁹, the resistivity of an arrangement including enormous MH might be as high as a few several ohm-m, though dregs without MH ordinarily have a resistivity of around 1ohm-m. In this manner, marine EM studies have potential for imaging the MH zone. As of late, marine controlled-source EM (CSEM) reviews with sea base EM collectors (OBEMs: Weitemeyer et al., 2006⁹), and with towed framework (Schwalenberg et al., 2008⁹) prevail with regards to imaging MH. Be that as it may, their spatial resolutions are constrained because of number of perception destinations.

Growth, Optical, Dielectric and Ferroelectric Properties of Non-Linear Optical Single Crystal: Glycine-Phthalic Acid was described.
Crystal growth, perfection, linear and nonlinear optical, photoconductivity, dielectric, thermal and laser damage threshold properties of 4-methylimidazolium picrate: This system describes an interesting organic crystal for photonic and optoelectronic devices. Horizontal Transfer of Chloramphenicol Resistance Plasmids from was implemented for Marine associated Pseudomonas. Frequently distinguished underneath glands are taken special care in this case. The newly developed marine DC resistivity survey system is shown in the system.

We additionally built up the electromagnetic instruments settled on the ocean bottom and getting simulated signs from the profound towed source dipole. Our own ocean bottom instrument, called as a sea base electromagnetometer (OBEM; Fig.2) is portrayed as a high example rate, an arm collapsing framework system to encourage get together and recuperating operations, and the littler size. The OBEMs can likewise watch common electromagnetic signs from the ionosphere. They have as of now demonstrated adequate quality for imaging the crustal structure underneath the ocean bottom by utilizing magnetotelluric strategy. The subtle elements of our OBEM and its preparatory outcomes are outlined in Kasaya and Goto (2009).

Fig. 1. Schematic diagram of the newly developed marine DC resistivity survey system

**Instruments**

We have built up another profound towed marine DC resistivity review framework for imaging the sub-ocean bottom resistivity structure constantly (Fig.1). It was predominantly intended to recognize the top limit of the methane hydrate zone, which is not imaged well by seismic reflection reviews. Our framework comprises from a transmitter and a 160-m-long tail with eight source terminals and a recipient dipole, which is towed from an exploration vessel close to the ocean bottom. The flat area and water profundity of 160-m-long tail are checked by an advanced acoustic transponder framework. Albeit comparative marine DC resistivity reviews have been led at the extremely shallow water zone (e.g., Lile et al., 1994; Allen and Merrick, 2007), its applications to remote ocean looking over have been uncommon. On the premise of numerical reviews, our framework will be delicate to the profundity of 100 m beneath the ocean bottom. Such infiltration profundity additionally couldn’t be accomplished by the past reviews with marine DC resistivity study, perhaps because of the littler source current plentifullness than our framework.

In the following chapters, two case studies of our marine DC resistivity survey system are introduced. They imply the high possibility of marine electromagnetic techniques elucidating resistivity structure below the seafloor.

**Case 1: Sea of Japan**

Clench hand, we connected our framework to another zone in the Sea of Japan, where the MH outcrops on the ocean bottom were discovered as of late (Goto et al., 2008). Before applying our marine DC resistivity framework to the field, we made a field test at the journey “KY06-02” in a zone off Tokai range, along the Pacific bank of Japan, where no MH outcrops were seen by profound towed camera pictures. Also, a resistivity logging information at a well was accessible at that territory. Our framework steadily got obvious resistivity with little mistakes (< 2%), predictable with the logging information.
Secondary, the try different things with marine DC resistivity review was completed at the cruise "KY05-08" in the Sea of Japan. The detail of the investigation and its preparatory outcome was accounted for by Goto et al. (2008). The level inspecting rate of evident resistivity was around 50m along a profile around 3.5 km long.

Thus, we got high clear resistivity at the outcrop zones. A basic resistivity demonstrate with three-dimensional geology can't clarify such high esteems, so that the resistive materials are required beneath the ocean bottom. On the premise of resistivity models with a reversal plot, we reason that high-resistivity zones (>10 Ohm-m) exist beneath the MH outcrops, and decipher them to be expected to the MH (Fig.3). Accordingly, marine DC resistivity review can be will be another apparatus to picture sub-ocean bottom structures inside methane hydrate zones to the profundity of 100m.

Case 2: Off Tokai Area, Japan

Although resolution of our marine DC resistivity survey system is limited to the shallow depth (<100m), a combination survey of marine DC and CSEM (controlled source electromagnetic) surveys will refine it: a shallower part can be imaged by DC survey and a deeper part imaged by CSEM survey. As the other case study, we introduce the CSEM experiment at the cruise “KY06-02”, in the area off Tokai area (Fig. 3) with both our towed system as introduced above and a seafloor EM al. in prep.), the longer offset between source and OBEM allow us to image the resistivity structure to the depth of about 300m. On the basis of numerical forward calculations, the averaged resistivity of sediments from the seafloor to the depth of several hundred meters with 1-2 Ohm-m can properly explain potential amplitude observed by OBEM normalized by the source amplitude (Fig 4). Such resistivity (1-2 Ohm-m) is consistent with one from resistivity logging at a borehole near our profile We also checked by using numerical forward modeling and observed OBEM potential data whether a thin and deep MH zone (with thickness of about 30m and depth of about 200m below the seafloor) recognized in the borehole is imaged or not. However, such thin resistive layer cannot be constrained by our preliminary analysis of the CSEM data.

One of the real reasons we assume is a change of the track and bearing of profound towed source dipole. On the premise of numerical reviews, we propose that the heading of source dipole firmly influence to the OBEM potential information, and ought to be painstakingly watched for imaging the resistivity structure close to the ocean bottom (<500m) by utilizing CSEM technique. Luckily, our CSEM framework has an advanced acoustic route framework, and the dipole was definitely observed from the examination vessel amid this CSEM explore. Since the route information was not utilized for our preparatory investigation, further and cautious examination of CSEM information with acoustic route information will enable us to picture the profound MH zone. Also, circuit commotion in the electric field of OBEM made moderately substantial watched blunders at the trial. We have officially settled the issue and commotion...
level in the electric field was diminished with element of 0.1. In the following tests, we will ideally picture such a profound and thin MH layer.

**CONCLUSION**

We introduced two case studies of marine electromagnetic surveys off Japan coast to detect MH below the seafloor. Both experiment in 2005 and 2006 indicated that marine electromagnetic surveys properly give us information of subseafiled resistivity structure near the seafloor. Deep and thin resistive layer corresponding MH layer could not be constrained by our preliminary analysis. However, careful treatment of experiment such as location of towed cables and seafloor instruments and improvement of observed noise level will permit further discussion about such thin MH zones.

**Ethical Clearance:** Taken from, AMET University.

**Source of Funding:** Self

**Conflict of Interest:** NA

**REFERENCES**


The Effect of Learning Organization Activities of Members of an Organization on Their Innovative Behavior - Comparative Analysis of the Effect among Employees of Different Workplaces

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¹Dept. of Knowledge Service & Consulting, Hansung University, Republic of Korea

ABSTRACT

Background/Objectives: This paper is an empirical research on the effect of learning organization activities of members of organization on their knowledge management activities and innovative behavior.

Method/Statistical analysis: The survey was conducted to employees of three big companies in service, manufacturing, and IT industries. Based on the survey data, this research comparatively examined the relationship among variables.

Findings: In all kinds of work places - service, manufacturing, and IT companies - learning organization activities of organizational members have significant effects on knowledge management activities and innovative behavior, and knowledge management activities have significant effects on innovative behavior. There were some differences in the size of effects among workers in different work places. In the effect of learning organization activities on innovative behavior, the manufacturing company was the biggest among three work places; in the effect of knowledge management activities on innovative behavior, the IT Company was the biggest; in the effect of learning organization activities on innovative behavior, the manufacturing company was the biggest.

Improvements/Applications: This research discussed the differences in the effect of learning organization activities on organizational members in different workplaces and the relations among variables, and suggested the causes of them.

Keywords: Learning Organization Activities of Organizational Members, Knowledge Management Activities, Innovative Behavior, Comparative analysis of Relationship Among Groups.

INTRODUCTION

Due to globalization, business environment in the 21st century has entered the unlimitedly competitive system. Owing to such an environmental change, numerous companies are faced with various threats of life and death, and average life expectancy of companies is reduced.

In such a rapidly changing business environment, to maintain competitive advantage, it is necessary for companies to pursue organizational change and innovation in various ways.

Related researches in Korea since 2000 have been done as follows: researches on establishment of learning organization; researches on learning organization and organizational performance; researches on specific regions; researches on specific industries; researches on members of specific companies.

Through formation of close and smooth relationship among members, pursues high sense of ownership and voluntary performance. On the other hand, the service industry, unlike the manufacturing
industry, is highly dependent on human resources, because the products it generates and the manufacturing process are non-physical. While R&D levels within companies are low, they are more dependent on external sources in innovation. It provides service based on IT technology, and it is the industry leading manufacturing companies and service companies to generate high added values.

THEORETICAL BACKGROUNDS

The relationship between learning organization activities and knowledge management activities of organizational members

The concept of learning organization was first suggested by Senge, which triggered scholastic debates in full scale on the concept. In the analysis of mediating effect of knowledge transfer in the relationship between learning organization level and organization immersion, Kang W Y found out partial mediating effect of knowledge transfer (knowledge acquisition, knowledge sharing and knowledge use).

The relationship between knowledge management activities and innovative behavior

Innovative behavior is the behavior in which one seeks and develops new production process or product, secure funds necessary to embody ideas, establish proper working plans and schedule. Also, the subordinates who support their supervisors in any circumstances tend to explore new job techniques and ideas and help other people to perform innovative behaviors.

The relationship between learning organization activities and innovative behavior among organizational members

The validity of the knowledge and integrate it in the strategy and management of the organization. In his research using office workers of big businesses as research objects, Gong H R found that learning orientation of the organization and members.

Based on learning organization theories and social capital theory, Yoon S H & Han T Y examined the factors affecting innovative behavior of organizational members. Employees of small and medium enterprises, Jeon H I & Yoon G S found out that learning organization, human capital, innovative behavior of organizational members have effect on organizational performance.

RESEARCH METHOD

Designing research model

This research aims to empirically examine the effect of learning organization activities on knowledge management activities and innovative behavior. Thus, this research tried to find any statistically significant differences among employees in service, manufacturing, and IT industries.

Operational definitions of variables and measurement tools

In this research, independent variable is learning organization activities, dependent variable is innovative behavior, and mediating variable is knowledge management activities. All the questions used in this research were those which had been used in previous researches, to secure content validity.

EMPIRICAL ANALYSIS

Data collection and analytic method

This research sent the questionnaire to about 520 respondents who were working for three big companies in service, manufacturing, and IT areas and received copies of the questionnaire for about a month from January 19 to February 17.

General characteristics of the sample

Demographic and other characteristics of 489 respondents are as follows. In gender, there were 287 males (58.7%) and 202 females (41.3%). Age group distribution was as follows: those in 30s were 38.7% (189); those in 40s were 27.6% (135); those in 20s were 22.7% (111); those in 50s were 11.0% (54).

Fig. 1. Research Model

validity and reliability of measurement tools

Cronbach's value was acquired to test internal consistency among variables. Exploratory factor
analysis showed that all the factors were 0.5 or above, proving high reliability. Analytical results are shown in Table 2, Table 3, and Table 4.

Table 1. Operational definitions of variables and the number of questions per category

<table>
<thead>
<tr>
<th>Research variables</th>
<th>Operational definitions</th>
<th>No of questions</th>
<th>Related researches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge management activities</td>
<td>Activities designed to institutionalize active creation and sharing of knowledge in an organization</td>
<td>8</td>
<td>Lee Y C [10] Heo M S, Cheon M J [21]</td>
</tr>
<tr>
<td>Innovative behavior</td>
<td>The process of viewing problems with new eyes, drawing new, creative and applicable ideas and solutions, summoning supporters of those ideas and solutions and applying them to manufacturing or service processes</td>
<td>9</td>
<td>Jansen [14] Yang D M, Shim D S [30]</td>
</tr>
</tbody>
</table>

Table 2: Factor analysis and reliability analysis of learning organization activities of members

<table>
<thead>
<tr>
<th>Measurement item</th>
<th>Factor loading</th>
<th>Communality</th>
<th>Eigen value</th>
<th>Cronbach’s α</th>
</tr>
</thead>
<tbody>
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<td>Learning organization activity (LOA)</td>
<td>LOA 1</td>
<td>.714</td>
<td>.521</td>
<td>4.971</td>
</tr>
<tr>
<td></td>
<td>LOA 2</td>
<td>.797</td>
<td>.664</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LOA 3</td>
<td>.642</td>
<td>.518</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LOA 4</td>
<td>.714</td>
<td>.637</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LOA 5</td>
<td>.689</td>
<td>.516</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LOA 6</td>
<td>.717</td>
<td>.558</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LOA 7</td>
<td>.738</td>
<td>.549</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LOA 8</td>
<td>.794</td>
<td>.654</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LOA 9</td>
<td>.787</td>
<td>.649</td>
<td></td>
</tr>
</tbody>
</table>

Factor extraction method: principal component analysis, Rotation method: Varimax with Kaiser normalization, KMO=.927
Approx-\(X^2=2579.882, \, df=36, \, p=.000, \, A/D\) explanatory power=51.557%

Table 3: Factor analysis and reliability analysis of knowledge management activities of members

<table>
<thead>
<tr>
<th>Measurement item</th>
<th>Factor loading</th>
<th>Communality</th>
<th>Eigen value</th>
<th>Cronbach’s α</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge management activity (KMA)</td>
<td>KMA 1</td>
<td>.598</td>
<td>.497</td>
<td>3.887</td>
</tr>
<tr>
<td></td>
<td>KMA 2</td>
<td>.754</td>
<td>.588</td>
<td></td>
</tr>
<tr>
<td></td>
<td>KMA 3</td>
<td>.718</td>
<td>.574</td>
<td></td>
</tr>
<tr>
<td></td>
<td>KMA 4</td>
<td>.725</td>
<td>.601</td>
<td></td>
</tr>
<tr>
<td></td>
<td>KMA 5</td>
<td>.726</td>
<td>.611</td>
<td></td>
</tr>
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<td></td>
<td>KMA 6</td>
<td>.741</td>
<td>.545</td>
<td></td>
</tr>
<tr>
<td></td>
<td>KMA 7</td>
<td>.826</td>
<td>.779</td>
<td></td>
</tr>
<tr>
<td></td>
<td>KMA 8</td>
<td>.711</td>
<td>.618</td>
<td></td>
</tr>
</tbody>
</table>

Factor extraction method: principal component analysis, Rotation method: Varimax with Kaiser normalization, KMO=.910
Approx-\(X^2=1097.219, \, df=28, \, p=.000, \, A/D\) explanatory power=53.219%

Table 4: Factor analysis and reliability analysis of Innovative behavior of members

<table>
<thead>
<tr>
<th>Measurement item</th>
<th>Factor loading</th>
<th>Communality</th>
<th>Eigen value</th>
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</tr>
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<tbody>
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<td>Innovative behavior (IB)</td>
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<tr>
<td></td>
<td>IB 2</td>
<td>.774</td>
<td>.678</td>
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</tr>
<tr>
<td></td>
<td>IB 3</td>
<td>.799</td>
<td>.642</td>
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Table 4: Factor analysis and reliability analysis of Innovative behavior of members (Contd.)

<table>
<thead>
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<th>Measurement item</th>
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<th>Eigen value</th>
<th>Cronbach’s α</th>
<th>ααααα</th>
</tr>
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<tbody>
<tr>
<td>IB 4</td>
<td>.782</td>
<td>.612</td>
<td></td>
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</tr>
<tr>
<td>IB 5</td>
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<td>IB 9</td>
<td>.821</td>
<td>.707</td>
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Factor extraction method: principal component analysis, Rotation method: Varimax with Kaiser normalization, KMO=.911
Approx-X²=2974.668, df=36, p=.000, A/D explanatory power=60.587%

Table 5: Results of confirmatory factor analysis of variables

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<th>Path</th>
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<th>LOA 3</th>
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<th>LOA 7</th>
<th>LOA 8</th>
<th>LOA 9</th>
</tr>
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<tbody>
<tr>
<td>Standardized coefficient</td>
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<td>0.623</td>
<td>0.611</td>
<td>0.697</td>
<td>0.681</td>
<td>0.718</td>
<td>0.754</td>
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<tr>
<td>S.E</td>
<td>Fix</td>
<td>0.086</td>
<td>0.078</td>
<td>0.073</td>
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Knowledge management activity (KMA)

<table>
<thead>
<tr>
<th>Path</th>
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<th>KMA 2</th>
<th>KMA 3</th>
<th>KMA 4</th>
<th>KMA 5</th>
<th>KMA 6</th>
<th>KMA 7</th>
<th>KMA 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standardized coefficient</td>
<td>0.615</td>
<td>0.708</td>
<td>0.708</td>
<td>0.694</td>
<td>0.687</td>
<td>0.664</td>
<td>0.713</td>
<td>0.697</td>
</tr>
<tr>
<td>S.E</td>
<td>Fix</td>
<td>0.080</td>
<td>0.08</td>
<td>0.078</td>
<td>0.077</td>
<td>0.075</td>
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</tr>
<tr>
<td>P value</td>
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<td>.000</td>
<td>.000</td>
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</tr>
<tr>
<td>AVE</td>
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<td>CR</td>
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<td>.608</td>
<td>.608</td>
<td>.608</td>
<td>.608</td>
<td>.608</td>
<td>.608</td>
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</tr>
</tbody>
</table>

Innovative behavior (IB)

<table>
<thead>
<tr>
<th>Path</th>
<th>IB 1</th>
<th>IB 2</th>
<th>IB 3</th>
<th>IB 4</th>
<th>IB 5</th>
<th>IB 6</th>
<th>IB 7</th>
<th>IB 8</th>
<th>IB 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standardized coefficient</td>
<td>0.712</td>
<td>0.779</td>
<td>0.787</td>
<td>0.709</td>
<td>0.773</td>
<td>0.699</td>
<td>0.748</td>
<td>0.786</td>
<td>0.717</td>
</tr>
<tr>
<td>S.E</td>
<td>Fix</td>
<td>0.052</td>
<td>0.051</td>
<td>0.055</td>
<td>0.053</td>
<td>0.053</td>
<td>0.052</td>
<td>0.052</td>
<td>0.053</td>
</tr>
<tr>
<td>P value</td>
<td>-</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>AVE</td>
<td>947</td>
<td>947</td>
<td>947</td>
<td>947</td>
<td>947</td>
<td>947</td>
<td>947</td>
<td>947</td>
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</tr>
</tbody>
</table>

Table 6: Correlation coefficients

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Learning organization activities</th>
<th>Knowledge management activities</th>
<th>Innovative behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning organization activities</td>
<td>3.74</td>
<td>.677</td>
<td>1</td>
<td>.579***</td>
<td>1</td>
</tr>
<tr>
<td>Knowledge management activities</td>
<td>3.51</td>
<td>.501</td>
<td>.579***</td>
<td>1</td>
<td>.694***</td>
</tr>
<tr>
<td>Innovative behavior</td>
<td>3.28</td>
<td>.599</td>
<td>.618***</td>
<td>.694***</td>
<td>1</td>
</tr>
</tbody>
</table>

***p<.001

***p<.01
Table 7. Results of hypothesis tests

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Path</th>
<th>Whole</th>
<th>Service</th>
<th>Manufacturing</th>
<th>IT</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Std Coef.</td>
<td>P-value</td>
<td>Std Coef.</td>
<td>P-value</td>
<td>Std Coef.</td>
</tr>
<tr>
<td>H1</td>
<td>Learning organization activities</td>
<td>Knowledge management activities</td>
<td>.617***</td>
<td>.000</td>
<td>.557***</td>
<td>.000</td>
</tr>
<tr>
<td>H2</td>
<td>Knowledge management activities</td>
<td>Innovative behavior</td>
<td>.513***</td>
<td>.000</td>
<td>.501***</td>
<td>.000</td>
</tr>
<tr>
<td>H3</td>
<td>Learning organization activities</td>
<td>Innovative behavior</td>
<td>.207***</td>
<td>.000</td>
<td>.194***</td>
<td>.000</td>
</tr>
</tbody>
</table>

***p<.01, **p<.05

Table 8. H4 - mediating effect of knowledge management activities

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Path</th>
<th>Direct effect</th>
<th>Indirect effect</th>
<th>Total effect</th>
<th>S.M.C</th>
</tr>
</thead>
<tbody>
<tr>
<td>H4 (Whole group)</td>
<td>Learning organization activities</td>
<td>Knowledge management activities</td>
<td>Innovative behavior</td>
<td>0.207</td>
<td>0</td>
</tr>
<tr>
<td>H4-1 (Service G)</td>
<td>0.194</td>
<td>0</td>
<td>0.334</td>
<td>0</td>
<td>0.528</td>
</tr>
<tr>
<td>H4-2 (Manufacturing G)</td>
<td>0.249</td>
<td>0</td>
<td>0.418</td>
<td>0</td>
<td>0.667</td>
</tr>
<tr>
<td>H4-3 (IT G)</td>
<td>0.179</td>
<td>0.021</td>
<td>0.487</td>
<td>0</td>
<td>0.566</td>
</tr>
</tbody>
</table>

***p<.01, **p<.05

Confirmatory factor analysis

To extract measurement model from measurement items per research unit, confirmatory factor analysis was performed. To evaluate goodness of fit to extract optimal condition of item composition, χ², p value on χ², (≥0.05), GFI(≥0.9), AGFI(≥0.9), RMR, and NFI, etc. were used.

Correlation analysis

Based on factors acquired from factor analysis, means of each item was calculated using mean function, and descriptive analysis was performed on them. Based on data acquired by such methods, bivariate correlation analysis was done for each constitutive concept.

Research model analysis

Therefore, this research, to test whether there is common method bias or not, performed single factor test of Harman35. Through principal component analysis, this research tested whether single factor or common factor is extracted36. Based on this method, not rotated factor analysis was performed, and 9 factors were extracted.

RESEARCH RESULTS AND SIGNIFICANCES

Summary of research results and hints from them

This research aims to empirically examine what effects learning organization activities have on knowledge management activities and innovative behavior. It is similar to previous researches on learning organization activities and knowledge management activities.

Limits of the research and future direction of research

This research has gone beyond the case-focused learning organization activity research, and did empirical research targeting employees in three different industries - service, manufacturing, and IT. But, if future researches comprehensively include such antecedent elements as management support, compensation system, trust, leadership, openness of communication, the results of such researches will be useful.
ACKNOWLEDGMENT

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Ethical Clearance: Taken from Hansung University

Source of Funding: Self

REFERENCES


The Influence of Recognition of Stakeholder to Succession Performance of Family Business Succession

Dong-kil Lee¹, Yen-yoo You²
¹Doctoral Student, ²Professor, Dept. Hansung University, Seoul, Korea

ABSTRACT

Background/Objectives: This study aims to conduct empirical analysis on structural relationship of influence of factor recognition of stakeholder who can affect the succession process of family corporate which is increasing due to aging entrepreneurship generation and establish the efficient succession strategy.

Method/Statistical analysis: In order to confirm the influence of recognition of stakeholder to succession result regarding succession of family business, the family businesses which had family succession within recent 5 years were selected as study subjects, conducted visiting and email interview for 5 months from November 2015 to March 2016, collected 230 copies and utilized SPSS 20.0 and AMOS 20.0 for 190 copies excluding insincere responses, and conducted exploratory factor analysis and structure equation model.

Findings: First, the study confirmed that the higher Procedural recognition is the higher the social recognition, internal recognition and succession performance is. Second, the study confirmed that the higher Institutional recognition is, the higher the Internal recognition and social recognition is. Third, the higher the social recognition is, the higher the succession performance is. Also, it was confirmed that the Institutional recognition did not have significant influence on succession performance and the internal recognition did not have significant influence on succession performance.

Improvements/Applications: In order to improve succession performance, there is a need to establish succession plan in advance, share it with stakeholders and conduct systematic management with Procedural recognition enhance activity of stakeholders such as period of succession, preparation period and Procedural conflict solving.

Keywords: Family Business, Family Business Succession, Stakeholder, Succession Performance, Succession Recognition.

INTRODUCTION

Due to the aging society, the retirement of first generation of entrepreneur who successfully founded businesses is increasing, and business succession became an issue for not only the family business but also for national economy. Nevertheless, according to Davis&Harveston(1998), the survival rate of second generation of family business is about 30%, and 14% for third or further generation.¹ Westhead(2003) argued that the failure of succession plan threatens the development or even existence of family business, and if the succession is not sufficient, it will increase the closing rate of businesses and resist development of business.² Huang(1999) suggested that the lack of department or manager for succession plan, concerns for counter effects of succession, lack of resources from small business scale, lack of recognition about succession plan of CEO, or lack of knowledge of Procedural and contents are the cause of succession failure.³ On the other hand, Ram&Jones(2002) argued that when succession is conducted in an atmosphere filled with royalty toward business and trust, the specific ability and know-how for the business management is delivered to next generation successor and provide business competitiveness.⁴ Thus, this study aims to conduct empirical analysis on structural relationship of influence of factor recognition of stakeholder who can affect the succession process of family corporate which is increasing due to aging entrepreneurship generation and establish the efficient succession strategy.
relationship of influence of factor recognition of stakeholder who can affect the succession process of family corporate which is increasing due to aging entrepreneurship generation and establish the efficient succession strategy.

**MATERIALS AND METHOD**

**Theoretic background**

**Family business**

According to Tyee(2007), the definition of family business is hard to establish as there are scores of studies, but in this study, it followed definition by Churchill & Hatten (1987) which defines the concept as a business which ownership and control authority is in the family and the ownership successes to next generation.

**Family business succession**

According to Ward(1987), family business succession is a successful transition of ownership and control authority of business to next generation of family. From sustainable management point of view, family business succession is a significant challenge and the family business succession plan establishment and Procedural management are very important in business performance.

**Stakeholders**

When dealing with topic about stakeholder in family business succession study, it targets current executive, successor and family, and neglect non-family member executives and employees. Thus, this study included non-family member executives and employees in the study and conducted empirical study. According to Fox & Hamilton(1996), the relationship between current executive and major stakeholders, between business and stakeholders, between successor and stakeholders are important in family business succession, and Danco(1980) argued that family business succession is a long-term process and as there are various stakes involved, it includes complicated emotional factors. Therefore, the business succession must be planned in advance.

**Succession performance**

According to Song Gyeong Ae(2014), definition of family business succession performance by the previous studies are separated into subjective performances such as efficiency of succession, change in succession recognition, organization culture, and objective performances such as sales increase, investment expansion and profit increase. Thus, this study examined the succession performance focusing on subjective performance.

**Study model**

Based on the previous studies, this study proposed a study model described in <figure> to examine the influence of recognition of stakeholder to succession performance of domestic family business succession.

![Fig. 1. Statistical Research Model](image)

**Study hypothesis**

Jeong Hae Yeong(2016) classified the influential factors of family business succession largely as internal factor, external factor and cross factor. External factors include taxation, legal and social prejudice; cross factors include procedural factors such as planning and duration of business succession, and social factors. Also, between objective performances such as effectiveness and actual profit of family business succession and subjective performances such as intention, legitimacy of succession and sustainable management, the study argued that subjective performance is the major standard of deciding actual profit of family business succession. Kang Jeong Moon(2010) insisted that as the result of study about influential factor of family business succession, the higher the recognition is, the higher the efficiency of succession is. Also, Jeon Hyo Sook(2013) argued that satisfaction of stakeholder is the most important factor in succession process for the successful succession. On the other hand, Hwang Woo Yeon(2008) argued that internal and external factors do not affect improved performance of family business succession for efficient succession.
Based on previous studies above, this study established hypothesis as below in order to confirm the influence of succession recognition of stakeholders to succession performance.

H1: Institutional recognition will pose positive influence on Internal recognition.
H2: Institutional recognition will pose positive influence on social recognition.
H3: Procedural recognition will pose positive influence on social recognition.
H4: Procedural recognition will pose positive influence on Internal recognition.
H5: Institutional recognition will pose positive influence on succession performance.
H6: Procedural recognition will pose positive influence on succession performance.
H7: Internal recognition will pose positive influence on succession performance.
H8: Social recognition will pose positive influence on succession performance.

STUDY METHOD
Population and sample property

In order to confirm the influence of recognition of stakeholder to succession result regarding succession of family business, the family businesses which had family succession within recent 5 years were selected as study subjects, conducted visiting and email interview for 5 months from November 2015 to March 2016, collected 230 copies and utilized SPSS 20.0 and AMOS 20.0 for 190 copies excluding insincere responses, and conducted exploratory factor analysis and structure equation model analysis.

Operational definition of variable and measurement.

As for the succession recognition of stakeholders, the study referred to Jeong Hae Yoeng (2016), Song Gyeong Ae (2014), Jeon Hyo Sook (2013), Hwang Woo Yeon (2008), Kang Jeong Moon (2010) and composed 5 Procedural recognition questions (consent of stakeholders, procedural rationality, opening of Procedural and information, adequacy of timing), 5 Institutional recognition questions (taxation, legislation and management method about succession), 5 Internal recognition questions (capability of successor, unity of employee, family solidarity etc.), 5 Social recognition questions (client business recognition etc.), 6 succession performance questions (improved work place atmosphere, improved finance, improved work process and image etc.). Excluding demographic variables, the survey was composed of 26 questions. Each question was measured by 5 point Likert scale from 1 point (strongly disagree) to 5 point (strongly agree) and the survey results is as shown in <Table 1>.

Table 1: Composition of survey

<table>
<thead>
<tr>
<th>Measurement variables</th>
<th>No of questions</th>
<th>Preceding studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Institutional Recognition</td>
<td>5</td>
<td>Jung, Hae Young(2016)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Jeoun, Hyo Suk(2013)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kang, Jung Moon(2010)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hwang, Woo Yoon (2008)</td>
</tr>
<tr>
<td>3. Internal Recognition</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>4. Social Recognition</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>5. Succession Performance</td>
<td>6</td>
<td>Song, Kyung Ae (2014)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kang, Jung Moon(2010)</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td></td>
</tr>
</tbody>
</table>

RESULTS AND DISCUSSION

Data collection

The general property of sample is as shown in <Table 2>. The largest number of responder for age group was the 40s who are non-family manger-level employees with 52.6%, the largest number of responder for business scale was business with more than 100 employees with 82.1%, the largest number of responder for business history was business with history of 10 to 29 years with 17.9%. As for the period of succession, less than 1 year was the most popular answer with 84.2%.
Table 2: The Characteristics of Samples

<table>
<thead>
<tr>
<th>Categories</th>
<th>Frequencies</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20s</td>
<td>4</td>
<td>2.1</td>
</tr>
<tr>
<td>30s</td>
<td>74</td>
<td>38.9</td>
</tr>
<tr>
<td>40s</td>
<td>100</td>
<td>52.6</td>
</tr>
<tr>
<td>Over 50s</td>
<td>12</td>
<td>6.3</td>
</tr>
<tr>
<td>Total</td>
<td>190</td>
<td>100</td>
</tr>
<tr>
<td>No. of employees</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 persons –99 persons</td>
<td>34</td>
<td>17.9</td>
</tr>
<tr>
<td>More than 100 persons</td>
<td>156</td>
<td>82.1</td>
</tr>
<tr>
<td>Total</td>
<td>190</td>
<td>100</td>
</tr>
<tr>
<td>Firm Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 years – 29 years</td>
<td>34</td>
<td>17.9</td>
</tr>
<tr>
<td>More than 30 years</td>
<td>156</td>
<td>82.1</td>
</tr>
<tr>
<td>Total</td>
<td>325</td>
<td>100</td>
</tr>
<tr>
<td>Succession period</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 1 year</td>
<td>160</td>
<td>84.2</td>
</tr>
<tr>
<td>1 year – 3 years</td>
<td>26</td>
<td>13.7</td>
</tr>
<tr>
<td>More than 3 years</td>
<td>4</td>
<td>2.1</td>
</tr>
<tr>
<td>Total</td>
<td>325</td>
<td>100</td>
</tr>
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</table>

Validity and reliability analysis

To confirm the validity, the study conducted exploratory factor analysis. To extract factors, principle component analysis was adopted and used varimax as a simplified process of factor loading. This study set criterion as characteristic value over 1.0 and factor loading over 0.4. In the factor analysis process, Internal recognition(IR.5), social recognition(SR.1, SR.2) were remove and the explained total deviation was 71.920%. As for the variables, based on the theoretic structure of previous studies, 5 variables were extracted and named as Institutional recognition, procedural recognition, Internal recognition, social recognition and succession performance and were subjected to reliability analysis. Cronbach’s α values of each variable were distributed around .836~.917 as shown in <Table 3> which is within the reliable range(Cronbach’s α >0.8).

Table 3: Exploratory Factor Analysis and Reliability Test

<table>
<thead>
<tr>
<th>MV</th>
<th>ISR</th>
<th>SP</th>
<th>PR</th>
<th>IR</th>
<th>SR</th>
<th>Cα</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISR.4</td>
<td>0.859</td>
<td>-0.031</td>
<td>0.206</td>
<td>0.226</td>
<td>0.107</td>
<td>0.917</td>
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<td>ISR.3</td>
<td>0.818</td>
<td>-0.019</td>
<td>0.215</td>
<td>0.24</td>
<td>0.117</td>
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<tr>
<td>ISR.2</td>
<td>0.807</td>
<td>0.119</td>
<td>0.21</td>
<td>0.219</td>
<td>0.232</td>
<td></td>
</tr>
<tr>
<td>ISR.5</td>
<td>0.78</td>
<td>-0.029</td>
<td>0.221</td>
<td>0.256</td>
<td>0.191</td>
<td></td>
</tr>
<tr>
<td>ISR.1</td>
<td>0.665</td>
<td>0.126</td>
<td>0.288</td>
<td>0.035</td>
<td>0.305</td>
<td></td>
</tr>
<tr>
<td>SP.3</td>
<td>0.017</td>
<td>0.945</td>
<td>0.025</td>
<td>0.029</td>
<td>0.026</td>
<td>0.893</td>
</tr>
<tr>
<td>SP.4</td>
<td>0.038</td>
<td>0.897</td>
<td>0.054</td>
<td>-0.016</td>
<td>-0.008</td>
<td></td>
</tr>
<tr>
<td>SP.1</td>
<td>0.018</td>
<td>0.874</td>
<td>-0.045</td>
<td>0.005</td>
<td>0.007</td>
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</tr>
<tr>
<td>SP.5</td>
<td>0.042</td>
<td>0.742</td>
<td>0.016</td>
<td>0.061</td>
<td>0.113</td>
<td></td>
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<td>SP.2</td>
<td>-0.058</td>
<td>0.714</td>
<td>0.046</td>
<td>0.017</td>
<td>0.033</td>
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<tr>
<td>SP.6</td>
<td>0.051</td>
<td>0.648</td>
<td>0.059</td>
<td>-0.039</td>
<td>-0.118</td>
<td></td>
</tr>
<tr>
<td>PR.2</td>
<td>0.246</td>
<td>0.044</td>
<td>0.847</td>
<td>0.084</td>
<td>0.104</td>
<td>0.836</td>
</tr>
<tr>
<td>PR.5</td>
<td>0.212</td>
<td>0.016</td>
<td>0.84</td>
<td>0.181</td>
<td>0.135</td>
<td></td>
</tr>
<tr>
<td>PR.1</td>
<td>0.209</td>
<td>0.087</td>
<td>0.677</td>
<td>0.181</td>
<td>0.201</td>
<td></td>
</tr>
<tr>
<td>PR.4</td>
<td>0.207</td>
<td>0.003</td>
<td>0.526</td>
<td>0.319</td>
<td>0.209</td>
<td></td>
</tr>
<tr>
<td>PR.3</td>
<td>0.366</td>
<td>0.031</td>
<td>0.456</td>
<td>0.304</td>
<td>0.223</td>
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</tr>
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</table>
Table 3: Exploratory Factor Analysis and Reliability Test (Contd.)

<table>
<thead>
<tr>
<th>MV</th>
<th>ISR</th>
<th>SP</th>
<th>PR</th>
<th>IR</th>
<th>SR</th>
<th>Cα</th>
</tr>
</thead>
<tbody>
<tr>
<td>IR.3</td>
<td>0.177</td>
<td>0.063</td>
<td>0.338</td>
<td>0.769</td>
<td>0.118</td>
<td>0.865</td>
</tr>
<tr>
<td>IR.2</td>
<td>0.443</td>
<td>-0.051</td>
<td>0.061</td>
<td>0.767</td>
<td>0.199</td>
<td></td>
</tr>
<tr>
<td>IR.4</td>
<td>0.098</td>
<td>0.045</td>
<td>0.423</td>
<td>0.723</td>
<td>0.118</td>
<td></td>
</tr>
<tr>
<td>IR.1</td>
<td>0.427</td>
<td>-0.01</td>
<td>0.096</td>
<td>0.7</td>
<td>0.199</td>
<td></td>
</tr>
<tr>
<td>SR.5</td>
<td>0.237</td>
<td>-0.015</td>
<td>0.219</td>
<td>0.146</td>
<td>0.857</td>
<td>0.916</td>
</tr>
<tr>
<td>SR.4</td>
<td>0.237</td>
<td>-0.044</td>
<td>0.232</td>
<td>0.198</td>
<td>0.855</td>
<td></td>
</tr>
<tr>
<td>SR.3</td>
<td>0.237</td>
<td>0.073</td>
<td>0.167</td>
<td>0.142</td>
<td>0.84</td>
<td></td>
</tr>
<tr>
<td>OV</td>
<td>4.031</td>
<td>4.002</td>
<td>3.076</td>
<td>2.768</td>
<td>2.664</td>
<td></td>
</tr>
<tr>
<td>V%</td>
<td>17.527</td>
<td>17.4</td>
<td>13.375</td>
<td>12.035</td>
<td>11.583</td>
<td></td>
</tr>
<tr>
<td>AV%</td>
<td>17.527</td>
<td>34.927</td>
<td>48.302</td>
<td>60.337</td>
<td>71.92</td>
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</tbody>
</table>

Note 1) ISR: Institutional Recognition, Note 2) SP: Succession Performance, Note 3) PR: Procedural Recognition, Note 4) IR: Internal Recognition, Note 5) SR: Social Recognition, Note 6) Cα: Cronbach’s, Note 7) OV: Original Value, Note 8) V%: Variance %, Note 9) AV%: Accumulation Variance %

Measuring model analysis

In order to examine the validity and reliability of scale and adequacy of measuring model adopted by the study, the measuring model analysis was conducted. To confirm the adequacy of data, study used $\chi^2$/df(<3.0), GFI•AGFI•CFI•NFI•TLI(>0.9), RMR•RMSEA (<0.05) value. As in Table 4, t value about estimation between latent variable and measurement variable is over 1.965 and confirmed that the latent variable well explains variant of measurement variables. Also, AVE value was over .5 and CR value was over .7 which confirmed concentration validity. In addition, the measuring model verified its adequacy with $\chi^2$/df=2.287, GFI=.973, AGFI=.873, CFI=.954, NFI=.922, IFI=.954, TLI=.943, RMR=.016, RMSEA=.053.

Table 4: Goodness of Fit of Measurement Model

<table>
<thead>
<tr>
<th>Measure</th>
<th>SLFV</th>
<th>SE</th>
<th>t-value</th>
<th>p</th>
<th>CR</th>
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Goodness of fit - Measurement model

<table>
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<tr>
<th>Measure</th>
<th>SLFV</th>
<th>SE</th>
<th>t-value</th>
<th>p</th>
<th>CR</th>
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</tr>
</tbody>
</table>

Note 1) SLFV: Standardized Loading Factor Values, Note 2) SE: Standard Error, Note 3) CR: Construct Reliability, Note 4) AVE: Average Variance Extracted
The study conducted distinction validity analysis after confirming concentration validity of measuring model. The result of analysis based on method by Fornell and Larcker(1981) which regards average variance extract value is above the square value of correlation coefficient among concepts as valid in distinction(AVE>Φ^2) is as shown in Table 5.

The highest coefficient among variables, coefficient of determination of procedural recognition "succession performance(.380=.617 X .617) was smaller than AVE value of each latent variables, and the distinction validity was confirmed.

### Table 5: Distinction validity analysis

<table>
<thead>
<tr>
<th>ISR</th>
<th>PR</th>
<th>IR</th>
<th>SR</th>
<th>SP</th>
</tr>
</thead>
<tbody>
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<td>.906</td>
<td>.906</td>
<td>.906</td>
<td>.906</td>
<td>.906</td>
</tr>
</tbody>
</table>

Note) Bold numbers indicate AVE values between variables

### Study model analysis

To examine the study model, the study confirmed adequacy of structural equation model as final measuring model, and the result satisfied the standard like Table 6.

### Table 6: Goodness of Fit of Research Model

<table>
<thead>
<tr>
<th>ReferenceValue</th>
<th>MeasuredValue</th>
</tr>
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<tr>
<td>Chi-Square</td>
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<td>df</td>
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<tr>
<td>P</td>
<td>.000</td>
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<tr>
<td>CMN/DF</td>
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<td>RMR</td>
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<tr>
<td>RMSEA</td>
<td>.048</td>
</tr>
</tbody>
</table>

### Hypothesis test result

The study model was confirmed to be adequate, and the result of path coefficient examination for specific hypothesis test, it was as shown in Figure 2.

Finally, the result of hypothesis test about the influence of recognition of stakeholder to succession performance in family business succession is as shown in Table 7.

### Table 7: The Results of Hypothesis Testing

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Hypothesis To Be Testing</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>Institutional recognition will pose positive influence on Internal recognition</td>
<td>Accept</td>
</tr>
<tr>
<td>H2</td>
<td>Institutional recognition will pose positive influence on social recognition</td>
<td>Accept</td>
</tr>
<tr>
<td>H3</td>
<td>Procedural recognition will pose positive influence on social recognition</td>
<td>Accept</td>
</tr>
<tr>
<td>H4</td>
<td>Procedural recognition will pose positive influence on Internal recognition</td>
<td>Accept</td>
</tr>
<tr>
<td>H5</td>
<td>Institutional recognition will pose positive influence on succession performance</td>
<td>Reject</td>
</tr>
<tr>
<td>H6</td>
<td>Procedural recognition will pose positive influence on succession performance</td>
<td>Accept</td>
</tr>
<tr>
<td>H7</td>
<td>Internal recognition will pose positive influence on succession performance</td>
<td>Reject</td>
</tr>
<tr>
<td>H8</td>
<td>Social recognition will pose positive influence on succession performance</td>
<td>Accept</td>
</tr>
</tbody>
</table>
CONCLUSION

As for the result of the study about recognition of stakeholders and succession performance in family business succession, it was confirmed that sharing a succession plan prepared in advance, preparation period and timing of succession, Procedural recognition improvement of stakeholders regarding the conflict solving in Procedural, systematic management and improvement of succession performance were significant factors, and through the empirical analysis regarding recognition factors relevant to family business succession, the study is expected to give reference to planning of succession plan and management.

Meanwhile, this study contains limitations described below, and hereby proposing the direction for future study. First, due to difficult condition which limits the study subject as family business which experienced succession within recent 5 years and business executives dodging survey, the apprehension of subject businesses was quiet limited. Therefore, as the study results might vary in accordance with the diversity and scale of business, it would make a study more objective if more family succession businesses are secured as population. Second, the procedural recognition was selected as an influential factor to succession performance, but it is more desirable to reflect more various factors.

Ethical Clearance: Taken from Hansung University

Source of Funding: Self

Conflict of Interest: NIL

ACKNOWLEDGMENT

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REFERENCES

Credible Node Selection with Enhanced Protection against Replication Attack in Wireless Sensor Networks

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¹Research Scholar, St. Peter’s University, Chennai, India, ²Professor, Department of Electronics and Communication Engineering, EGS Pillay Engineering College, Nagapattinam, India

ABSTRACT

Wireless sensor network is a cluster of sensors with finite resources that integrate in order to attain a common goal. Because of their working nature, it is vulnerable to different kinds of novel attacks. Diagnosing the attack of node replication has turned into an obligatory analysis in sensor network security, and mapping detection strategy against node replication attack includes various menacing problems and challenges. This work concentrates on authenticating key while distributing in order to secure network. A scheme is introduced namely Credible Node Selection with Enhanced Protection using Key Authenticate (CNSEP-KA). In this scheme, every node in network must confirm adjacent location of another node with help of message authentication code computed on relative public key using keys acquired from encrypted beacons transmitted by anchor nodes before initiating pairwise key between two nodes. The performance analysis of proposed CNSEP-KA shows the increases transmission of data, decreased rate of packet loss, and minimized energy consumption comparing to existing techniques.

Keywords: Replication Attack, Credible Nodes, Key Authenticate, Credible Node Selection with Enhanced Protection using Key Authenticate Scheme.

INTRODUCTION

In wireless sensor network enabling the security and the trustworthiness of the transferred information is the important need in an intruder environment in which it can be seized quickly by the adversaries. The illegitimate users can acquire the wireless communication channel more easily. To verify the security in WSN, it must include offering authenticity, securing sensitive information and durability are attained through encryption schemes and also particular key distribution approach should be followed for effective transmission. One of the most harmful attacks in sensor networks is node replication attack. There are two categories of schemes for identifying node replication attack that includes centralized approach and distributed approach. Base station is used in centralized approach to diagnose the duplicating node in the network whereas in the distributed approach all or few collaboration of nodes are used to diagnose the duplicate node in the network. Considering the stable wireless sensor network distributed schemes, the information of node location is used to diagnose replicas as the nodes do not alter their physical location, in which the nodes similar ID but vary in their place are consider as the node replication attack. There are many numbers of schemes for distributing key was introduced.

An (IAZ) Isolated Adversary Zone scheme which is based on a random walk introduced for securing source location in wireless sensor networks. It improves the energy efficiency and safety period. But by waiting for a long-time adversary can make an attack¹.

Therefore in this work, a scheme for key management is introduced for wireless sensor networks. This mainly focuses on authenticating key during the key distribution for securing the network. This work introduces a scheme namely (CNSEP-KA).
RELATED WORK

In this segment, schemes that are used previously to diagnose node replication attacks are examined. The various cases of clone nodes are also mentioned in this segment.

ChakibBekara et al. analysis many number of threats and assaults are precluded using cryptographic substances but few threats includes replication attack are still unidentified. Guo Cheng et al. identify the replication attack in clustered wireless sensor network by using monitor nodes. To identify replica nodes more quickly, an enhanced LEACH protocol is introduced to minimize the scale of cluster by node’s residual energy are taking into consideration. Mauro Conti et al. analyzed there were many disadvantages for using any protocol in resource constrained wireless sensor network.

Mauro Conti et al. analysed the needs and problems in distributed detection of node identity replicas in wireless sensor networks. S. Ganesh et al. analysis the progress on miniaturization schemes and wireless communications make the formation and succeeding evolution of wireless sensor network. Wazir Zada Khan et al. proposed a new distributed resolution named as RAND for identifying the replication attack in static wireless sensor networks. Sherif Khattab et al. introduced a framework against jamming attack in wireless sensor networks named as Honeybees: integrating the evasion and replication for reducing base station jamming in network. Lee-Chun Ko et al. introduced a scheme called (NBDS) Neighbor Based Detection Scheme for preventing replication attacks in wireless sensor networks.

Siwei Peng et al. found that among several attacks in wireless sensor network, the most frightening attacks are Sybil attack and node replication attack. Amar Rasheed et al. studied that mobile sinks are pre-eminent in WSN for effective gathering of data, reprogramming localized sensor and differentiating faulty sensors from normal sensors and cancelling the compromised sensors.

Sarmad Ullah Khan et al. present a scheme for key management that supporting node mobility in heterogeneous wireless sensor networks. Sachin Umrao et al. deals with identifying and reducing node replication attack in wireless sensor network with pulse delay. With the proposed approach the attack of clone and pulse delay can be mitigated.

PROPOSED WORK

The main objective of proposed work is to prevent from replication attack. Hence a scheme is introduced namely (CNSEP-KA). The proposed work involves, monitoring location of source nodes, identifying difficulties along path during data transmission that may includes any data loss, involvement of attack, etc, detects replication attack during data transmission. The main contributions of this work are as follows:

- To form cluster and selecting suitable cluster head for each cluster.
- Monitoring location of source nodes
- Detecting replication attack during data transmission with monitor nodes
- Identifying credible node for effective data communication with the algorithm (CNSEP-KA).
- Analysing performance of proposed algorithm CNSEP-KA

Fig. 1 shows overall process involved in the proposed Credible Node Selection with Enhanced Protection using Key Authenticate Scheme which reveals the aspects of the proposed work.

Monitoring Location of Source Nodes: Initially, nodes are positioned in random and before locating the nodes, the regions are split into equal partitions and each region represents a cluster. For clustering a region, it uses criteria of distance.

Attacker can be able to seize or use tracing assets by identifying position of source nodes. The problem is to identify adversary nodes. This can be identified by categorizing the credibility nodes and faulty nodes. Credibility nodes are the one which have required resources for data transmission, enough energy and
sufficient power to transmit packets in the network. The monitor nodes can be selected to monitor data transmission. Following algorithm is used for selecting monitor nodes.

**Input:**

\[ S = (s_1, s_2, s_3, \ldots, s_N) \] is set of sensors that distributed in cluster C in random;

\[ x: \text{set of } n \text{ nodes; } \]

\[ X : \text{set of } x \text{ sets; } \]

\[ m': \text{set of candidate monitor nodes which covers cluster } C. \]

\[ M': \text{set of sets } m'; \]

**Output:** Cost(C) is minimized.

1: for each set \( x \subseteq X \) do
2: if \( x \) not covering the region of \( C \) then
3: \( M' \leftarrow \text{null}; \)
4: else
5: \( M' \leftarrow x; \)
6: end if
7: compute the \( \text{Cost}(C) = \sum_{i=1}^{n} W(m_i) \) of each set \( m' \subseteq M'; \)
8: choose the lowest \( \text{Cost}(C) \) and relative set \( m' \);
9: \( M \leftarrow m' \)
10: end for
11: return the set \( M \).

**Detecting replication attack during data transmission:** During data transmission, every node is aware of the location of itself and neighbor nodes for reliable data transfer. Hence in proposed system is developed in the manner of making each node to know the location hence adjacent node can compares signature and checks the location claim. If node finds any collision, it arises in case if two various location claims are found with same ID, then it immediately transmits two contrast claims as proof to cancel replicas.

For any two adjacent nodes, the distance between them is given by,

\[ d = \frac{\text{trans} - N_d}{S} \]

where,

\[ \text{trans} - \text{denotes transmission range} \]

\[ N_d - \text{denotes distance between two nodes} \]

\[ S - \text{denotes node’s average speed} \]

The probability of two nodes which shares common key is given by

\[ A = \frac{(s-p_1)(a-p_2)}{s \cdot a \cdot 2p} \]

(2)

In case if the general key didn’t match, two nodes can be able to initiate connection by using the intermediate nodes which possess common authentication key.

Let consider that adversary cannot be identified, so there is no more than \( a - b + 1 \) bits of a packet is identified. Therefore it is easy to identify the probability that adversary will not be detected is,

\[ P_1(a, b, p) = (1 - p)^{a-b+1} \]

(3)

Here, \( P_1 \) refers the probability of missed detection that the adversary is not identified by using single monitor node. In such as case, an encoder function is established. So that,

\[ b = a + 1 - \frac{\zeta(a, p)}{p} \]

(4)

Hence equation (3) can be written as

\[ P_1(a, b, p) \leq e^{-p(a-b+1)} = e^{f(a, p)} \]

(5)

Similarly, the probability of adversary cannot be identified by \( l \) monitor nodes is given by \( P_{l_1}(a, b, p, l) \)

\[ P_{l_1}(a, b, p, l) = e^{l \cdot f(a, p)} \]

(6)

To generate probability of missed detection small, \( b/a \) method arbitrarily to optimum, the function \( f(a, p) \) is selected. Hence function \( f(a, p) \) is constructed which is given by,

\[ f(a, p) = \alpha \ln a \]

(7)

where \( \alpha \) is any positive constant.

Then the equation can be rewritten as,
P1(a,b,p,l) ≤ e^{-a ln a}
\Rightarrow a - \ln a \rightarrow 0 \text{ as } a \rightarrow \alpha(8)

With this detection code, the rate b/a can be calculated.

**Credibility node selection with enhanced protection:** Algorithm for the purpose of identifying genuine node is as follows:

1. Establish communication
2. Each node activation time is recorded as $N_t$.
3. Server verifies each sensor node after each minute.
4. If new node arrives:
   - Check id of node.
   - If id varies:
     - Establish communication.
   - Else:
     - Stop communication.
5. If node id is similar to other:
   - Compare activation time of it with each other node.
   - Else:
     - If its timing is different, then it is malicious node.
     - Stop communication.
   - Else:
     - It is a credible node.

In this algorithm, sensor nodes are represented by $S_s$ and timing is denoted as $T_x$ and $T_y$. Nonce bit is given by $S_n$ and $e$ denotes transmission delay and $E$ denotes threshold value of delay. Initially the server activates and stores every node activation time. In case of new node arrives, then id of new node is compared with all existing nodes and if id matches the connection, can be aborted else it begins the process of authentication.

In the process of authentication, server sends synchronization message to each node that constitutes id of sender and receiver node i.e $(S_x, S_y)$, synchronization message $(M_s)$, and nonce bit $S_n$. By getting the response which comprises of sender and receiver id, and time of sending and receiving, key $K_{xy}$ and acknowledgement. Then server computes transmission delay and compares with threshold value of delay. i.e value of $e$ is compared with $E$, if it is found the value of transmission delay is less than or equal to delay threshold, starts communication. Otherwise it is assumed as compromised node.

**Key Management:** Each credible node will send beacon message including nonce and encrypted. Initially, adjacent node generates private key and then computes public key. Then adjacent nodes listening the network to catch beacon messages transmitted by credible node. The obtained nonces are used to produce authentication keys.

Then the node deciphers the obtained beacon messages with the help of initial key and gets back the identities and nonces send by credible nodes. After that it calculates authentication key which is shared among corresponding credible node.

Furthermore, key of faulty nodes are cancelled and all other devices in the network should be informed and adds this information in to revocation list.

**PROPOSED PACKET FORMAT**

**Packet ID:** It incorporates the details of nodes in network. This includes all status upgrades of network nodes and position of nodes. Fig. 2 shows packet format of proposed system. Here source and destination node ID fields take 2 bytes. Third field is status of Monitor nodes. Next field is replication attack detection. Fifth field is credible node selection. The last field is key authentication.
PERFORMANCE ANALYSIS

To simulate proposed (CNSEP-KA) scheme, Network Simulator NS-2.34 version is used. In our simulation, about 100 sensor nodes move around a 950 meter x 900 meter square region with simulation time of 17 milliseconds. Mac address 802.11 is inbuilt in design and every node has uniform coverage range of about 250 meters. The simulation setting and parameters are summarized in table.

Table 1: Simulation setup of proposed protocol

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<tr>
<td>Mobility</td>
<td>Random Way Point</td>
</tr>
<tr>
<td>Protocol</td>
<td>LEACH protocol</td>
</tr>
</tbody>
</table>

Simulation Result: Fig. 3 shows that proposed method named as (CNSEP-KA) scheme is an efficient one compared with existing IAZ [3] and RED [19].

It improves security by detecting replication attack and choosing credible nodes for effective transmission with efficient key distribution mechanism comparing to existing techniques.

Performance Analysis: X-graph is employed in simulation to examine the following performance metrics in ns2.34.

Fig. 4 shows the rate of attack detection. It is seen that proposed CNSEP-KA the rate of detection is more compared to other existing methods HBRP, SICRA, EERRA, REMFS, IAZ and RED.

Fig. 5 shows the transmission rate due to different schemes. It is clearly seen that transmission rate of CNSEP-KA is high comparing to other existing schemes HBRP, SICRA, EERRA, REMFS, IAZ and RED.
Energy Consumption: Fig. 8 shows consumption of energy. In proposed CNSEP-KA scheme energy consumption is minimized compared to existing methods.

Conflict of Interest: I have no conflicts of interest to declare

Source of Funding: The authors have no funding to report

Ethical Clearance: This research is completely followed by ethical standards.

CONCLUSION

In this work, (CNSEP-KA) is introduced. The proposed scheme rectified the problem of replication attack. It monitors location of source nodes. Credible node selection algorithm is employed for identifying genuine nodes for effective transmission. The outcome of simulation proves that proposed CNSEP-KA identifies replication attack. The performance analysis of CNSEP-KA improves rate of transmission and lifetime of network and reduces packet loss, energy consumption and network overhead to a great extent.

REFERENCES


An Effective Handoff Algorithm Using Modified Cat Swarm Behavior Based Optimization in Heterogeneous Wireless Mobile Networks

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ABSTRACT

In wireless system environment, optimal vertical handoff is a challenging issue. In this paper, a Modified Cat Swarm Behavior based Optimization (MCSBO) based handoff algorithm is proposed in heterogeneous wireless mobile network to reduce handoff. Initially, resource-poor mobile nodes, and resource-rich mobile nodes are clustered using Modified Expectation Maximization (MEM) to reduce the handoffs efficiently. Here, parameters like packet loss rate, dynamic new calls blocking probability, Bandwidth, and Cost along with the velocity of the Mobile Terminal (MT) are considered for the design of the Handoff algorithm. The Membership Functions (MFs) for each of the parameter are determined and corresponding Membership Degrees are evaluated from their concerned MFs. The optimized fuzzification of the parameters is obtained via developing the appropriate weight vector. The weight vector is optimized using MCSBO algorithm. Experimental results show that the proposed algorithms attained best performance bandwidth utilization, handoff dropping rate and handoff rate compared to existing handoff decision vector algorithms.

Keywords: Handoff, wireless communication, modified expectation maximization, membership function, modified cat swarm optimization.

INTRODUCTION

The fourth generation (4G) of mobile communication networks is predicted to integrate a probably large number of heterogeneous wireless technologies in what can be considered an enormous revolution toward universal seamless access. Heterogeneous networks have created several challenges like quality management, resource management, providing Quality-Of-Service (QoS), location management, security, cost and handoff. Change between heterogeneous networks needs seamless vertical handoff. One among the most challenges for seamless quality is the convenience of straightforward and economical vertical handoff also called as handover schemes, that is the call for a mobile node like notebook computer, phone and personal organizer to handoff between differing types of networks, like cellular, satellite, Wireless Local Area Networks (WLANs) And Wireless Wide area Network (WWAN)1. Vertical handoff schemes can play a significant role within the IEEE 802.21 normal and shall pave the road for emergence of 4G overlay multi-network surroundings. The popular vertical handoff will change Mobile nodes or Terminals (MT) to move freely across heterogeneous wireless mobile networks with the QoS needs satisfied.

In vertical handoffs, several network characteristics have an effect on whether or not a handoff should occur. These embrace power consumption, cost of service, network conditions, security and network performance. For a lot of information about these parameters, the reader is observed1. Up to now, several methodologies are used on vertical handoff, like fuzzy logic2, policy-enabled schemes3, pattern recognition4, neural networks ideas5, etc. Though a number of these strategies are quite successful, they’re not significantly appropriate for real-time applications like Voice Over Internet Protocol (VOIP), since the dependability of them usually depends on complicated procedure. Moreover, as mentioned above, vertical handoff is usually enforced on resource-limited mobile nodes. Therefore,
complicated handoff decision procedure isn’t suited real world applications. Additionally, all existing works don’t consider network traffic load within the handoff decision procedure. Besides, most of the previous works create handoff decision based on thresholds of Received Signal Strength (RSS) however yield serious ping-pong impact when a mobile node moves around the overlay area of many heterogeneous wireless networks. The ping-pong effect causes unneeded handoff and brings some weaknesses, as well as low network throughput, long handoff delay, and high dropping likelihood.

Available bandwidth is employed to point network conditions and could be a major issue, particularly for voice and video traffic. There are several works that specialize in available bandwidth based vertical handoff support. Additionally, 2 of the most vital indexes for QoS observation are the New call blocking probability (NCBP) and also the handoff decision dropping probability also called as Handoff Dropping Rate (HDR). The elaborate description of the NCBP and also the HDR are as follows. A new decision is initiated once a user requests a new connection, whereas a handoff decision occurs once an active user moves from one network to a different. Thus, NCBP is the probability of a new arriving call being rejected whereas HDR is the probability that a handoff try fails. In mobile communication networks, limiting HDR among a pre-specified target price is a vital QoS issue as a result of mobile nodes ought to be able to maintain ongoing sessions even throughout their handoff. In general, handoff dropping is a lot of objectionable than new call blocking. Here, a simple and robust FRVHDF proposed for heterogeneous wireless mobile networks.

PROPOSED METHODOLOGY

In this section, the proposed MEM clustering based optimal vertical handoff has been discussed using MCBSO and also introduced building blocks of the proposed handoff algorithm. The traditional VHDF algorithm has been discussed.

System overview: The step by step process of proposed system is illustrated in Fig 1. It shows that the handoff decision process of proposed FRVHDF. The bandwidth and call blocking probability are considered as an input signal. Initially, the bandwidth is calculated from mobile nodes and decides whether the node is resource poor or resource rich by using MEM. The resource poor nodes only used step 1 for handoff decision and resource rich nodes are used step 1 and step 2 processes simultaneously.

Packet loss rate: In, presented the packet loss measurement scheme. To obtain the accurate results the number of probing packets are needed and is analyzed as given below eqn (1)

\[
X_k \begin{cases} 
1, \text{packet is lost with probability } p \\
0, \text{packet is received with probability } 1 - p
\end{cases} 
X_r = \frac{X_1 + X_2 + \ldots + X_N}{N}
\]

Where \(X_k\) defined as the packet loss rate for \(N\) samples. Using central limit theorem the is defined as \(p = E(X_k)\).

![Fig 1: Architecture of proposed fuzzy rule based VHDF](image)
Dynamic New Call Blocking Probability (DNCBP):
The bandwidth change process of network $n_i$ for the traffic characteristics is defined as a $B_i$ process, and $B_i$ represents the total bandwidth. For channels, the arrival of requests can be predicted follows a Poisson distribution with mean $\lambda_i$, where $\lambda$ is, per unit time how much number of request arrivals and $i = 1, 2, ..., N$. Considered the Call Holding time (CHT) to follow an exponential distribution with mean $(1/\mu_i)$, where $\mu_i$ represents the per unit time, how much number of calls serviced. Here, obtained the priority to handoff calls in a more dynamic manner and DNCBP of network $n_i$ is given in eqn (2)

$$H_i = \frac{(\lambda_i/\mu_i)}{(\sum_{n=0}^{b_i} (\lambda_i/\mu_i)^n n!)}$$

(2)

Where $H_i$ represents the DNCBP of network.

Cluster process using MEM: EM is linear in database size, robust to noisy data, can handle high dimensionality and has a very good quality while using huge datasets. This algorithm assumes Apriori that tries to fit the data into „n“ Gaussian channel by expecting the classes of all data point and finding the maximum likelihood of Gaussian centers. Algorithm steps for EM are given as

Step 1: Initialized the $t^{th}$ iteration

$$\lambda_t = \{\mu_1^{(t)}, ..., \mu_c^{(t)}; \Sigma_1^{(t)}, ..., \Sigma_c^{(t)}; p_1^{(t)}, ..., p_c^{(t)}\}$$

Step 2: Computed the expected classes of all mobile nodes for each class using

$$P(w_k|x_k|\lambda_t) = \frac{P(w_k|x_k|\lambda_t)}{\sum_k P(w_k|x_k|\lambda_t)} = \frac{P(w_k|x_k|\mu_k^{(t)}; \Sigma_k^{(t)})}{\sum_k P(w_k|x_k|\mu_k^{(t)}; \Sigma_k^{(t)})} \mu_k^{(t)}$$

(3)

Step 3: Computed the maximum likelihood ($\theta^t$) given in network mobile node class membership distribution using

$$\mu_j^{(t+1)} = \frac{\sum_k P(w_k|x_k|\lambda_t) \lambda_t}{\sum_k P(w_k|x_k|\lambda_t)}$$

$$\theta_i^{(t+1)} = \frac{\sum_k P(w_k|x_k|\lambda_t) \lambda_t}{\sum_k P(w_k|x_k|\lambda_t)}$$

(4)

Where ‘R’ is the number of node points. Repeat the steps 2 and 3 while algorithm converges. In this proposed MEM, Gaussian and Sigmoid Fuzzy membership functions are used to compute based on “degrees of truth” rather than usual “true or false” (0 or 1) Boolean logic. Fuzzy logic has been employed to handle the concept of partial truth, where the truth values may lie between complete truth or complete false.

Step 4: The received data or node resource information are grouped into different clusters using MEM. The clustering separated the resource rice and poor nodes. Based on this clustering, the handoff decision function based two steps are carried out.

Handoff decision functions: The handoff function has two steps as: 1. Pre-handoff decision, 2. FRVHDF

Step 1: Pre-handoff decision

In this step, the minimum guarantee of network $i$, $i = 1, 2, ..., N$ for a user is evaluated. Particularly, the values of some easy-perceived and crucial parameters are more than predefined thresholds.

$$\mu_i = F(1 - b_k - b_k; F(BSS, -BSSm), F(V_t - V_{th}), F(\theta_i - \theta_{th}); F(C_t - C_{th}))))$$

(6)

Where $b_k$ indicates the bandwidth, $V_t$ → velocity, $T_i$ → duration, $C_t$ → battery power, $\theta_i$ → cost of Mobile Node (MN) from a particular network $i$. $b_{th}$ indicates the bandwidth of traffic class, $V_{th}, T_{th}, C_{th}$ → velocity, duration, battery power and cost to support the requested traffic class, $F(\cdot)$ → unit step function. This eqn (6) can be used to make a faster and intelligent handoff decision.

In this calculation, the $T_i$ defined the estimated time MN and is used to estimate the velocity of MN, location information of MN and moving pattern of MN the coverage of a particular network i, the requested traffic class is frequently the main traffic class for MN, and that takes up the most throughout. The unit step function is an irregular function whose value is 0 for negative argument and 1 for positive argument. Therefore, once there is not smaller than one parameter value of MN from a particular network $i$ means, lower than its threshold; the minimum guarantee function has zero value. In that situation, network i is not considered as a target network. If the minimum guarantee function value is one for a particular network I, then this network will be added to the candidate network set S. this scheme is simple and the parameters from this equation can be estimated quickly, very low time consumption.

Step 2: Fuzzy Rule based Vertical Handoff Decision Function (FRVHDF): In the candidate network set S, The proposed FRVHDF is used to measure the enhancement gained via handing off to a particular network $i$. Step by step process of process of proposed scheme is given below

1. Select ‘n’ network $BSS$ i.e. BS1, BS2, BS3, BS4

2. Pre-handoff decision

3. FRVHDF
BSn. Assign some priorities values (P-weight) to the parameters like power consumption, cost of service, security, network conditions, and network performance and DNCBP.

2. some membership values assigned to the linguistic variables and parameters

3. the total value i.e., support is calculated

\[
TV = \sum_{i=1}^{n} (BSi \times P - weight i)
\]

Where \( TV \) is total value, \( n \)-network

4. High Value (HV) is computed

\[
HV = \sum_{i=1}^{n} (BSi \times P - weight 1) \times 1
\]

5. the membership function i.e Fuzzy Value(FV) is calculated

\[
FV = TV / HV
\]

For First BS i.e. for BS1 the membership degrees vector let it be V1 may be defined as

\[
V1 = \{MD11 (d); MD12 (d); MD13 (d); MD14 (d)……. MD1n (d)\}
\]

Where \( MD \) = membership degree, \( d \) is distance

Frequently, changing the values of the input parameters and their MD are changed in random order. Therefore, to obtain the optimized vertical handoff based on different conditions, and weight vector (w) also used. This weight vector is very important for decision support.

6. Now dividing into \( N \) ranges between high and low values

\[
B (i + 1) = LV + (m \times HV / n)
\]

Where \( LV \) indicates the low values= \( \sum_{i=1}^{n} (BSi \times P - weight 1) \times 0 m = 0 \) to \( n \)

7. verify for each \( i = 0 \) to \( n - 1 \)

\[
H (total >= b(i + 1) \&\& total < b(i + 2)) \text{ Then Stage="} Sj \text{" where j=1 to n+1}
\]

Else if (\( total == b(i + 2)\)) Then stage="Sj + 1."

8. verify for each \( j=1 \) to \( n+1 \)

if (stage is equal to ("Sj") { handoff="type j"; } 
Else {
handoff="type j+1"; }

**RESULTS AND DISCUSSION**

In this section, MATLAB has been used to evaluate the performance of proposed scheme. Here, two networks are considered with the low bandwidth of 384 kb/s, and high bandwidth of 1 Mb/s. In this experiment, the BS...
and load are given as input to measure the call blocking probability. The 40 above BS are given and load classified as none, light, average, heavy and oscillating. The performance of proposed scheme is compared with existing EFR with MPSO, RSS with Threshold in terms of handoff dropping rate, bandwidth utilization rate, DNCBP, handoff function and handoff rate.

Here, assumed all mobile nodes have enough resource to make both steps. And this proposed experiment did not focus on any specific traffic class. As mentioned above, it is clear that if the thresholds of the handoff decision parameters are predefined according to a specific traffic class, the performance of proposed algorithm will be better.

The graphical representation of overall bandwidth utilization depends on offered load is illustrated in Fig. 2. It shows, the proposed scheme offers better results when varies the offered load, compared than existing EFR with MPSO, RSS with Threshold on overall bandwidth utilization also defined as network throughout. Particularly, in each chosen case, the proposed MEM with MCSBO method increases bandwidth utilization by 0.2 compared with the existing approach. Let considered overall bandwidth utilization is mainly restricted by pre-specified offered load. Therefore, due to the pre-specified offered load, the overall bandwidth utilization improvement brought through proposed the handoff dropping rate is the same as overall bandwidth utilization.

The graphical representation of handoff dropping rate depends on offered load is illustrated in Fig. 3. From Fig. 3, It shows, the proposed scheme outperforms and gives better results when varies the offered load, compared than existing EFR with MPSO, RSS with Threshold on handoff dropping rate. And it reduces handoff dropping rate by up to about 0.174% in individual cases.

The graphical representation of handoff rate depends on offered load is illustrated in Fig. 4. The handoff rate is defined the ratio of total number of handoff execution to handoff decision. And a handoff execution means a successful handoff to the other network.

In this experiment, set the number of handoff decision in the existing approach equals to that in proposed MEM with MCSBO schemes. Clearly, the proposed MEM with MCSBO approach shows that handoff rate is always smaller than that in the existing schemes.

Conflict of Interest: I have no conflicts of interest to declare

Source of Funding: The authors have no funding to report

Ethical Clearance: This research is completely followed by ethical standards.

CONCLUSION

In this paper, a simple and robust FRVHDF is proposed for heterogeneous wireless mobile networks with the DNCBP. First, the rapid assessment method for the pre-handoff decision is described. Second, the fuzzy based handoff decision function for handoff execution can be explained. The input nodes are separated as resource rich and poor nodes via MEM clustering. Conversely, vertical handoff decision would consider both steps for resource-rich mobile nodes. In second step, the weight vectors are optimized using MCSBO for accurate decision. The network simulation results
have proven that the proposed FRVHDF outperforms compared than the existing schemes in handoff dropping rate, bandwidth utilization rate, DNCBP, handoff function and handoff rate.

REFERENCES


Design of Compact Reconfigurable Miniaturized Triple-band filtenna for IoT Applications

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ABSTRACT

The Microstrip Patch technology offers a compact Triple-band Antenna for IOT Application achieves reduced filter size and desired output. Novel Compact Microstrip Patch Antenna and 2x2 Antenna Array with Band Pass Filter for IOT Application in WSNs/WLAN/LTE bands is proposed. The Compact rectangular antenna is designed with inverted C Shape for the dual band resonance at 3.5/5.8 GHz and the 2x2 antenna array is designed for the triple band resonances at 2.4/3.5/5.8 GHz fed with 50Ω microstrip feed line to support WSNs/WLAN/LTE bands for IoT Applications. The parameters such as Return Loss, Gain, Directivity, Radiation Pattern of the single antenna and antenna array are obtained with high performance. The single antenna shows directional radiation pattern with the gain value of 4dBi and 6.5dBi and resonates at 3.5/5.8 GHz. The antenna array shows directional radiation pattern with the gain value of 5/7/9 dBi and resonates at 2.4/3.5/5.8 GHz respectively. Finally the LPF and HPF are cascaded to develop a Band pass filter (BPF), for passing frequencies 2.4/3.5/5.8 GHz and analyzed. From the comparison of Single antenna and Antenna array, 2x2 Antenna array achieves highest performance with triple band resonance. The proposed antenna parameters are fabricated and analysed using Vector Network Analyser.

Keywords: Antenna Array; Single Band; Dual Band; WLAN; IOT; Filtenna

INTRODUCTION

Internet of Things (IoT) is a conceptual communication technology combines many wireless communication systems together, such as Wireless Sensor Networks (WSNs), wireless local area network (WLAN), Long Term Evolution (LTE), etc. Recently, the rapid progress of IoT increases the difficulties of multi-band antenna toward compact and low profile for IoT devices¹. Design of multi-frequency antenna for IOT applications has been attracting great interest. To accommodate many systems of different frequency into limited space, circuit components, including antennas, are often required to be multi-frequency and compact. WSNs/WLAN/LTE technologies gained an attention among academics and industrials in the wireless world for the use of indoor and hand held-system of multiple layer wavelength dependent antenna array². In 2002, WSNs/WLAN/LTE technology has got a lot of popularity since US Federal Commission Communication (FCC) permitted upto 10.6 GHz frequency band for commercial usages. WSNs/WLAN/LTE communication technology offers high data rate transmission, compact size, low power consumption and easy to fabricate which gives advantages to the communication applications such as RFID systems, C/X band application, sensor networks, radar, and location tracking C/X band with Invariant Radiation Pattern Characteristics³⁴. It is in quite demand with dual coverage and operates between the frequency of 3-6 GHz. The 9x9microstrip patch antenna with slots is implemented with dual feed for C-band radar application⁵⁹. MIMO Antenna is designed and fabricated with High Isolation for WBAN Application⁶. Modeling and Predicting Sky-Noise Temperature for X to W-Band , X and KU Band Applications⁷⁸. Series-Fed Microstrip Antenna Arrays and their application to Omni-Directional Antennas⁹, multi-resonant wideband slotted dipole antenna with modified ground plane¹³.

In this paper, convenient designs of WSNs/WLAN/LTE antenna for IOT Applications, which can be used as building blocks to construct multi-band antennas are proposed. The objective of this work is to develop a
low-cost, high-gain, directional antenna operating in the WSNs/WLAN/LTE band that enables eventual integration of electronics for radiation pattern control and operates on the frequency resonances at 2.4/3.5/5.8 GHz to operate dual and triple bands of WSNs/WLAN/LTE for IOT Applications.

The antenna array feed methods can be categorized as series and corporate feed architectures. Rectangular arrays are the common type used for antenna arrays. Studies on dual and triple band antennas employing rectangular arrays were reported. Compared to rectangular patch antenna arrays, there are limited numbers of studies performed on multiband rectangle patch antenna arrays due to difficulties in fabrication, but the advantage of rectangular antenna array results high gain with better performance. Novel F-shaped quad-band printed slot antenna for WLAN and WiMAX MIMO systems. The proposed antenna is simulated using Advanced Design System and analysed the performances of the antenna.

The proposed antenna widely offers the requirements of the wireless transmission services for adapting the antenna to the narrow bands needed by IoT systems and reducing the interference effects. This antenna structure can be analysed using ADS software. The antenna performance can be analysed using various parameters with corresponding resonance frequency (fr).

Rectangular Microstrip Patch Antenna Design for IoT Application

To design the proposed Compact antenna with inverted C Shape using microstrip rectangular patch. Initially the rectangular patch antenna was designed and then the slots are introduced with the calculated length and width. The antenna is designed by using dielectric FR4 substrate material with 1.654 mm with 4.4 dielectric constant value. The length and width of the antenna can be calculated by using the mathematical equations.

For an effective radiator, a practical width that leads to high radiation efficiencies

\[ W = \frac{5n}{2\pi} \sqrt{\frac{2}{\varepsilon_r + 2}} \ldots \ldots \ldots (1) \]

Where \( v_0 \) is the free-space velocity of light

The actual length of the patch can be determined by solving

\[ L = \frac{\lambda}{2} - 2\Delta L \ldots \ldots \ldots \ldots (2) \]

\[ \Delta L = 0.412 h \left( \frac{\varepsilon_{reff} + 0.3}{\varepsilon_{reff} - 0.264} \right) \left( \frac{W}{h} + 0.264 \right) \]

Where

Antenna Design and Geometry

The Compact antenna can be designed by introducing inverted C-shape slot on the rectangular patch antenna with corresponding length and width. The Geometry of proposed antenna is shown in Figure 1. Based on this designing parameter the antenna can satisfy the IOT Applications. The Dimensions of the Rectangular Antenna is shown in Table 1.

Dimensions and Geometry of single and 2x2 rectangular antenna array

The Single rectangular antenna and 2x2 antenna array is designed with FR-4 substrate of dielectric constant 4.4. The dimensions for the proposed single antenna and antenna array are given in Table 1. The Geometry of the Single rectangular antenna and 2x2 antenna array is shown in Figure 1.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Dimensions (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rectangular Patch</td>
<td></td>
</tr>
<tr>
<td>Length (L₁)</td>
<td>8.9</td>
</tr>
<tr>
<td>Width (W₁)</td>
<td>13</td>
</tr>
<tr>
<td>Inverted C-Shaped Patch</td>
<td></td>
</tr>
<tr>
<td>Length (L₂)</td>
<td>6</td>
</tr>
<tr>
<td>Width (W₂)</td>
<td>10</td>
</tr>
<tr>
<td>Slot</td>
<td></td>
</tr>
<tr>
<td>Length (L₃)</td>
<td>1.4</td>
</tr>
<tr>
<td>Width (W₃)</td>
<td>1</td>
</tr>
<tr>
<td>Feed Line</td>
<td></td>
</tr>
<tr>
<td>Length (L₄)</td>
<td>1.8</td>
</tr>
<tr>
<td>Width (W₄)</td>
<td>1</td>
</tr>
<tr>
<td>Substrate thickness (FR4)</td>
<td>1.6</td>
</tr>
</tbody>
</table>
Design of Band Pass Filter

Wireless Local Area Network (WLAN) is a very attractive technology for innovative wireless communications requiring high data rates. A designated antenna, which presents a reflection coefficient (S11) matched band comparable to the band-pass filter (BPF) is required at the transceivers. The inherited BPF response of the antenna satisfies the specifications of the front-end BPF components of the transceivers. For the fabrication, a comprehensive set of well-defined measurements (using a standard antenna) were used to validate the BPF integrated antenna. The microstrip lines are arranged in parallel to each other which provides a large coupling output for a particular spacing between the microstrip lines which helps us in designing a bandpass filter structure which can have a wide range of bandwidth which is an added advantage of this parallel coupled filter structure.

The parameters which is defined at the central resonance frequency of the filter is the slope parameter. For any serial resonator the reactance slope parameter is defined by (3)

\[ \alpha = \frac{\omega_0}{2} \frac{dX}{d\omega} \bigg|_{\omega_0} \]  

Where X is the reactance of the resonator.

For a parallel resonator the susceptance slope parameter is defined by this equation (4)

\[ \gamma = \frac{\omega_0}{2} \frac{dB}{d\omega} \bigg|_{\omega_0} \]  

The relations between the integrated elements of the band-pass and low pass filters for parallel and serial resonators are as follows (5, 6).

\[ \gamma_j = \frac{\omega_0 C_j}{\omega_0 L_j} = \frac{\omega_0^2 L_j}{2W} \]  

\[ \alpha_k = \frac{\omega_0 L_k}{\omega_0 C_k} = \frac{\omega_0^2 C_k}{2W} \]  

Where W is the relative bandwidth and “\( \omega_0 \)” is the central resonance frequency for the band-pass filter.

Table 2: Optimized values of the given band-pass filter

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>12</td>
</tr>
<tr>
<td>L1</td>
<td>0.2</td>
</tr>
<tr>
<td>L2</td>
<td>5</td>
</tr>
<tr>
<td>L3</td>
<td>3</td>
</tr>
<tr>
<td>L4</td>
<td>0.4</td>
</tr>
<tr>
<td>W1</td>
<td>0.2</td>
</tr>
<tr>
<td>W2</td>
<td>0.2</td>
</tr>
<tr>
<td>W3</td>
<td>5</td>
</tr>
<tr>
<td>W4</td>
<td>0.44</td>
</tr>
<tr>
<td>W5</td>
<td>12</td>
</tr>
</tbody>
</table>

The structure presented in Figure 2, a broadband band-pass filter has been designed, analyzed, and built. The structure of this filter has been implemented on a Fr4 substrate with a thickness of 0.787mm and a dielectric constant of 4.6.
Simulation and Measurement Results

Prototype design of single antenna

The Layout of the antenna structure is designed based on the Microstrip line feed. The purpose of the Microstrip line feed in the patch is to match the impedance between the patch and the feed line without the need of any additional matching element. This is done by properly controlling the position of the feed. The main advantage of this feed method is that it is simple for modelling and impedance matching. The bandwidth range of this feeding technique is between 2-5% The Layout design and fabrication model of the Single band antenna is shown in Figure 3 and Figure 4.

The simulation and measurement plot of return loss $S_{11}$ of single antenna is -19.551 dB at 3.5 GHz and -20.241 dB at 5.8 GHz is shown in Figure 5 and Figure 6.

The Current flow Distribution of Single antenna and the Omni Directional Radiation pattern for the single WLAN antenna is shown in Figure 7 and Figure 8.
Table 3: Comparison of Simulated and Measured output of Single Antenna

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Simulated Output</th>
<th>Measured Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resonating Frequency</td>
<td>3.5 GHz</td>
<td>5.8 GHz</td>
</tr>
<tr>
<td>Return Loss ($S_{11}$)</td>
<td>-19.55 dB</td>
<td>-20.24 dB</td>
</tr>
<tr>
<td>Gain</td>
<td>4 dB</td>
<td>6.5 dB</td>
</tr>
<tr>
<td>Directivity</td>
<td>4.32 dB</td>
<td>6.52 dB</td>
</tr>
<tr>
<td>Radiation Pattern</td>
<td>Omni-direction</td>
<td>Omni-direction</td>
</tr>
<tr>
<td>VSWR</td>
<td>&lt;1</td>
<td>&lt;1</td>
</tr>
</tbody>
</table>

Prototype design of 2x2 antenna array

The Prototype design and fabrication model of the Dual antenna array is shown as Figure 9 and Figure 10.

Figure 9. Layout design of double band antenna array

Figure 10. Fabrication model of double band antenna array

Return loss ($S_{11}$) is the important parameter to analyse the effective power delivery of the designed antenna performance in wireless environment

The simulation plot and Measured plot of return loss $S_{11}$ of the antenna array is -11.850 dB at 2.4 GHz, -12.186 dB at 3.39 GHz and -20.050 at 5.8 GHz as shown in Figure 11 and Figure 12. The narrow bandwidth required by IoT applications are obtained.

Return loss ($S_{11}$) is the important parameter to analyse the effective power delivery of the designed antenna performance in wireless environment.
The radiation pattern defines the variation of the power radiated by an antenna as a function of the direction away from the antenna. The Omni Directional radiation pattern of the proposed antenna array is shown in Figure 14 and the VSWR of WLAN Antenna is shown in Figure 15.

### Table 4: Comparison of Simulated and Measured output of Antenna Array

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Simulated Output</th>
<th>Measured Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resonating Frequency</td>
<td>2.4 GHz</td>
<td>2.4 GHz</td>
</tr>
<tr>
<td></td>
<td>3.5 GHz</td>
<td>3.5 GHz</td>
</tr>
<tr>
<td></td>
<td>5.8 GHz</td>
<td>5.8 GHz</td>
</tr>
<tr>
<td>Return Loss ($S_{11}$)</td>
<td>-11.85 dB</td>
<td>-23.61 dB</td>
</tr>
<tr>
<td></td>
<td>-12.18 dB</td>
<td>-20.06 dB</td>
</tr>
<tr>
<td></td>
<td>-20.05 dB</td>
<td>-34.73 dB</td>
</tr>
<tr>
<td>Gain</td>
<td>5 dB</td>
<td>5.2 dB</td>
</tr>
<tr>
<td></td>
<td>7 dB</td>
<td>7.1 dB</td>
</tr>
<tr>
<td></td>
<td>9 dB</td>
<td>9.4 dB</td>
</tr>
<tr>
<td>Directivity</td>
<td>5.2 dB</td>
<td>5.3 dB</td>
</tr>
<tr>
<td></td>
<td>7.1 dB</td>
<td>7.2 dB</td>
</tr>
<tr>
<td></td>
<td>9.2 dB</td>
<td>9.5 dB</td>
</tr>
<tr>
<td>Radiation Pattern</td>
<td>Omni-direction</td>
<td>Omni-direction</td>
</tr>
<tr>
<td></td>
<td>Omni-direction</td>
<td>Omni-direction</td>
</tr>
<tr>
<td>VSWR</td>
<td>&lt;1</td>
<td>&lt;1</td>
</tr>
<tr>
<td></td>
<td>&lt;1</td>
<td>&lt;1</td>
</tr>
<tr>
<td></td>
<td>&lt;1</td>
<td>&lt;1</td>
</tr>
</tbody>
</table>

### CONCLUSION

Novel resonant modules for constructing multi-band WSNs/WLAN/LTE antennas for IoT Application have been proposed in this paper.

The proposed Compact rectangular single antenna resonates dual bands at 3.5/5.8 GHz and the 2x2 antenna array resonates triple bands at 2.4/3.5/5.8 GHz fed with 50Ω microstrip feed line to support WSNs/WLAN/LTE Applications. The single antenna shows directional radiation pattern with the gain value of 4dBi and 6.5dBi resonates at 3.5/5.8 GHz. The antenna array shows directional radiation pattern with the gain value of 5/7/9dBi and resonates at 2.4/3.5/5.8 GHz respectively. Thus the proposed antenna parameters are fabricated and analysed using Vector Network Analyser.

Both antennae were designed with ADS and characterized. Simulation and Measured Result is obtained with high performance. From the comparison of Single rectangular antenna and Antenna array, 2x2 Antenna array achieves highest performance with triple band resonance. Thus the proposed 2x2 antenna array is simple and convenient to use and provides flexibility in multi-band WSNs/WLAN/LTE antenna.

**Ethical Clearance**: Taken from St. Peter’s University

**Source of Funding**: Self

**Conflict of Interest**: Nil

**REFERENCES**


Dipole Micro-strip Patch Antenna Design for Tri-Band Frequencies

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ABSTRACT
The proposed design makes antenna work in different frequencies. The antenna produces better gain and efficiency compared to conventional antennas. The conventional antenna transmits data between sender and receiver with single frequency, but the proposed antenna overcomes the problem by transmitting the different frequencies using the single antenna. Conventional antenna uses multiple antennas for different frequencies like WiMAX (Worldwide Interoperability for Microwave Access) applications. The design of the antenna radiator is used to generate three frequency bands with the frequencies of 1.57, 2.45 and 3.54 GHz for WiMAX applications. Here the radiating branch is responsible for the higher band selected for tuning. The stub connected with the antenna to design the planar structure to have the Tri-band frequencies, which produces high gain and low return loss. It has the current distribution and voltage parameters synchronized with the measured result. The Results proves that the higher band can be continuously tuned in frequency where the lower band unchanged for different frequencies. The reflection coefficient, radiation pattern, VSWR and efficiency of the antenna are studied using ADS simulation and measurement using vector analyzer.

Keywords: GPS, WLAN, multiband antenna, planar antenna, quad-band antenna, reconfigurable antennas, Worldwide Interoperability for Microwave Access (Wi-MAX), Spectrum Sensing, Wi-Fi.

INTRODUCTION
The antenna is designed to produce the patch structure which used to have the sufficient parameters in a better way compared to the existing systems. This design is used to have the dipole multiband reconfigurable structure because many dipole antennas can never produce multiband frequencies, if they have the multiband structure it generate the gain in the lower rate. To overcome those problems this reconfigurable patch antenna is designed to have a gain up to 80.9%. To achieve our antenna design we have been studied, the monopole antenna used for Wi-MAX system is described in [1], has generated and proposed only two frequencies, a multi-band planar inverted F-antenna used for the wireless-wide-area-network system to varying the frequencies in [2], a multi-band patch antenna is used for the frequency radiation of varying the polarization states in [3], the dual-band loop antenna is used to achieve the frequencies of 2.4/5.2/5.8 GHz in [4-6]. The antenna designed to produce the significant efficiency to have Wi-MAX application; the tri-band antenna is described in [5-9]. In the proposed antenna, we designed a tri-band slot antenna for the GPS/Wi-MAX/WLAN systems. The proposed antenna consists of a feed patch structure, the inverted T-shape stub structure to produce tri frequency bands at about 1.575 for the GPS, 2.45 IEEE 802.11b, and 3.5 Wi-MAX and 5.4 GHz for IEEE 802.11a systems, respectively. In this antenna design, the generated frequency band will produce only one antenna element and the gain achieved by this antenna is much higher than the other antennas which has up to 89.5% output efficiency, so that it can be used for the Wi-MAX application. The antenna is designed to reduce the complexity between the data transmissions for the various frequencies using the dipole radiation structure, which produces the static position with less return loss and the high efficiency. The ADS is the simulation tool used to design the antenna in the simpler structure. The feed is given to the antenna so that it is effective to have the design result with required efficiency, peak gain radiation pattern and the reflection coefficient S11 of the antenna.
Design of the Antenna:

The antenna is proposed to produce the output in the effective way which used to have the Wi-Max application. The designed antenna has the size of L1xW1=48x18 mm$^2$ which evaluates using the ADS software. The measured result verified and tested using the VNA. This VNA can be able to calculate the S-Parameter, VSWR, Impedance, gain and the Phase Shift. The figure 1 gives the dramatic structure of the antenna design.

![Antenna Design](image1)

Fig. 1. Antenna Design.

Design Parameters:

This Antenna designed using the modulation of the length and the width statistics of the designing which is to be used to have the switching the various frequencies.

The fig.2 used to design the length and width of the antenna the outer width of the slot is consist of rectangular slot loaded with the size of L1xW1=48x18 mm$^2$ on the one side substrate. Here the antenna the feed line width of Wf=1.76mm to get the impedance of 50Ω. By using this impedance matching, the antenna can be able to generate the variable frequencies like 1.57, 3.5, 2.45 and Wi-Max (5.4) GHz in the different bands like band 1,2,3,4 in the wireless standards.

![Antenna Design in ADS](image2)

Fig.2 Antenna Design in ADS.

Design Structure of the antenna:

The current flow in the antenna will be varied for different frequencies to achieve the different frequency Bands. The source current of the device will act as the input source, the input source given to the antenna designed with T-shaped and E-shaped slot to have the different frequencies like 1.57, 3.5, 2.45 and Wi-Max (5.4) GHz in the different bands

Antenna Structure and design:

The Designed structure and function of the antenna based on the theoretical parameters and formulations to have the required frequencies. In the simulated results, the frequencies achieved in the different bands Band1, 2, 3, 4.

In this antenna shown Fig.2, the feed line placed symmetrically on the ground plane, which can block the way of the other electronic components placed on the PCB. However, the feed line designed to place asymmetrically on the ground plane to give more space for other components.

The designed antenna is studied with a relative permittivity of $\epsilon_r=3.5$, the thickness of the antenna is 0.8 mm, and the tangent loss is 0.004.

![Block Diagram](image3)

Fig.3 Block Diagram.

Patch width:

In the figure4, the hardware design of the antenna described which produces the GPS frequency between 1.55- 1.80GHz in the Band 1. The second frequency is produced in the patch where the frequency of the stub to have the WLAN frequency which lies between 2.45-2.65 GHz in the Band 2 region. The third frequency produced in the patch to have the Wi-MAX frequency lies between 3.083-3.55 GHz in the Band 3 region. The system frequency remunerates the dip in the circular...
polarization graph has the current dissipation and power distribution in various Band structures. This antenna has the two ports one for the antenna and another for the patch where these two ports connected in the same place so that the gain of the antenna easily measured. The Dip below 10dB for the antenna design shown in the figure6.

![Fig. 4. The hardware design of the antenna](image4.png)

Antenna Geometry and Design:

This antenna designed with the frequencies of different Bands in the radiation produced in the various portions of the antenna. The antenna has the low return loss of less than 10dB and the high gain for different frequencies. Here the antenna can resonate with the frequencies of 2.4GHz in the designed one side of the dipole region. The radiation produced in the antenna in the port where it produces the high gain in the ports where the pin 1 and pin 2 connected to the same point in the substrate. The autonomous design of the antenna can generate the radiation in the end portion of the E-shaped portion with the width and length of W1&L6 positions for the frequencies 2.45GHz, the radiation in the stub will produce the frequencies of 3.56GHz used for the Wi-MAX application.

$$f_1 = \frac{c}{2(L1+\pi W1)\sqrt{\epsilon}} = 1.43\, \text{GHz}$$

This antenna resonates the frequencies of 2.1/3.5/5.2 GHz in the different bands it has the modulated current distribution and polarization of the antenna. It produces the result in the different way that is the antenna will measure the gain by connecting the cable any the gain can be calculated without connecting the cable. We will acquire the result better when the cable is removed the measured. The measured and simulated result given in Figure 6.

![Fig 6. Measured and Simulated Graph](image6.png)

The antenna design has the current dissipation in the software result, which imposes the power dissipation in the far field structure.

The measured and Simulated result of the antenna has the radiation pattern for the frequencies of 1.567, 2.45, 3.5 and 5.27 GHz in the different bands of the antenna patch. The radiation pattern of the antenna has the omni directional in the x-y plane and “dummy-bell” shape in the x-z plane. In the Low-frequency structure of the antenna, the radiation pattern of the measured result will be smaller than that of the simulated result because of the the cable connections. It denoted as the red and blue lines in figure8. The Efficiency of the antenna then improved by using the analytical method. The software will first measure the gain, a radiation pattern with its intensity than the reflection coefficient. The designed and analyzed result will lead to identifying the directivity of the antenna design using the radiation intensity. The antenna efficiency can be measured by using the equation.

$$\text{Efficiency} = \frac{G(\theta, \phi)}{D(\theta, \phi)} (1 - |\Gamma|^2)$$
Where $\Gamma$ - the voltage reflection coefficient, $G(\theta, \phi)$ - The gain of the antenna, $D(\theta, \phi)$ - The directivity of the antenna.

**Table 2. The Frequency and the Efficiency of the Antenna in the Simulated Software**

<table>
<thead>
<tr>
<th>Band</th>
<th>Frequency</th>
<th>Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.565 to 1.575 GHz</td>
<td>76.8%</td>
</tr>
<tr>
<td>2</td>
<td>2.012 to 2.126 GHz</td>
<td>80.1%</td>
</tr>
<tr>
<td>3</td>
<td>3.45 to 3.76 GHz</td>
<td>96.6%</td>
</tr>
<tr>
<td>4</td>
<td>5.20 to 5.34 GHz</td>
<td>85.5%</td>
</tr>
</tbody>
</table>

The table 2 used to find the parameters of the different frequencies of the different Bands. The systematic approach of the Software used to find the radiation pattern in dipole structure. The figure 11 shows the radiation pattern of the antenna after simulation completed.

**Hardware design of the Antenna:**

The hardware design done by using the ceramic material like FR4 and the copper material. This antenna has the thickness of 1.6mm; the antenna is specially designed using the computerized tool is used to report the design with accurate structure. The antenna is used to have the special frequencies like 5.8GHz is more useful for the Wi-Max application. The frequencies achieved from this antenna are more useful for the 5G technology. The figure 12 shows the return loss of the antenna in the vector analyzer.

**Fig.7. Current and Power Dissipation results.**

The antenna has the radiation pattern structure which results in the characteristics gain of the antenna structure. The radiation pattern can be identified using the far field in ADS software, the range of the antenna structure will be denoted using the color coding. The radiation occurs in the antenna will be in the blue color with the radiation of red and yellow color. It shows that the antenna has the efficiency up to 81.01%. The power dissipation and the current distribution has been discussed in the figure 7.

The power dissipation and the power gain can be calculated using the design parameters. The polar graph is used to find the Radiation pattern and the Smith chart is used to find the Impedance matching. Here we are using the polar graph in the EMFarField circuit to find the power dissipation and the Gain which is denoted by Red and Blue color. It has the dielectric constant of 2.45Ghz with a tangent loss of 0.002. It also has the peak gain of about -6 dBi to -4 dBi on the frequency Band of 1.5 to 3 GHz.

**Fig.8. the radiation pattern of the designed antenna.**

**Fig.9. Return loss of the antenna**
output wave reflected back to the transmitter, so the system will be inefficient. These mismatches will occur in the interfaces between the various equipments, transmitter, cable, and the antenna. In general, the antennas have correct dimensions it would have the impedance typically at 50 ohms. When there is any reflection occurs the standing waves are produced in the cable.

**Radiation Pattern:**

The Radiation pattern of the antenna designed and the measured result produced in the Fig.14. The frequency bands that has been given which is tuned to propose the WiMAX application and the resonant frequency in the antenna of the higher frequency range remains unchanged in 5.2 GHz with the bandwidth from 5.1 to 5.32 GHz. The simulated radiation pattern of the given antenna has been justified using simulation and hardware measurements.

This antenna has been reproducing in omni-directional patterns, in the x-y plane. Then it has the dumb-bell shape in the x-z plane, similarly as a typical Dipole antenna. In 2.4 GHz, this antenna also has an omni directional pattern on the x-y plane with respect to the corresponding Z-axis. However, there are no zeros (null) in the z-direction. So the measured results will always be smaller than the simulated result.

**Phase Parameters of the antenna:**

The phase difference is the difference that expressed in the degrees of time between the two waves having the same frequency, which referenced to the same point of time. If two oscillators have the same frequency and no phase difference is said to be in phase. Our antenna is has been reproduced the in phase shift.

**Hardware and Software Comparison:**

Comparing the results of the hardware and software, we have the efficiency of 90 percentages. This has the achieved results of

<table>
<thead>
<tr>
<th>Band</th>
<th>Simulated result</th>
<th>Hardware result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>1.74 GHz</td>
<td>1.599 GHz</td>
</tr>
<tr>
<td>2.</td>
<td>2.43 GHz</td>
<td>2.07 GHz</td>
</tr>
<tr>
<td>3.</td>
<td>3.083 GHz</td>
<td>3.56 GHz</td>
</tr>
<tr>
<td>4.</td>
<td>5.833 GHz</td>
<td>5.218 GHz</td>
</tr>
</tbody>
</table>
CONCLUSIONS

The reconfigurable antenna designed to have the different frequencies like GPS, Wi-MAX, and WLAN. The radiation pattern of the antenna realized peak gain, efficiency, and the return loss can be analyzed using measured and simulated results in the ADS software design with 72.8% of gain. The results of the antenna for the required frequencies are 1.599, 2.074, 3.562 and 5.218 GHz in the different bands of the antenna patch. These frequencies will be used to configure the applications like GPS, Wi-MAX, and WLAN Etc. This antenna design is more reliable and advanced type because it has generated the different frequencies at the same time and the efficiency is more than 90 percent compared to the other antennas.

Future Scope:

The future scope of this antenna design includes the MEMS switch used to trigger the different frequencies efficiently. The efficiency of the antenna design increased by this design structure. The MEMS switch is a miniature structure, which used to have the antenna structure to be so smaller so that the size of the device minimized. The MEMS switch placed in the antenna structure so that the return loss reduced and the accuracy increased.

Ethical Clearance- Taken from St.Peter’s University

Source of Funding- Self

Conflict of Interest – Nil

REFERENCES

Hybrid Three Port Converter with Extended Modes of Operation

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¹Research Scholar, ²Professor, St.Peter’s University, Chennai, India

ABSTRACT
This paper presents a Three Port Converter with two additional Modes of operation, realized using two different sources in second port. The existing system consists of a battery, which acts as energy storage. First and third ports consist of Photovoltaic system and the Load. The Proposed System consists of Second Port with both Battery storage and wind energy system. Thus, the entire system is capable of regulating the power even at peak load demands using a bidirectional switching topology. Two extra modes of operation, namely Dual Input Single Output mode (DISO-2) and Single Input Single Output (SISO-2) are discussed in the proposed system that uses Perturb and Observe based Maximum Power Point Tracking for extracting maximum power from the Photovoltaic System. The improvements include the increase in net Efficiency of converter system with improved voltage boost ratio above six times verified using simulation results. In addition, a prototype model of the proposed system developed in the Laboratory for validation purpose.

Keywords: Distributed Energy Resources, Three Port Converter, Perturb and Observe Controller, State-of-Charge Controller.

INTRODUCTION
The three-port converter is a device that combines the two different sources, and it may be a renewable or a constant DC power supply. The sources present at the input side are DC source, where for the wind energy the output AC is rectified using diode rectifier². The important feature of the three-port converter is to regulate the two inputs and feed it to load. The proposed system consists of energy storage realized by a battery with an additional wind power system at the second port. Conventional standalone system comprises PV, battery, load at the first, second and third ports⁵,⁶. In the conventional system, the battery in the second port acts as the storage device that supplies constant DC source to the load, thus compensating the load requirement during low voltage conditions.

The advantage of using proposed converter topology includes the high voltage step-up capability with additional modes of operations. The Wind Energy Conversion System comprises Diode Rectifier to convert the AC power from the wind generator to the DC output. Three Port Converters are first developed for the satellite systems with Photovoltaic and the Battery as the sources to energize the satellite for continuous operation⁸. The additional advantages of using isolated three-port converter topology is to separate the output and the input using a linear transformer. The Port Converters also have certain advantages of low-cost design, compact size and capable of operating at low input voltage, which can be used in remote power systems as Distributed Energy Resources, where the grid power is intermittent.

Figure 1 shows the Proposed Three Port Converter System with the modified Second Port including both the Wind Energy and the Battery Storage Systems. By varying the modulation indices of some multilevel inverter schemes, the optimum output voltage with lowered harmonic distortion is obtained¹⁰. For the cascaded multilevel inverters in addition to the batteries, capacitors, constant DC sources also used to achieve higher output voltages³. The Wind Turbines are classified based on the structure i.e. Horizontal Axis Wind Turbine (HAWT) and Vertical Axis Wind Turbine (VAWT) and the proposed wind energy system realized using Permanent Magnet Synchronous Generator using VAWT configuration². Two mass drive train model performs the control of motor torque in the
Wind generation system. H-Bridge DC/DC converters are capable of controlling the power flow between the two input sources based on their availability for the non-linear systems. The switching topology mentioned only allows the power flow in one direction from either wind or battery system to the load. Three-port converter makes use of unidirectional switching to charge the battery. Four-Port Converters make use of multiple photovoltaic cells connected in parallel. Three Port H-Bridge Converter system eliminates the need for two different DC-DC converters in the system.

**PROPOSED CONVERTER SYSTEM**

**Topology Configuration**

In the system with four-port converters, the Photovoltaic, Wind Energy System, and the Battery are connected to the first three input ports while the load is attached to the Output port (fourth) which makes the entire system control more complicated. The power flow from the PV panel or other DC sources charges a battery or storage device. The Proposed Three Port Converter consists of six Capacitors, Co, C1, C2, C3, CPH, and CWIND, three switches S1, S2, S3, and the diodes D1, D2, D3, D4, and D5. The Linear Transformer consists of Magnetizing Inductance Lm, Leakage inductance Llk, the Primary side of the transformer Np, and secondary side Ns, connected to the Capacitor C3 and Diode D4.

The output capacitor Co reduces the output DC ripples. The current through the output capacitor is denoted as iCo, while Io and V0 are the output current and voltages. The Capacitors C1, C2, C3 kept at the constant voltages. Ns and Np refer to the Primary and the Secondary Turns of the Linear Transformer. In Three Port Converter System, the Power flow takes place in two different directions one is via Capacitor C2, Diode D4, and D5 to the Load and another is via diode D1 and Inductance 'L' to the primary of the Linear Transformer Np.

The Inductor 'L' has the two-stage discharging functionality. When the Diode D1 is ON, the Discharging of the Inductor takes place through the Linear Transformer that occurs due to the presence of the Photovoltaic panel at one end. When Switch S1 is ON, the Inductor 'L' discharges current via Linear Transformer due to the flow of power from the battery storage to the Load. Figure 2 represents the proposed three-port converter configuration with a wind energy system and a battery storage system at the second port. In AC systems, the multilevel converters operated as the static VAR compensators by operating the power electronic devices at the fundamental frequency. Table 1 represents the Input Specifications of the Proposed Three Port Converter system using unidirectional switchingTopology.

**Table I: Circuit Specifications**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illumination</td>
<td>1000 W/m²</td>
</tr>
<tr>
<td>Temperature</td>
<td>25 °C</td>
</tr>
<tr>
<td>Wind Speed</td>
<td>12 m/s</td>
</tr>
<tr>
<td>PV Voltage</td>
<td>24 - 36 V</td>
</tr>
<tr>
<td>Wind System Voltage</td>
<td>46 - 48 V</td>
</tr>
<tr>
<td>Battery Voltage</td>
<td>48 - 50 V</td>
</tr>
</tbody>
</table>

**Fig.1 Standalone Three Port Converter System consists of PV at first port and Second Port comprising both wind energy and battery storage systems.**

The bi-directional power flow to the battery or storage device is possible using the proper switching techniques. The complexity of three-port converter system reduces by using two different sources in the Second Port of three-port converter system.
State of Charge Controller:

Fig.3: Block diagram of the State of Charge Controller

Figure 3 shows the entire block diagram of the State of Charge Controller used in the Proposed System. The control of Battery made possible using a constant Voltage Source from the photovoltaic system and by comparing the voltage signal with the maximum required demand. SOC control implemented using the suitable PWM control techniques. The equation for the State of Charge (SOC) controller expressed as

\[
SOC = \frac{E_{battery}}{E_{max}}
\]

I. OPERATING MODES OF PROPOSED THREE PORT CONVERTER

Figure 4 shows the Five Different Modes of operation available using the proposed PV-Battery-Wind Based Hybrid Converter System. The Battery charges in SIDO mode and discharges in the SISO - 1 and DISO - 1 modes of operation as shown in Fig 4. Five Mode of Operations includes two SISO and DISO modes with one SIDO mode. Figure 5 represents the control Diagram of the Proposed MPPT technique for the Modified Three Port Converter System.

Different Modes of Operation

1. Single Input Single Output Mode (SISO-1): Battery acts as the source to the Load.
3. Double Input Single Output mode (DISO-1): Photovoltaic and Battery used to power the Load.
4. Double Input Single Output mode (DISO-2): Photovoltaic and the Wind Energy Systems are used to power the resistive load.
5. Single Input Dual Output Mode (SIDO): Photovoltaic act as the source while Battery and the Load are outputs, the battery is in the charging mode.

Fig.4. Modes of Operations: (a) SISO - 1 Mode (b) SISO – 2 Mode (c) DISO – 1 Mode (d) DISO – 2 Mode (e) SIDO Mode

In the DISO mode, the battery discharges from the maximum of 48 volts while in the SIDO mode the battery charges to 48 volts. Figure 6 represents the
Input Voltage Controller used where the voltage and the current values are the inputs to the MPPT controller. Figure 8 represents the algorithm flowchart of the proposed Perturb and Observe based MPPT controller. WVR is Wind Voltage Regulator, BVR is Battery Voltage Regulator, IVR is Input Voltage Regulator, OVR is Output Voltage regulator.

Figure 7 represents the design of the Perturb and Observe based MPPT controller design. The Voltage and the current values are inputs based on which the pulses are generated for the switch $S_3$. In the Flowchart, ‘P’ represents the Power, while the ‘D’ and Vref represents the Duty and Reference voltage respectively, ‘n’ represents the number of levels.

**SIMULATION RESULTS**

PV and Battery/Wind Energy System power the Load. The “$T_s$” represents the Sample time taken. $D_{SW_1}$ and $D_{SW_2}$ represent the ON time, while $(1-D)T_s$ represents the OFF time of switch $S_3$. The proposed circuit simulated under five different modes of operation. Figure 9 through 13 shows the output voltage and Battery State-of-charge waveforms of DISO-1, DISO-2, SISO-1, SISO-2 and SIDO modes respectively. The Switch $S_3$ acts as the MPPT Switch. In DISO Mode, the switches $S_1$ and $S_3$ are in ON condition while the $S_2$ switch is in OFF condition. Table II shows the Output Specifications for Different modes of operation of the Proposed Three Port Converter System. In SISO Mode, the switches $S_1$ is in ON condition while the $S_2$ and $S_3$ switch are in OFF condition. The input voltage fed from the wind energy system when the power from the battery and the...
photovoltaic is unavailable.

**DISO-1 mode (PV-BAT):**

![DISO-1 mode (PV-BAT) Mode: (a) Output Power and Voltage (b) Battery - State of Discharge](image)

**SIDO Mode:**

In SIDO Mode, the switches $S_2$ and $S_3$ are in ON condition while the $S_1$ switch is in OFF condition. The ON time of the Switch $S_2$ and the Switch $S_3$ compared and the resulting Figure 13(a) and 13(b) represent the output voltage and the battery charging waveforms. The OFF times of the Diodes $D_2$ and $D_3$ are denoted by $(1-D_2)$ and $(1-D_3)$. Figure 14 shows the battery discharge characteristics in the secondary port of three-port converter system. The battery discharge analyzed for two different current levels of 1.5 and 3 Amperes at constant temperature. The graph obtained represents the reduction in voltage to the battery capacity in
Ampere-hour (Ah). Table II shows the output voltage and current obtained at the output port of the three-port configuration.

Table II: Output Specifications

<table>
<thead>
<tr>
<th>Modes Of Operation</th>
<th>SISO</th>
<th>DISO</th>
<th>SIDO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Voltage (V)</td>
<td>260</td>
<td>505</td>
<td>375</td>
</tr>
<tr>
<td>Output Power (W)</td>
<td>135</td>
<td>486</td>
<td>255</td>
</tr>
</tbody>
</table>

**EXPERIMENTAL RESULTS**

The prototype circuitry of the proposed Three-port converter system implemented with specifications as shown in the Table I. For this purpose, the PIC16F877A microcontroller used for generating pulses to the switches $S_1$, $S_2$, and $S_3$ for different modes of operation. Switching device implemented using IRF840 Power MOSFET, while the gate drive implemented using TLP250 and the system uses IN4001 Diode. The Wind Energy System realized using a Vertical Axis Wind Turbine. Figure 15 shows the overall prototype design of the Proposed Converter Configuration. From the Figure 15, ‘1’ represent Controller section, ‘2’ is the three-port converter circuit configuration. ‘3’ represent output port, ‘4’ battery port, ‘5’ represent wind port, ‘6’ for Photovoltaic port.

Figure 16 shows the overall circuit of the Proposed Three Port Converter Configuration. It indicates the PV, Wind, Battery, and the Output Ports while the control unit consists of Gate Driver controlled using PIC16F877A microcontroller. Figure 17 through 21 represents the Output Waveforms of respective modes of operation. The DC Voltage boost ratio for the SISO mode obtained at 5.4 times the input voltage. In SIDO mode, the voltage ratio obtained at 15.5 times the input voltage, while in the DISO mode, obtained at seven times the input voltage.
The highest efficiency achieved in SISO mode of operation compared to the other two other modes. In DISO-2 mode, the PV array energizes while using the Wind Energy System at the Second Port. The existing system efficiencies obtained at 96% for SISO mode, 94% for SIDO, and 93% for DISO mode of operation. The efficiencies of the Proposed System obtained at 94% for DISO mode and 95.5% for the SIDO mode and SISO mode without MPPT obtained at 97.5%.

Figure 25 shows the Conversion efficiencies of three different modes of operation of Proposed Three Port Converter System. The different modes of operations are represented in the different colours with respect to the output power.

SISO MODE
DISO MODE
SIDO MODE
COMPARISON OF PROPOSED TOPOLOGY WITH EXISTING SYSTEM

Compared to the existing PV-Battery based Three Port Converter System, the Proposed PV-Wind-Battery based Three Port Converter System has two extra modes of operation. Proposed Hybrid Converter System is applicable for Distributed Energy Resources and in remote places where the power supply is intermittent. The improvement in the net efficiency of the converter system without increase in the number of switches. In the SISO mode, while using the wind as the source, the settling time reduced to 0.05 seconds. Table III represents the Efficiency comparison of existing and proposed Hybrid System configurations. Table IV represent the voltage boost ratio of existing and proposed systems.

Table III: Efficiency Comparison

<table>
<thead>
<tr>
<th>Mode of operation</th>
<th>Existing System</th>
<th>Proposed Three Port Converter System (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DISO</td>
<td>93.6</td>
<td>94</td>
</tr>
<tr>
<td>SIDO</td>
<td>94</td>
<td>95.5</td>
</tr>
<tr>
<td>SISO</td>
<td>96.3</td>
<td>97.5</td>
</tr>
</tbody>
</table>

Table IV: Comparison of Voltage Boost Ratio

<table>
<thead>
<tr>
<th>Mode of operation</th>
<th>Existing System</th>
<th>MPPT Results</th>
<th>Hardware Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>DISO</td>
<td>5.6</td>
<td>7</td>
<td>6.7</td>
</tr>
<tr>
<td>SIDO</td>
<td>14.2</td>
<td>15.5</td>
<td>15</td>
</tr>
<tr>
<td>SISO</td>
<td>5</td>
<td>5.4</td>
<td>5.25</td>
</tr>
</tbody>
</table>

CONCLUSION

Proposed PV-Wind-Battery based Three Port Converter System has the advantage of using both wind energy source and a battery at the second port. The improvements include an increase in the efficiency of the three-port converter system operating in different modes of operation described in Section VI. Furthermore, in the proposed three-port converter system, voltage boost ratio obtained above six times the input voltage in DISO mode, represented by the Figure 12 and 13.

REFERENCES


A Study of Big Data Definition, Layered Architecture and Challenges of Big Data Analytics

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ABSTRACT

Big data has drawn great attention from researchers in decision makers, information sciences and policy in enterprises and government. There are so much potential and useful hidden values in the enormous volume of data. Big data is tremendously valuable to provide productivity in evolutionary breakthroughs in scientific disciplines and businesses. It facilitates lot of opportunities to develop great progresses in many domains. Moreover, big data also comes with many challenges including data collection, data analysis, data storage and data visualization. This paper provides the review on big data definitions, layered architecture and common big data challenges. There is no doubt that the future world in technologies and business productivity will converge into the explorations of big data.

Index Terms—Big Data, Data Analysis, Data Collection, Data Storage, Data Visualization, Hadoop and Map Reduce.

INTRODUCTION

The evolving big-data paradigm, owed to its wider impact, has intensely converted our society and will remain to attract diverse considerations from both technological specialists and the public in general. It is clear that we are living a data deluge period, supported by the sheer volume of data from a variety of sources and its developing rate of generation. For example, an IDC report forecasts that, from 2005 to 2020, the global data volume will develop by a factor of 300, from 130 exabytes to 40,000 exabytes, signifying a double growth every two years. The term of “big-data” was created to capture the thoughtful meaning of this data-explosion development and indeed the data has been advertised, which is expected to renovate our society. The massive potential linked with big-data has led to an evolving research field which has quickly attracted remarkable interest from diverse sectors such as industry, research and government community. The wide interest is first illustrated by coverage on both industrial reports and public media such as the Economist, the National Public Radio (NPR) and the New York Times. Government has also act as a major role in generating new programs to quicken the progress of attempting the big data challenges. Moreover, Nature and Science Magazines have issued special issues to confer the big-data occurrence and its challenges, which escalating its impact beyond technological fields.

Owing to the distinctiveness of big-data, designing an accessible big-data system aspects a series of technical challenges, comprising:

- Due to the variety of different data sources and the sheer volume, it is problematic to gather and incorporate data with scalability from distributed places. For example, more than 175 million tweets covering text, image, video, social relationship are produced by millions of accounts dispersed globally.

- Big data systems requisite to store and accomplish the gathered heterogeneous and massive datasets, while offer function and performance assurance with respect to fast retrieval, privacy protection and scalability. For instance, Facebook needs to access, store, and analyze across 30 petabytes of user generate data.

- Big data analytics should efficiently mine huge datasets at diverse levels in real-time or near real-time - containing modeling, visualization, optimization and prediction - such that intrinsic promises can be revealed to enhance decision making and obtain further benefits.
These technical challenges demand a repairing re-examination of the current data management schemes, ranging from their architectural standard to the implementation facts.

Though, traditional data analysis and management systems are mainly based on the Relational Database Management System (RDBMS). They are insufficient in tackling the above-mentioned list of big-data challenges. Precisely, the mismatch among the traditional RDBMS and the developing big-data paradigm falls into the following two features:

- From the perception of data structure, RDBMSs can only care structured data, but provide little support for semi-structured or unstructured data.
- From the perception of scalability, RDBMSs scale up with costly hardware. It cannot scale out with service hardware in parallel, which is inappropriate to copeup with the ever developing data volume.

In order to overcome these challenges, the research community and business have recommended numerous solutions for big data systems in an ad-hoc manner. Specifically, Distributed File Systems (DFS)[7] and No SQL [8] databases are appropriate for persistent storage and the organization of enormous scheme free datasets. Also, Map Reduce [9], which is a programming framework and it has attained great success in handling group-aggregation tasks, such as website ranking. Hadoop [10] incorporates data processing, data storage, system management, and other components to form a powerful system-level solution, which is becoming the backbone in handling the big data challenges.

The rest of this paper is organized as follows: Section 2 provides the big data definition and paradigms. Section 3 presents the layered architecture of big data. Section 4 provides the challenges of big data system. Section 5 presents the conclusion.

2. Big Data – Definition and Paradigms

2.1 Definition of Big Data

Essentially, big data means not only an enormous volume of data but also other structures which distinguish it from the notions of “enormous data” and “very large data”. In fact, numerous definitions for big data are established in the literature. There are three types of definitions act as a significant role in determining how big data is observed:

2.1.1 Attributive Definition

“Big data technologies define a new generation of architectures and technologies, intended to economically retrieve the value from very huge volumes of a wide variety of data. It enabling the high-velocity capture, discovery, and analysis”. This description defines the four salient features of big data, such as volume, variety, velocity and value. As an effect, the “4Vs” description has been used extensively to illustrate the big data. A similar explanation appeared in a 2001 research report[2] in which META group now called as Gartner, analyst Doug Laney renowned that data growth opportunities and challenges are three-dimensional, such as increasing volume, velocity, and variety. Though this depiction was not meant formerly to define big data, Gartner and much of the organization such as IBM[11] and certain Microsoft researchers [12] endure to use this “3Vs” model to define big data 10 years later [13].

2.1.2 Architectural Definition

The National Institute of Standards and Technology (NIST)[14] recommends that, “Big data is defined as where the data volume, data representation or acquisition velocity limits the capability to accomplish an effective analysis with the help of traditional relational approaches or involves the use of substantial horizontal scaling for well-organized processing”. In particular, further big data can be categorized into big data frameworks and big data science. Big data frameworks are “software libraries along with their related algorithms which allow distributed processing and study of big data issues across clusters of computer units”. Whereas, big data science is defined as the study of procedures covering the acquisition, conditioning, and estimation of big data.

2.1.3 Comparative Definition

Mckinsey’s report [2] defined the big data as “datasets whose size is away from the ability of distinctive database software tools to capture, analyze, store and manage”. This description is subjective and it does not define big data in terms of any specific metric. Though, it integrates an evolutionary side in the definition over time or across sectors of what a dataset should be considered as big data. Table 1 provides the comparison between the traditional data and big data.
Table 1: Comparison between traditional data and big data

<table>
<thead>
<tr>
<th></th>
<th>Traditional data</th>
<th>Big data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume</td>
<td>GB</td>
<td>Constantly updated (TB or PB)</td>
</tr>
<tr>
<td>Structure</td>
<td>Structured</td>
<td>Semi structured or Un structured</td>
</tr>
<tr>
<td>Generated data</td>
<td>Per hour, day,...</td>
<td>More rapid</td>
</tr>
<tr>
<td>Data source</td>
<td>Centralized</td>
<td>Decentralized</td>
</tr>
<tr>
<td>Data store</td>
<td>RDBMS</td>
<td>HDFS, NoSQL</td>
</tr>
<tr>
<td>Data Integration</td>
<td>Easy</td>
<td>Difficult</td>
</tr>
<tr>
<td>Access</td>
<td>Interactive</td>
<td>Batch or near real time</td>
</tr>
</tbody>
</table>

2.2 Big Data Paradigms

Big data analytics is the method of using analysis algorithms running on potent supporting platforms to discover potentials hidden in big data such as hidden patterns or unknown connections. Big data analytics can be categorized into two alternative paradigms based on processing time requirement:

- Streaming processing
- Batch processing

2.2.1 Streaming Processing

The initial point for the streaming processing paradigm is the postulation that the potential value of data based on data freshness. Hence, the streaming processing model examines data as soon as possible to originate its results. In this paradigm, data attains in a stream. In its constant arrival, because the stream is fast and transfers huge volume, only a portion of the stream is kept in memory. One or few permits over the stream are made to and approximation results. This streaming processing technology and theory have been studied for decades. Representative open source systems include S4, Storm, and Kafka. The streaming processing paradigm is applied for online applications, usually at the second, or even millisecond, level.

2.2.2 Batch Processing

In the batch-processing model, first data are stored and then analyzed. Map Reduce has become the central batch-processing model. The central idea of Map Reduce is that data are divided into small chunks. Then, these chunks are handled in parallel and in a distributed manner to create intermediate results. The final result is obtained by aggregating all the intermediate outcomes. This paradigm schedules computation resources close to data location, which eliminates the communication overhead of data transmission. Map Reduce model is simple and broadly applied in machine learning, bioinformatics, and web mining. There are many differences among these two processing models. They are summarized in the following table 2.

Table 2: Differences between streaming processing and batch processing

<table>
<thead>
<tr>
<th></th>
<th>Streaming</th>
<th>Batch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>Stream of new updates or data</td>
<td>Data chunks</td>
</tr>
<tr>
<td>Size of data</td>
<td>Unknown or infinite</td>
<td>Known and finite</td>
</tr>
<tr>
<td>Processing</td>
<td>Single or few pass over data</td>
<td>Processed in multiple rounds</td>
</tr>
<tr>
<td>Storage</td>
<td>Not store or store non-trivial pieces in memory</td>
<td>Store</td>
</tr>
<tr>
<td>Hardware</td>
<td>Single limited amount of memory</td>
<td>Multiple CPUs, memories</td>
</tr>
<tr>
<td>Time</td>
<td>Few seconds or even milli seconds</td>
<td>Much longer</td>
</tr>
<tr>
<td>Applications</td>
<td>Sensor networks, traffic monitoring, web mining</td>
<td>Adopted in almost every domain</td>
</tr>
</tbody>
</table>
The streaming processing paradigm is appropriate for applications in which data are created in the form of a rapid and stream processing is required to attain approximation results. Hence, the streaming processing application domains are comparatively narrow. In recent times, most applications have implemented the batch-processing paradigm; even definite real time processing applications utilize the batch-processing paradigm to attain a faster response. Also, some research effort has been made to incorporate the advantages of these two models. Big data platforms can utilize substitute processing paradigms; still, the differences in these two paradigms will cause architectural differences in the related platforms. For instance, batch-processing-based models usually encompass complex data storage and management systems, whereas streaming processing based models do not.

3. Layered Architecture of Big Data

The big data organization can be decomposed into a layered structure. It is illustrated in Fig. 1.

![Fig.1 Layered architecture of big data system.](image)

The layered architecture is divisible into three layers,

1. Infrastructure layer,
2. Computing layer, and
3. Application layer.

This layered architecture only offers a conceptual hierarchy to highlight the complication of a big data system. The function of each layer is detailed as follows.

3.1 Infrastructure Layer

The infrastructure layer comprises of a pool of ICT resources that can be systematized by cloud computing infrastructure and it can be permitted by virtualization technology. These resources will be visible to upper-layer systems in a fine-grained method with a detailed Service Level Agreement (SLA). Within this layer, resources should be distributed to meet the big data request while accomplishing resource efficiency by maximizing energy awareness, system utilization, operational interpretation, etc.

3.2 Computing Layer

The computing layer summarizes numerous data tools into a middleware layer which can runs over raw ICT resources. In the background of big data, typical tools contains data management, data integration, and the programming model. Data management defines as tools and mechanisms which enable highly efficient management and persistent data storage, such as DFS and SQL or NoSQL data stores. Data integration refers attaining data from different sources and incorporating the dataset into a combined form with the essential data pre-processing techniques. The programming model enables the data analysis applications and implements the abstraction application logic. Some of the programming models include Dryad\[^{19}\], Dremel\[^{20}\], Map Reduce\[^{9}\], and Pregel\[^{21}\].

3.3 Application Layer

The application layer exploits the interface delivered by the programming models to execute various data analysis functions such as clustering, classification, querying, and statistical analyses. Then, it integrates basic analytical systems to develop several filed related applications. McKinsey offered five potential big data application fields such as retail, health care, global manufacturing, personal location data and public sector administration.

4. Challenges of Big Data System

Planning and organizing a big data analytics system is not a straightforward or trivial task. As one of its definitions recommends, big data is outside the capability of current software and hardware platforms.
The new software and hardware platforms in turn demand new models and infrastructure to address the extensive range of challenges in big data. Recent works\cite{22-24} have presented a potential complications to the development of big data applications. This paper classifies these challenges into three groups: data collection and management, data analytics, and system issues.

Data collection and management addresses enormous amounts of complex and heterogeneous data. The following challenges of big data should be encountered:

• Data Representation: Many datasets are varied in type, accessibility semantics, structure, organization, and granularity. A capable data presentation must be designed to reflect the hierarchy, diversity and structure of the data, and an integration method should be designed to permit efficient operations across diverse datasets.

• Redundancy Reduction and Data Compression: Usually, there is a great number of redundant data in raw datasets. Redundancy reduction and data compression without scoring potential value are effective ways to reduce whole system overhead.

• Data Life-Cycle Management: Pervasive sensing and computing is creating data at an extraordinary rate and scale, which exceed much lesser advances in storage system technologies. One of the crucial tasks is that the current storage system cannot host the enormous data. In general, the value covered in the big data is based on the data freshness; Hence, it should set up the data importance principle related with the analysis value to choose what parts of the data should be discarded and what parts should be archived.

• Data Privacy and Security: With the explosion of online services and mobile phones, security and privacy concerns regarding analyzing and accessing personal information is increasing. It is serious to understand what provision for privacy must be delivered at the platform level to remove privacy leakage and to enable various analyses.

There will be a noteworthy impact that results from progresses in big data analytics, containing modeling, interpretation, prediction, and simulation. Unfortunately, heterogeneous data structures, enormous amounts of data, and varied applications provide tremendous challenges, such as:

• Approximate Analytics: As data sets develop and the real time necessity becomes severer, study of the complete dataset is becoming more problematic. One way to possibly solve this issue is to offer approximate results such as by means of an approximation query. The idea of approximation has two scopes:
  o Groups omitted from the output and
  o Accuracy of the result.

• Linking Social Media: Social media owns unique properties such as statistical redundancy, vastness, and the accessibility of user feedback. Numerous extraction techniques have been effectively used to discover references from social media to particular product names, locations, or people on websites. By linking inter-field data with social media, applications can accomplish high levels of precision and different points of view.

• Deep Analytics: One of the drivers of eagerness around big data is the anticipation of gaining novel visions. Sophisticated analytical technologies like machine learning, are essential to unlock such visions. But, effectually leveraging these analysis toolkits needs an understanding of statistics and probability. The potential pillars of security and privacy mechanisms are compulsory access control and security communication, privacy-aware data mining and analysis, multi-granularity access control, and security storage and management. Lastly, large-scale parallel systems usually confront several common problems; still, the rise of big data has amplified the following challenges, in particular.

• Energy Management: The energy consumption of extensive computing systems has involved better concern from environmental and economic perspectives. Data storage, transmission, and processing will unavoidably consume increasingly more energy, as data analytics and volume demand increases. Hence, system-level power control and management mechanisms should be measured in a big data system, while enduring to offer accessibility and extensibility.

• Scalability: A big data analytics system should be able to support very huge datasets produced now and in the future. All the mechanisms in big data systems
must be capable of scaling to overcome the ever-growing size of multifaceted datasets.

- Collaboration: Big data analytics is an interdisciplinary research domain which needs specialists from several professional fields cooperating to retrieve the hidden values. A widespread big data cyber infrastructure is essential to permit the broad communities of engineers and scientists to access the diverse data, relate their particular expertise, and cooperate to achieve the goals of analysis.

According to McKinsey report, the efficient use of big data has the primary benefits to transform economies and providing a new wave of productive development. Taking benefits of valuable information beyond employees that have the serious skills on big data. There are many advantages of big data in business section which can be achieved through harnessing big data as shown in fig.2. It comprises information strategic direction, operational efficiency, identifying and developing new services and products and developing better customer service, identifying new markets etc.

CONCLUSION

This paper provides a study of big data definition, layered architecture and challenges faced by big data. There is no doubt that big data analytics is still in the development stage, since existing big data tools and techniques are very inadequate to solve the real big data problems completely. Moreover, some of them even cannot be observed as big data tools in the true sense. Hence, more scientific investments from both enterprises and governments should be transferred into this scientific paradigm to capture massive values from big data. Big data also refers big systems, big profits and big challenges, hence more research works in the big data sub fields are essential to resolve it.

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Source of Funding- Self

Conflict of Interest - NA

REFERENCES


An Image Feature Extraction and Image Representation Strategies for the Analysis of Image Processing

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¹Prof & Head, ²Assistant Professor, PG Department of Computer Applications, Guru Nanak College, Chennai

ABSTRACT

Feature extraction and feature representation techniques are an important and crucial process in image processing. To extract and retrieve the ideal features is still a challenging problem in the computer vision which can reflect the essential content of the representation as complete as possible. Feature extraction is usually applied for generating the important features to be used in the feature selection and classification process. Feature selection minimizes the number of features delivered to the classification task. Those features are probable to assist in perception are selected and used in the classification process. This paper review the recent development of image feature extraction and representation. Also, this paper analyzes the efficiency of the integration of local and global features in the content based image retrieval and image annotation.

Index Terms— Classification, Feature Extraction, Feature Representation, and Feature Selection

INTRODUCTION

Feature extraction defines the significant shape information enclosed in a pattern so that the task of classifying the pattern is made simple by a formal practice. In image processing, feature extraction is a defined as a special form of dimensionality reduction. The main objective of feature extraction is to retrieve the relevant information from the original image and denote the information in a lower dimensionality space. If the input data is too large to be handled and it is suspected to be redundant, then the input data will be transformed into a reduced representation set of features which is also called as feature vector. Converting the input data into the distinct set of features is termed as feature extraction. If the extracted features are carefully selected, it is expected that the feature set will retrieve the useful information from the input data to perform the specific task with the help of reduced representation rather than using the full size of an image.

The primary step for a computer program in semantic understanding is to extract effective and efficient visual features and construct models from them rather than the human background knowledge. Hence, we can understand that how to extract low-level visual features of an image and what type of features will be extracted act as a vital role in numerous tasks of image processing. The most common visual features contains color, texture and shape, etc.[1-4], and most image annotation and retrieval schemes have been built based on these features. Though, their performance is greatly dependent on the usage of image features. Usually, there are three feature representation approaches, which are global based, and region-based and block features.

Chow et al[5] implements an image classification method through a tree-structured feature set, in which the root node represents the whole image features while the child nodes denote the local region-based features. Tsai and Lin[6] associates several combinations of image feature representation comprising the global, local block-based and region-based features for image database classification. Moreover, a block-based image feature representation[7] is used to reflect the spatial features for a particular concept. Though, a little consideration has been paid to image feature extraction when compared to a substantial amount of research on annotation or retrieval model. Hence, this paper focuses a review on the latest development in image feature extraction.

The rest of the paper is organized as follows. Section 2 elaborates the most common image visual
features, including their characteristics and some classic applications. Section 3 presents the methods of image feature representation. In specific, merging of global and local features in image processing community is explained. Finally, some essential conclusions and future potential research directions are suggested in Section 4.

2. Image Feature Extraction

When the preprocessing and the preferred level of segmentation such as line, word, character or symbol has been attained, some feature extraction method is applied to the segments to attain features, which is followed by the application of classification techniques and post processing techniques. There are three types of features. They are

- Color features
- Texture features
- Shape features

2.1 Color Features

Color is one of the most significant features of images. Color features are distinct subject to a specific color space or model. A number of color spaces have been utilized in literature, such as RGB, HSV, LUV and HMMD\(^{[2]}\). Once the color space is identified, color feature can be retrieved from images or regions. A number of significant color features have been offered in the literatures, including color moments (CM)\(^{[8]}\), color histogram\(^{[9]}\), color correlogram\(^{[10]}\) and Color Coherence Vector (CCV) \(^{[11]}\) etc. Among them, CM is one of the modest yet very efficient features. The common moments includes mean, standard deviation and skewness. The corresponding explanation can be defined as follows:

\[
\mu_i = \frac{1}{N} \sum_{j=1}^{N} f_{ij}
\]

(1)

\[
\sigma_i = \left( \frac{1}{N} \sum_{j=1}^{N} (f_{ij} - \mu_i)^2 \right)^{1/2}
\]

(2)

\[
\gamma_i = \left( \frac{1}{N} \sum_{j=1}^{N} (f_{ij} - \mu_i)^3 \right)^{1/3}
\]

(3)

Here, \(f_{ij}\) is the color value of the \(i\)-th color component of the \(j\)-th image pixel and \(N\) represents the total number of pixels in the image. \(\mu_i\) denote mean, \(\sigma_i\) represent standard deviation, and \(\gamma_i\) represent the skewness \((i=1,2,3)\) of each channel of an image respectively.

Table 1 presents a summary of various color methods excerpted from the literature\(^{[12]}\), including their advantages and drawbacks. Table 1 explains the following color methods such as Dominant Color Descriptor (DCD), Scalable Color Descriptor (SCD) and Color Structure Descriptor (CSD) respectively.

<table>
<thead>
<tr>
<th>Color method</th>
<th>Advantages</th>
<th>Drawbacks</th>
</tr>
</thead>
<tbody>
<tr>
<td>CM</td>
<td>Robust, compact</td>
<td>Not enough to define all colors, no spatial information</td>
</tr>
<tr>
<td>CCV</td>
<td>Spatial information</td>
<td>High computation cost, high dimension</td>
</tr>
<tr>
<td>DCD</td>
<td>Compact, robust, perceptual</td>
<td>Require post processing for spatial information</td>
</tr>
<tr>
<td>CSD</td>
<td>Spatial information</td>
<td>Sensitive to noise, rotation and scale</td>
</tr>
<tr>
<td>SCD</td>
<td>Compact and scalability</td>
<td>No spatial information, less accurate if compact</td>
</tr>
<tr>
<td>Histogram</td>
<td>Simple to estimate and intuitive</td>
<td>High dimension, sensitive to noise, no spatial information</td>
</tr>
<tr>
<td>Correlogram</td>
<td>Spatial information</td>
<td>High computation cost, sensitive to noise, rotation and scale</td>
</tr>
</tbody>
</table>
2.2 Texture Features

Texture is a very valuable classification for a wide variety of image. It is usually believed that human visual schemes use texture for interpretation and recognition. Color is generally a pixel property while texture can only be estimated from a group of pixels. A large number of methods have been suggested to retrieve texture features. Based on the area from which the texture feature is extracted, they can be widely classified into spatial texture feature extraction systems and spectral texture feature extraction systems. For the existing approaches, texture features are retrieved by estimating the pixel statistics or identifying the local pixel constructions in original image domain, while the latter converts an image into frequency domain and then computes feature from the converted image. Both spatial and spectral features have their own advantage and disadvantages. They are summarized in the following table 2.

<table>
<thead>
<tr>
<th>Texture method</th>
<th>Advantages</th>
<th>Drawbacks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spatial</td>
<td>Easy to understand, meaningful, it can be extracted from any shape without losing information</td>
<td>Sensitive to noise</td>
</tr>
<tr>
<td>Spectral</td>
<td>Robust, require less computation</td>
<td>No semantic meaning, require square image regions with sufficient size</td>
</tr>
</tbody>
</table>

As the most usual technique for texture feature extraction is Gabor filter\cite{13}. It has been broadly used in image texture feature extraction. To be precise, Gabor filter is considered to sample the whole frequency domain of an image by distinguishing the center frequency and orientation constraints. The image is filtered with a bank of Gabor wavelets or Gabor filters of diverse preferred spatial orientations and frequencies\cite{14}. Every wavelet captures energy at a specific direction and frequency which facilitate a localized frequency as a feature vector. Hence, the texture features can be extracted from this group of energy distributions.

Consider an input image \(I(x,y)\), Gabor wavelet transform convolves \(I(x,y)\) with a set of Gabor filters of different spatial orientations and frequencies. A two-dimensional Gabor function \(g(x,y)\) can be well-defined as follows.

\[
g(x,y) = \frac{1}{2\pi \sigma_x \sigma_y} \exp \left(-\frac{1}{2} \left(\frac{x^2}{\sigma_x^2} + \frac{y^2}{\sigma_y^2}\right) + 2\pi i W \right)
\]

Here, \(\sigma_x\) and \(\sigma_y\) are defined as the scaling parameters of the filter (the standard deviations of the Gaussian envelopes), and \(\theta\) determines the orientation and \(W\) denotes the center frequency of the filter.

2.3 Shape Features

Shape is known as an essential indication for human beings to recognize and identify the real-world objects, whose purpose is to encode easiest geometrical forms such as straight lines in diverse directions. Shape feature extraction methods can be largely classified into two groups\cite{15}.

They are
1. Contour based methods and
2. Region based methods.

The former estimates shape features only from the boundary of the shape, while the latter method retrieves features from the complete region.

Moreover, spatial relationship is also measured in image processing, which can express object location within an image or the relationships among objects. It mainly comprises two cases:

1. Absolute spatial location of regions\cite{16} and
2. Relative locations of regions\cite{17, 18}.

Fig.1 shows an example of a 2D string representation.

![Diagram](https://example.com/diagram.png)

(a)

<table>
<thead>
<tr>
<th>Relationship Symbols</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;</td>
<td>Left right or below above</td>
</tr>
<tr>
<td>=</td>
<td>At the same spatial location as</td>
</tr>
</tbody>
</table>

(b)
### Fig. 1 Representation of 2D String

(a) Image decomposed into blocks, (b) object symbols as block names (c) description of relation symbols and (d) 2D string for (a)

The image in fig. 1(a) is decomposed into regions (blocks). For ease, the block identifiers are utilized as object symbols. Two relationship symbols are ‘<’ and ‘=’ which are used in this case. The symbol ‘<’ denotes ‘left-right’ and ‘below-above’ relationships in horizontal and vertical directions respectively. The symbol ‘=’ represents the spatial relationship ‘at the same spatial location as’. A 2D string takes the practice \((u, v)\), where \(u\) and \(v\) denotes the relationships of objects in horizontal and vertical directions respectively. Fig. 1(d) shows the 2D string for the image of Fig. 1(a).

### Image Feature Representation

In image processing domain, how to organize the image features and how to partition an image are also challenging problems. Generally, there are mainly three approaches to convert an image into a set of regions. They are:

1. Regular grid approach,
2. Unsupervised image segmentation and
3. Interest point detectors.

### Fig. 2 Three different approaches to transform an image into a set of regions: (a) original image, (b) image segmented by a regular grid, (c) the image segmented by the JSEG[19], and (d) salient regions detected by the DoG[20] detector

Fig. 2 explains the regions attained by these three methods, fig. 2 (a) depicts the original image, (b) provides the image segmented by a regular grid, (c) presents the image segmented by the JSEG[19], and (d) sketches the salient regions perceived by the Difference of Gaussian (DoG)[20] detector.

As the illustrative work of using both local and global image features, Chow et al[5] uses a two-level tree to incorporate both the global and local image features for image classification. Here, child nodes of the tree includes the region-based local features, while the root node comprises the global features.

Tsai and Lin[6] compare several combinations of feature representation methods comprising the global and local block-based and region-based features for image database classification. Then, the major conclusion, i.e. the combined global based feature and block-based feature depiction performs the best. Zhu et al[21] consider that a proper fusion of global and local features will compensate their limitations, and therefore increase the overall efficiency and effectiveness. Hence, they consider LBP, grid color moment, Gabor wavelets texture and edge orientation histogram by means of image global features, whereas SURF descriptor is incorporated to retrieve the image local features.

Tian et al[22] proposed a combined global and local block-based image feature representation technique so as to redirect the intrinsic content of images as whole as possible, such that the color histogram in HSV space is mined to denote the global feature of images, and color moments. Also, Gabor wavelets texture and Sobel shape detector are utilized to extract the local features. Shape feature can be extracted with the help of convolution of \(3 \times 3\) masks with the image in 4 different directions such as horizontal, \(45^\circ\) and vertical and \(135^\circ\). Lastly, they combine the global feature and local features of an image, i.e., features of the blocks are associated by left-to-right and top-to-down orders together. This results in a so-called block-line feature organization.

The following fig.3 depicts the illustration of image contents by incorporating both the global features and local region-based features. Here, fig.3(a) shows a whole input image, whose color histogram is retrieved and assisted as the global feature at the root node, (b) shows the six segmented regions of an input image. Color, texture, shape and size features are retrieved from all the regions and represented as the region features at the child nodes, and (c) represents the tree representation of the segmented image.
Table 3: Contrast of global and local feature extraction

<table>
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<tr>
<th>Sources</th>
<th>Global features</th>
<th>Local features</th>
</tr>
</thead>
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<tr>
<td>Chow et al[5]</td>
<td>Color histogram in HSV space</td>
<td>Color moments, shape, size and Gabor texture</td>
</tr>
<tr>
<td>Zhu et al[21]</td>
<td>LBP, Grid color moment, Gabor wavelets texture and edge orientation histogram</td>
<td>SURF</td>
</tr>
<tr>
<td>Lisin et al[23]</td>
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</tr>
<tr>
<td>Tsai et al[6]</td>
<td>Color moment in HSV space, four levels of Daubechies-4 wavelet decomposition</td>
<td>Color moment in HSV space, four levels of Daubechies-4 wavelet decomposition</td>
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<tr>
<td>Zhao et al[24]</td>
<td>Pseudo Zernike moments</td>
<td>SIFT</td>
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<tr>
<td>Tian et al[22]</td>
<td>Color histogram in HSV space</td>
<td>Color moments in HSV space, Gabor wavelets texture and Sobel shape</td>
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</table>

Table 3 precises the global and local features working. Zhou et al[25] recommend a joint appearance and locality image representation named as Hierarchical Gaussianization (HG). It adopts a Gaussian Mixture Model (GMM) for appearance information and a Gaussian map is applied for locality information. The fundamental procedure of HG can be described as follows:

- Abstract the patch feature, example include SIFT descriptor from overlapping patches in the images.
- From the images of interest, create a Universal Background Model (UBM) which is a GMM model defining the patches from the set of images.
- For every image, adjust the UBM to find another GMM to define the patch feature distribution within the image.
- Distinguish the GMM with the help of its component means and variances and a Gaussian map which comprises certain patch location information.
- Accomplish a supervised dimension reduction, called Discriminant Attribute Projection (DAP), to remove within-class feature variation.

4. Conclusion and Future Work

A study on recent development of image feature extraction and feature representation are presented in this paper. The three types of features such as
color, shape and texture are illustrated and explained. Then, the feature representation of an image are also presented with the respective examples. The contrast of local and global feature extraction is also discussed.

In conclusion, there are a number of remarkable problems which should be measured as future work. First, it is worth discovering the relationship among features number and the performance. Moreover, it is not possible that the more the features of number result the better performance as much as possible. Second, to discover the relationship among the features representation and the final performance is also a very challenging and interesting topic.

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