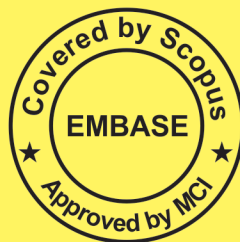




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The Profile of Suicides Encountered during Autopsy in a Teaching Hospital in Central Kerala: A Descriptive Study

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ABSTRACT

Kerala has one of the highest suicide rates in India. Prior studies conducted in Thiruvananthapuram in the south of Kerala and Kozhikkode which is a northern district have identified the demographic profile and the methods used for committing suicides. The present study, conducted in Ernakulam district which lies in central Kerala attempted to analyze the methods employed for committing suicide, as well as the age and sex profile of the suicides. The cases autopsied at a teaching hospital in central Kerala during an 18 month period were analyzed using descriptive statistics and ANOVA for this purpose. The study revealed that the female preference of self immolation (P 0.000) is statistically significant. Males on the other hand, showed a significant preference for poisoning (P 0.048). Senior citizens (aged above 60) had a less strong preference for hanging as a method of suicide (P 0.038), but they showed a statistically significant preference for self immolation (P 0.027). Those aged 30 or less showed statistically significant preference for drowning as a method for committing suicide (P 0.011).

Keywords: Cut Throat, Drowning, Electrocution, Hanging, Jumping, Kerala, Poisoning, Rail Track, Self Immolation, Suicide

INTRODUCTION

Kerala has one of the highest suicide rates in India of 39.3/1,00,000 person-years.¹ Analysis of the profile of suicide is of paramount importance in combating this health hazard. Assessment of the factors which predispose suicidal ideation, intent formation, attempt and completion are important to formulate strategies to reduce² suicide.

A study published in 2016, which used Beck's suicide intent scale to assess those who attempted suicide, showed that factors such as age and gender are not associated with high suicidal intent.³ Completed suicides, though, are more prevalent among men than women, with the male:female ratio of 3:1–7.5:1. Men generally employ more lethal methods, show greater aggressiveness, and usually there is a higher intent to die among men. However, this trend is not observed in India (♂:♀ ratio of 1.3:1) and mainland China (0.9:1).⁴ A study published in 2013 which analysed the suicide rates in Shandong, China, from 1991 to 2010 revealed that the

higher rates among females versus males was becoming less pronounced since the 1990s.⁵ The prevalence of self immolation, which is a highly lethal method, among women in India is speculated to be one of the reasons why there is no pronounced gender difference in India.⁶

Senior citizens show a different preference for the method of suicide than the general population. In US, those older than 65 years were more likely (72%) to die of firearms than the general population (52%).⁷ The easy availability of firearms in the US contributes to this. In contrast, a study conducted in Australia showed that the use of firearms and explosives for ending lives decreased with age, while suffocation by plastic bag and drowning increased with age.⁸

A study conducted in the year 2001 in Kozhikkode district of Kerala compared those who unsuccessfully attempt suicides and those who complete the attempt. The teaching hospital where this study was conducted catered to the northern districts of Kerala, namely Kasargod, Kannur, Kozhikkode, Wayanad and

Malappuram. Out of 689 suicide victims, 426 (61.8%) were males and 263 (38.2%) were females as per this study. Hanging was the commonest method used by the victims. 51.9% of males and 42.2% females had used this method. Poisoning was the second commonest method employed by the males who succeeded in ending their lives. 34.3% of males had consumed some poison, the commonest poison employed being organophosphates. For females, self immolation was the second commonest method employed (30%). Only 20.1% of the females had consumed poison to commit suicide as per this study. The mean age of males who completed suicide was 41 ± 17.11 and for females, it was 29.76 ± 12.05 . The author speculates that stronger suicidal intention may compel a person to use more lethal methods like hanging.⁹

A landmark study conducted in Thiruvananthapuram, which followed up the mortality of a cohort of 1,31,881 participants above the age of 35, from 1996 to 2005, with 87% participation rate. It was observed that of the 11,608 deaths during this period, 385 were suicides. The commonest method of suicide was hanging, followed by poisoning and drowning. Male gender, middle-age (40–60 years), Hindu religion, alcohol drinking habit and secondary education level (<7 years) were suicide determinants. Low socioeconomic level, living alone, or being a married woman was not associated with suicide risk.¹

Even though two such studies have been conducted in northern and southern Kerala, no study which looks into the methods used for suicide and their relationship with the age and sex of the individual has been conducted in the central Kerala so far. The authors feel that an analysis of the factors which influence suicide and the methods employed would be valuable in combating this menace.

MATERIALS AND METHOD

The cases which were brought for autopsy examination in the Cochin Medical College during the eighteen month period from January 2016 to June 2017 (both months included) were analysed. The study design was descriptive. The deaths which were identified as suicides during the inquest process and where no contradictory finding was detected during autopsy were included in the sample. The majority of the hanging, poisoning, self immolation and rail track death cases were revealed to be suicidal in nature during the inquest itself and the autopsy examination did not throw up any

finding which indicated another manner of death. The cases where there the suspicion of accidental causation could not be ruled out were excluded from the sample.

In the case of drowning and fall from height, more than 50% of the cases were revealed to be accidental in nature in the inquest. Only those cases which were identified as suicidal were included in the study. The age and sex of the individuals were extracted from the requisition for post mortem examination.

SPSS 16.0 software was used for statistical analysis. Pearson chi-squared test, uncorrected for continuity, was done. Cramer's V test was done to determine the strength of association. Fisher's exact test was also employed where chi-squared test was statistically unreliable. One way ANOVA and Turkey post hoc tests were also used.

FINDINGS

The total number of cases included in the study was 120 (see Table 1). The males far outnumbered the females (85 to 35). The mean age of the sample was 44.73 (Std. Deviation 17.579). For the males ($n = 85$), the mean age was 44.71 (SD = 16.085), while for the female subjects ($n = 35$) the mean age was 44.8 (SD = 21.033).

Eight different methods (hanging, poisoning, self immolation, death by train, drowning, cut throat, jumping from a height and electrocution) were used in the sample. See Fig 1.

Hanging was the preferred method of committing suicide in both males (43.5%) and females (37.1%), but the selection of the method was independent of gender ($P 0.519$). In the whole sample, 41.7% of the subjects employed hanging to end their lives. The second commonest method was poisoning in males (23.3%) and self immolation in females (31.4%). This gender difference in the second rank method of suicide was also observed in the study conducted in Kozhikode.⁹ A total of 14 subjects in our sample had employed self immolation as the method of suicide (3 males and 11 females). The selection of self immolation as a method of suicide was found to be gender dependent ($P 0.000$ as per Fisher's Exact Test). The Cramer's V value of 0.395 ($P 0.000$) indicated a very strong association with female gender and self immolation. The selection of self poisoning as a method of suicide was dependent on male gender ($P 0.048$) at α level 0.05. The Cramer's V

value of .181 indicated a small association with the male gender and poisoning.

The third commonest method employed was death by train, where the victim either lies on the railway track or deliberately gets in front of it. 10% of the sample had employed this method, all but one of whom were male (12.9% of males ended their lives by this means). Although only one female in the sample had ended her life in the rail track whereas 11 males had done so, this method did not show as strong a statistical relationship with gender (p 0.177 as per Fischer's exact test). For females, poisoning (11.4%) and drowning (11.4%) were the third preferred method. Drowning did not show any significant relationship with gender (P 0.445 as per Fischer's exact test).

In the sample, there was only one case of electrocution, two cases of jumping from a height and four cases of suicidal cut injuries. Fischer's exact test was used to assess whether there is a gender preference for these cases. Electrocution (P 1.000), jumping (P 1.000) and suicidal cut injuries (P 0.579) did not show any statistically significant association with gender.

ANOVA test was done to analyze if there was statistically significant difference between the mean ages of those who committed suicide by a particular method. Electrocution, jumping and cut throat wounds were excluded from the analysis because of low n . The difference between the mean ages of those who committed suicide by the other methods was statistically significant (P 0.016, F 3.210). A Turkey post hoc test revealed that the mean age was significantly lower for hanging (40.68 ± 16.492 years), when compared to poisoning (52.64 ± 16.308), P value being 0.031. The mean ages of those who committed suicide by self immolation was 50.36 ± 19.226 . For rail track suicides, it was 39.83 ± 13.037 and for drowning it was 37.44 ± 23.912 .

The youngest suicide victim in our sample was aged

16 and the oldest was aged 86. 19.2% of the sample was aged above 60 (senior citizens) while 25.8% were aged below 30. 55% belonged to the age group 31 – 60. See Fig 2 for the age wise distribution of the suicide methods employed.

In those aged 60 years or less, hanging was the predominant method employed. However, this trend changed after the age of 60 years. In the 61- 70 age group, self immolation was the leading cause. 3 females and 2 males in this age group chose to end their lives by means of fire. In the 23 senior citizens included in our sample, only 5 chose hanging to end their lives. The apparent preference of senior citizens for methods of suicide other than hanging was statistically significant (P 0.038) at α level 0.05.

Self immolation was a method apparently preferred by senior citizens in our sample. Six individuals above the age of 60 committed suicide by self immolation. There was a significant association (at α level 0.05) between the age above 60 and self immolation, with P value of 0.027 as per Fisher's exact test.

Poisoning was resorted to by eight senior citizens in our sample. This was however, not significant at α level 0.05 (P 0.078) as per Fisher's exact test. At the other end of the age spectrum, for those aged 30 or less, poisoning did not figure in the top three rank methods employed. Only one individual below this age had consumed poison to end his life. This lack of preference for poisoning in those aged ≤ 30 years was statistically significant (P 0.001).

In those aged 30 years or less, the common methods adopted were hanging, drowning, self immolation and death by train. There was no significant association between hanging (P 0.051), self immolation (0.758 as per Fisher's exact test), death by train (P 0.731 as per Fisher's exact test) and age of less than 30. However drowning (P 0.011 as per Fisher's exact test) had a strong statistical association with age less than 30 years.

Table 1: Suicide methods among the sample.

		First Rank Method	n	%	Second Rank Method	n	%	Third Rank Method	n	%
Entire Sample (n 120)		Hanging	50	41.7%	Poisoning	28	23.3%	Train	12	10%
Sex	♂ (n 85)	Hanging	37	43.5%	Poisoning	24	28.2%	Train	11	12.9%
	♀ (n 35)	Hanging	13	37.1%	Self Immolation	11	31.4%	Poisoning	4	11.4%
								Drowning	4	11.4%

Cont... Table 1: Suicide methods among the sample.

Age groups	11- 20 (n 11)	Hanging	6	54.6%	Drowning	4	36.4%	Self Immolation	1	4.5%
								Train	1	4.5%
	21- 30 (n 21)	Hanging	12	57.1%	Train	3	14.3%	Self Immolation	2	9.5%
								Drowning	2	9.5%
	31- 40 (n 21)	Hanging	8	38.1%	Poisoning	7	33.4%	Self Immolation	2	9.5%
								Train	2	9.5%
	41- 50 (n 18)	Hanging	8	44.4%	Poisoning	5	23.8%	Train	4	22.2%
	51- 60 (n 26)	Hanging	11	42.3%	Poisoning	7	26.9%	Self Immolation	3	11.5%
	61- 70 (n 15)	Self Immolation	5	33.3%	Poisoning	4	26.7%	Hanging	3	20%
	71- 80 (n 5)	Poisoning	3	60%	Self Immolation	1	20%			
					Hanging	1	20%			
	81- 90 (n 3)	Poisoning	1	33.4%						
Drowning		1	33.3%							
Hanging		1	34.3%							

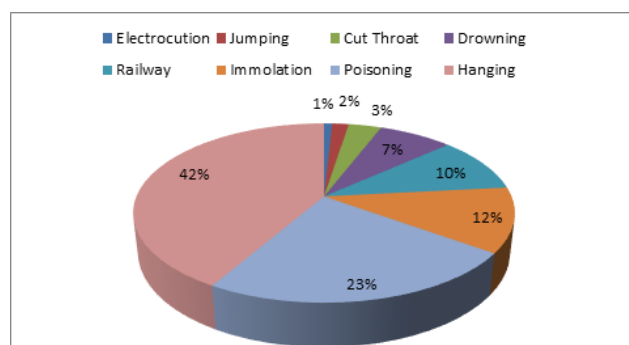


Fig 1: The distribution of different methods adopted to commit suicide.

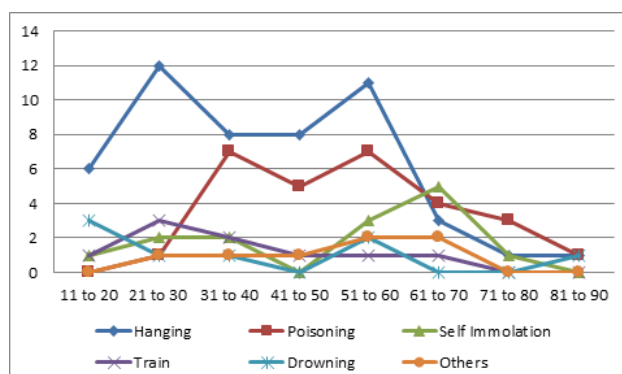


Fig 2: The age wise distribution of the methods employed in committing suicide. Cut injuries, jumping from a height and electric shock are methods which are considered together as "others".

CONCLUSIONS

The study revealed that the female preference of self immolation is statistically significant. Males on the other hand, showed a significant preference

for poisoning. It is possible that as per the traditional gender roles played by the male and the female, females have easy access to kerosene in the kitchen and males have access to agricultural poisons in the farms. The demographic background of the deceased were not collected as a part of this study, hence it is not possible to draw conclusions in that regard in the present study. More studies are required to understand this issue better.

Even though hanging was the single most common method used in both sexes, it was seen that senior citizens (aged above 60) had a lesser preference for hanging as a method of suicide compared to those younger. The senior citizens also had a statistically significant preference for self immolation. It was seen that in the US, those states which enacted a law stipulating that those who wished to purchase guns had to wait for a period had a statistically significant reduction in the suicides due to firearms in those aged above 55 years.¹⁰ Those aged 30 or less showed statistically significant preference for drowning as a method for committing suicide. In the second decade of life, drowning was the second rank method; while in the third decade of life, it was the third rank method. Whether those who chose drowning to end their lives actually knew swimming was not available to us.

The authors hope that the knowledge gained through this study would be helpful in formulating policies to combat this menace. Even though swimming lessons cannot ensure that children of any age are

completely protected from drowning,¹¹ the authors feel that formal swimming lessons in schools may be helpful in reducing deaths due to suicidal drowning, since it disproportionately affects the young.

Kerosene is the most common accelerant used in suicidal burns in India.⁶ Intentional as well as Non-Intentional burns are associated with availability of kerosene at home.¹² Discontinuing its supply through the public distribution system and shifting to cooking gas is likely to help in reducing self immolation suicides, which disproportionately affect the women and senior citizens.

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Ethical Clearance: Ethical clearance was obtained from the institutional ethics committee.

REFERENCES

1. Sauvaget C, Ramadas K, Fayette JM, Thomas G, Thara S, Sankaranarayanan R. Completed suicide in adults of rural Kerala: rates and determinants. *Natl Med J India*. 2009 Sep-Oct; 22(5): 228-33.
2. Gunnell D, Frankel S. Prevention of suicide: aspirations and evidence. *BMJ*. 1994 May 7; 308(6938): 1227-33.
3. Ramanathan R, Ramachandran AS, Periasamy K, Saminathan K. Assessment of Suicidal Intent. *Indian J Psychol Med*. 2016 Nov-Dec; 38(6): 529-32.
4. Nock MK, Borges G, Bromet EJ, Cha CB, Kessler RC, Lee S. Suicide and suicidal behavior. *Epidemiol Rev*. 2008;30:133-54. doi: 10.1093/epirev/mxn002. Epub 2008 Jul 24.
5. Sun J, Guo X, Zhang J, Jia C, Xu A. Suicide rates in Shandong, China, 1991–2010: Rapid decrease in rural rates and steady increase in male–female ratio. *J Affect Disord*. 2013 Apr 25; 146(3):361-8
6. Kumar V. Burnt wives--a study of suicides. *Burns*. 2003 Feb;29(1):31-5.
7. Yeates C, Thompson C. Suicidal Behavior in Elders. *Psychiatr Clin North Am*. 2008 Jun; 31(2): 333–56.
8. Koo YW, Kölves K, De Leo D. Suicide in older adults: differences between the young-old, middle-old, and oldest old. *Int Psychogeriatr*. 2017 Aug;29(8):1297-306.
9. Suresh Kumar PN, An analysis of suicide attempters versus completers in Kerala. *Indian J Psychiatry*. 2004 Apr; 46(2): 144-9.
10. Ludwig J, Cook PJ. Homicide and suicide rates associated with implementation of the Brady Handgun Violence Prevention Act. *JAMA*. 2000 Aug 2;284(5):585-91.
11. American Academy of Pediatrics Committee on Injury, Violence, and Poison Prevention. Prevention of drowning in infants, children, and adolescents. *Pediatrics*. 2003 Aug;112(2): 437-9.
12. Natarajan M. Differences between intentional and non-intentional burns in India: implications for prevention. *Burns*. 2014 Aug;40(5):1033-9.

A Retrospective Analysis of Poisoning Cases Brought for Postmortem Examination at Mortuary of R.C.S.M Government Medical College Kolhapur

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ABSTRACT

Introduction: Poisoning is a major health problem in developing countries like India. Recently, it is increased due to the frequent use of pesticides in agriculture and exposure to hazardous chemical compounds as a result of rapid industrialization.

Aim: Aim of this study was to determine the various parameters of poisoning such as mode and type of poisoning, relation to age & sex, occupation, marital status, vulnerable age group, and to find out the most common type of poison used in the Kolhapur region.

Materials and Method: The present study was conducted retrospectively during January 2016 to December 2016, which included 252 cases of death due to poisoning brought for post-mortem examination at mortuary of RCSM Medical College & CPR Hospital Kolhapur.

Results: Out of 1560 post mortem examinations done during the study period, 252 (16.15%) cases were that of poisoning. We observed that majority victims were male from rural area. Peak incidence was observed in the age group of 21-30 years. Majority of deaths were suicidal, followed by accidental however few homicidal poisoning were detected.

Conclusion: Organ phosphorus insecticide was the prime culprit among all poisons. Trends of this region were revealed and attempt was made to compare with previous studies.

Keywords: *Poison, Autopsy, Insecticide, Organ phosphorus, Paraquat*

INTRODUCTION

Poisons were known to antiquity. References to the poisons are found in the oldest Egyptian, Babylonian, Hebrew and Greek records. The ancient Indian Scriptures contain references to the poisoning of kings, the doings of professional poisoners and of widespread organized poisoning in prehistoric times. In those times, cases of poisoning the portions of stomach and heart

were put on fire and the nature of flame and sound were noted to determine the nature of poison¹.

Orfila, Professor of Chemistry and Legal Medicine at Paris is considered as the Father of Modern Toxicology. In the Nineteen Century, Orfila brought precise chemical method in to toxicology². The problem is getting worse with time as newer drugs and chemicals are developed in vast numbers. Today there are more than 9 million natural and synthetic chemicals, and the list keeps growing inexorably. However, less than 3000 of these cause more than 95% of the reported cases of poisoning.

The commonest agents in India appear to be pesticides (organophosphates, carbamates, chlorinated, hydrocarbons, and pyrethroids), sedative drugs,

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chemicals (corrosive and copper sulfate), alcohol, plant toxins and house hold poisons (mostly cleaning agents of late, aluminium phosphide has begun to emerge as a major player in the toxicological field, particularly in the some northern Indian states³. The first treatise on Indian Medicine was the Agnivesa Charaka Samhita, supposed to have been composed about the seventh century BC. It lays down an elaborate code regarding the training, duties, privileges and social status of physicians. It can be considered as the origin of medical ethics. It also gives a detail description of various poisons, symptoms, signs and treatments of poisoning². The Greek Philosopher Socrates was executed by the State through the use of hemlock, plant poison. A Chinese Materia medica of about 3000 B.C. gives information on poisons¹. The first textbook on poison was written in 1814 by Matthew Joseph Orfila, a Spanish chemist, who is considered to be the Father of Toxicology. Orfila extracted arsenic from human tissues using a procedure for identification, developed several years before by James Marsh. This evidence was used in the court (1840) to convict Marie Lefarge of a homicidal poisoning. This was the first time that the toxicological data had been as evidence in the trial². In ancient India, the poisons –arsenic, aconite and opium –were known. They were used by women to get rid of oppressive husbands. The word “Toxicology” is derived from the Greek word “Toxicon” which was used as a poisonous substance to arrowheads. The substance inflicting toxic effect may be a drug, an insecticide or pesticide or any chemical substance in the environment (Methyl isocyanate leakage at the Union Carbide Plant in Bhopal in 1984 resulted in high mortality and morbidity).

MATERIALS AND METHOD

The present retrospective study conducted in Dept. of Forensic Medicine & Toxicology, RSCM Govt. Medical College, Kolhapur included fatal poisoning cases brought for post-mortem examination at mortuary of CPR Hospital, Kolhapur during the period of Jan.-2016 to Dec.-2016. During this period total 1560 autopsies were conducted, out of them 252 cases (poisoning cases and Animal envenomation cases) were selected for study. Detailed and completed post mortem examination of the bodies was done. The

routine viscera were preserved by using appropriate preservative according to nature of poison and sent to Regional Forensic Science Laboratory, Pune as well as Regional Forensic Science Laboratory, Kolhapur for chemical examination. The cases were evaluated on the basis of hospital cases, police papers, available history from relatives or police, and chemical analysis report.

RESULTS

Out of total 1560 post-mortem cases, 252 cases of death due to poisoning were selected for present study. Incidence of death due to poisoning, were more in second decade (24.20 %) and fourth decade (10.31%) as compare to both extremes of age. The majority of victims were males (69.02 %) as compare to females (30.92 %) (Table-1) and out of them, majority of victims were married. Significant differences were observed in death due to poisoning in respect with locality (rural/urban). The victims of poisoning death cases were more in rural area (63.64%) as compared to urban area (36.37%). (Table 3) The manner of death was decided from history given by relative and police papers. The suicidal death cases (191 cases and 75.79 %) were more followed by accidental death cases (58 cases and 23.01 %).(Table 4) Most common cause of the fatal poisoning was financial problem in 63 cases (25%), followed by family problems 48 cases (19.04 %), failure in education 32 cases (12.69%), dowry 28 cases (11.11%), ill health or mental illness 26 cases (10.31%) and the least common cause was bereavement as 7 cases (2.77 %) and 9 undetermined cases (3.57%) of chronic illness. (Table 7). Out of total 165 cases of poisoning, 5 cases of animal envenomation were observed. According to chemical Analysis reports of 252 cases of poisoning, in majority of cases (201 cases & 79.71%), insecticides were found followed by Aluminium and Zinc Phosphide (12 cases & 4.76%) and ethyl alcohol found in 17 cases (Table 6). Among all the insecticides, the organo-phosphorus compounds were more in number than organochloro compound. Paraquat was detected in 93 (36.90%) cases while Methyl parathion in 40 cases (15.87%), chlorpyrifos in 27 cases (10.71%), Monochrotophos in 24 cases (9.52%), Dichlorvos in 15 cases (5.95%), Aluminium phosphide in 11 cases (4.36%) Table 5.

Table 1- Age & Sex wise distribution of poisoning cases

Age group (in yrs)	Male	Cases in %	Females	Cases in %	Total cases	Total cases in %
0-10	6	2.38%	5	1.98%	11	4.36%
11-20	26	10.31%	15	5.95%	39	15.47%
21-30	61	24.20%	27	10.71%	88	34.92%
31-40	24	9.52%	13	5.15%	33	13.09%
41-50	20	7.93%	11	4.36%	37	14.68%
51-60	22	8.73%	5	1.98%	27	10.71%
Above 60	15	5.95%	2	0.79%	17	6.74%
Total	174	69.02%	78	30.92%	252	100%

Table 2- Month wise distribution of poisoning cases

Month	Cases	Cases in %
January	18	7.14%
February	25	9.92%
March	21	8.33%
April	22	8.73%
May	13	5.15%
June	15	5.95%
July	24	9.52%
August	28	11.11%
September	27	10.71%
October	25	9.92%
November	17	6.74%
December	17	6.74%
Total	252	100%

Table 3- Distribution of poison according to location

Sex	Rural	Urban	No of cases	Cases in %
Male	115	59	174	69.04%
Female	55	23	78	30.95%
Total	170	82	252	100%

Table 4- Distribution of poisoning cases according to manner of death

Manner	Cases	Cases in %
Suicidal	191	75.79%
Accidental	58	23.01%
Homicidal	3	1.19%
Total	252	100%

Table 5-Distribution of poisoning cases according to poisonous compound from chemical analysis report

Compound	Cases	Cases in %
Aluminium phosphide	11	4.36%
Monochroptophos	24	9.52%
Methyl parathion	40	15.87%
Paraquat	93	36.90%
Dichlorovos	15	5.95%
Chlorpyrifos	27	10.71%
Hydroquinone	3	1.19%
Endosulfan	2	0.79%
Zinc phosphide	1	0.39%
Kerosene	2	0.79%
Ethyl alcohol	17	6.74%
Hydrochloric acid	5	1.98%
No poison detected	7	2.77%
Animal envenomation	5	1.98%
Total	252	100%

Table 6- Distribution of Poisoning cases according to type of poison, chemical examination, from history & external examination

Poison	No of cases	Cases in %
Insecticide	201	79.76%
Aluminium phosphide	11	4.36%

Cont.. Table 6- Distribution of Poisoning cases according to type of poison, chemical examination, from history & external examination

Zinc phosphide	1	0.39%
HCL	5	1.98%
Kerosene	2	0.79%
Hydroquinone	3	1.19%
Ethyl alcohol	17	6.74%
No poison detected	7	2.77%
Animal envenomation	5	1.98%
Total	252	100%

Table 7-Cases according to motive

Motivation	No of cases	Cases in %
Bereavement	7	2.77%
Dowry	28	11.11%
Failure in Education	32	12.69%
Family problems	48	19.04%
Financial problems	63	25%
Ill health/mental illness	26	10.31%
Love failure	17	6.74%
Unemployment	22	8.73%
Undetermined	9	3.57%
Total	252	100%

DISCUSSION

Total 1560 post-mortem examinations were carried out during the study period and out of them 252 cases (16.15 %) of death due to poisoning were observed which was consistent with Kapoor AK⁵, Dalal JS et al⁶ and Vaghela PC⁹, while Dhatarwal SK et al⁷ exhibited higher incidence of death due to poisoning (23.42 %). In the present study, poisoning death cases were higher as (69.04 %) in males than females deaths (30.95 %) which was also supported by previous studies like Dalal JS et al⁶, Vaghela PC⁹, Zine K.U et al¹⁰ and Chaudhry S¹². Though all studies were conducted in different parts of India, male predominance was a common and

constant feature. In present study, higher incidence of death due to poisoning was found in young age group 21–30 yrs followed by 11-20 years of age which was also observed in previous studies like Varma N⁴, Kapoor AK⁵, Dalal JS et al⁶, Gupta S et al⁸, Vaghela PC⁹, Sharma BR et al¹², Nigam M et al¹¹. It could be explained by the fact that the persons of this young age group are suffering from stress of the modern life style, family problems, financial problems and failure in the exams etc. Maximum numbers of poisoning cases were observed in the monsoon month of Aug-2016, Sept-2016, and Oct.2016 especially in the rural area because of increased farming activity like spraying of pesticide in these seasons which was consistent with previous studies like Varma N⁴, Vaghela PC⁹, Dhatarwal S.K et al⁷. Maximum numbers of poisoning cases were observed in rural area as compare to urban area due to illiteracy or less education, less availability of immediate treatment which was consistent with Varma N⁴, Kapoor AK⁵, Vaghela PC⁹ studies, while Chaudhary S et al¹⁴ showed 64.90 % cases were observed in urban as compared to rural area (35.10 %). According to the manner of death, majority of death were suicidal (75.79 %) followed by accidental (23.01 %) which was consistent with studies like Sharma BR et al¹², Karamjitsingh et al¹³, Chaudhry S et al¹⁴. The accidental poisoning cases were more (23.01 %) in rural area due to spraying of pesticide during farming activity and animal envenomation.

CONCLUSION

Pattern of poisoning in present study was more or less similar to the pattern found in most of the other studies. These similarities were present in almost all parameters used in this study. Majority of victims were male. From the chemical analysis reports we found that most commonly used poison was agricultural. In that category organophosphorus compounds and aluminium phosphide were top on the list of poisons. The Insecticides were most preferred poisons for suicidal purpose. Strict implementation of the pesticide act and involving a new policy by the government to educate the public and youth in large about the dangerous, life threatening effects of Organophosphorus compounds could help ameliorating the harmful effects of such poisoning. Establishment of more Poison Information Centres provide toxicity assessment and treatment recommendations over phone throughout the day for all kinds of poison similarly strict implementation of the

pesticide act and special policy by the government to educate and create awareness about the magnitude of the menace could help ameliorate the problem. Government grants for the setting up of better poison information centers and research on recent advances in the treatment of poisoning cases would be recommended for reducing the mortality rates.

Ethical Clearance – Taken

Source of Funding- Self

Conflict of Interest- Nil

REFERENCES

1. Reddy KSN. The essentials of Forensic Medicine and Toxicology. 33rd ed. 2014 Hyderabad, India, K Suguna Devi, Hyderabad p. 4, 449.
2. Vij K. Text Book of Forensic Medicine and Toxicology. 4th ed. New Delhi: Elsevier; 2008. p. 6, 562.
3. Pillay VV. Comprehensive Medical Toxicology, 1st ed. Hyderabad: Paras Publisher, 2003. p. 2, 3. 4
4. Varma N, Kalele SD. Original Research Paper Study of Profile of Deaths due to Poisoning in Bhavnagar Region. JIAFM; 2011; 33(4): 313318.
5. Kapoor AK An epidemiological study of Aluminium Phosphide poisoning at Allahabad. IIJFMT; 2006: 4(1).
6. Dalal JS et al. Poisoning Trends – a post mortem study. JIAFM. 1998; 20(2): 27-31.
7. Dhattarwal SK, Singh H. Profile of death due to poisoning in Rohtak, Haryana, JIAFM; 2001: 14(1); 51.
8. Gupta S, Shaikh MI. Study and changing trends of poisoning in year 2004-05 at Surat, India. International Journal of Medical Toxicology and legal Medicine; 2007: 10(1): 16-19. 7.
9. Gupta BD, Vaghela PC. Profile of fatal poisoning in and around Jamnagar. JIAFM. 2005;27(3): 145148.
10. Zine KU. Pattern of acute poisoning at Indira Gandhi Medical College and Hospital, Nagpur. JIAFM. 1998: 20(2): 37 – 39.
11. Nigam M et al. Trends of organ phosphorus poisoning in Bhopal region – An autopsy based study, JIAFM. 2004; 26(2), 62 – 65.
12. Sharma BR et al. The epidemiology of poisoning: An Indian View point, Journal of Forensic Medicine and Toxicology, 2002: 19(2), 5-11.
13. Karamjitsingh et al. Poisoning Trends in the Malwa Region of Punjab, Journal of Punjab Academy of Forensic Medicine and Toxicology; 2003: 3, 26-29.
14. Chaudhary S et al. An Epidemiological Study of Fatal Aluminium Phosphide Poisoning at Rajkot, IOSR Journal of pharmacy. 2013; 3(1): 17-23.

Study of Pattern of Unnatural Deaths at Rural Government Medical College & Hospital in Maharashtra

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ABSTRACT

Death is an unavoidable ultimate fate of any human being. Thanatology is a branch of science which deals with death in all its aspects. The incidence of unnatural deaths is found to be persistently increasing. So this study is aimed to know the pattern of unnatural deaths at rural region of Maharashtra.

Keywords: Unnatural Deaths, Road Traffic Accident, Suicide, Autopsy, Rural Population.

INTRODUCTION

Death may be natural (resulting from disease) or unnatural deliberate action of other (homicide), intentionally self inflicted (suicide), result of an environmental influence (accident).⁽¹⁾

Death which occurs exclusively by injury or is hastened due to injury in a person suffering from natural disease, the manner of death is unnatural or violent. Violence may be suicidal, homicidal, accidental or of undetermined or unexplained origin.⁽²⁾

The incidence of unnatural deaths is found to be persistently increasing.⁽³⁾

Unnatural death is one of the indicators of the level of social & mental health.⁽⁴⁾

When unnatural causes of death are considered the RTA is most common and above all the major issue is the number of persons died increasing year by year due to growth in automobile companies and easy availability of vehicles to younger age group. Suicidal and homicidal fatalities are common among both the urban as and rural population.

MATERIALS AND METHOD

This study is a retrospective study undertaken at the Mortuary of Rural Hospital during the period 1st January 2015 to 31st December 2015. All the unnatural deaths were included in the study. Natural deaths and deaths in which opinion was reserved were excluded. The data was compiled, tabulated and analysed statistically.

OBSERVATIONS

1. Total number of post-mortems conducted during year 2015 was 398 (Table-1)
2. Out of total 398 cases, 322 were of unnatural deaths. (Table 2)
3. Sex profile of unnatural deaths: Among 322 cases of unnatural deaths, 215 (66.8%) cases were males and 107 (33.2%) cases were of females. (Table3)
4. Age and sex wise distribution of unnatural deaths: The most common age group involved in unnatural deaths was 21 to 30 years in both the sexes. The youngest case was of age 1 month and the oldest case was of 80 years age. (Table 4)
5. Out of 322 cases, depending upon the cause of death, most of the cases 90 (27.9%) were due to RTA followed by 74 (22.9%) cases due to Poisoning and least number of cases 4 (1.2%) due to snake bite or animal bites. (Table 5)
6. Regarding manner of death, out of 322 cases, 202 (62.7%) cases were accidental, 103 (31.9%) were suicidal and 17 (5.3%) were homicidal. (Table6)

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Table 1: Total Number of postmortems Performed in Year 2015.

Year	2015
Total number of postmortems	398

Table 2: Number of Unnatural and Natural Deaths

Total Deaths	Unnatural	Natural
398	322	76
Percentage	80.9	19.0

Table 3 : Sex wise distribution of Unnatural Deaths.

Unnatural Deaths	Male	Female
322	215	107
Percentage (%)	66.8	33.2

Table 4 : Age group and sex wise distribution of Unnatural Deaths.

Age Group	Male	Female	Total	Percentage (%)
0-10	14	4	18	5.6
11-20	10	28	38	11.8
21-30	61	36	97	30.1
31-40	47	14	61	18.9
41-50	37	13	50	15.5
51-60	24	06	30	9.3
61-70	17	06	23	7.1
71-80	05	0	05	1.5
Total	215	107	322	100

Table 5 : Cause of Death and sex wise distribution of Unnatural Deaths

Cause Of Death	Male	Female	Total	Percentage (%)
Neck compression	47	21	68	21.1
Poisoning	49	25	74	22.9
Burn	15	53	68	21.1
RTA	85	5	90	27.9
Assault	6	2	8	2.4
Electrocution	9	1	10	3.1
Snake bite	4	0	4	1.2
Total	215	107	322	100

Table 6 : Manner of Death wise distribution of Unnatural Deaths.

Manner of death	Number Of Cases	Percentage (%)
Accidental	202	62.7
Suicidal	103	31.9
Homicidal	17	5.3
Total	322	100

DISCUSSION

In our study, (Table 1) out of total 398 deaths, unnatural deaths were 322 (80.9%) and natural deaths were 76(19.0%). Our study findings are similar to the study conducted by Srivastava P et al.⁽⁵⁾

Sex profile (Table3) of unnatural deaths in our study showed 66.8% of the cases were males & 33.2% cases were females. Similar results were seen in studies conducted by Santhosh. C. S et al⁽⁶⁾ also in study conducted by Singh D et al⁽⁷⁾.

One of the reasons for males being major portion of victims of unnatural deaths is males involved in outside work, travels more so prone for RTA. In our study percentage of females is due to accidental burns as in rural area they use woods or stove for combustion.

Age group wise, maximum numbers of cases of unnatural deaths 97 (30.1%) deaths involving 61 (18.9%) males and 36 (11.1%) females were seen in the age group of 21-30 years followed by 61 (18.9%) cases in age group of 31 to 40 years.

Most of the unnatural deaths 90 (27.9%) were due to RTA. Similar results were seen in study by Santosh C et al⁽⁶⁾

Increasing density of vehicles, rash driving, non-maintained vehicles and roads are few reasons for increasing RTA. Younger age group drive vehicles carelessly, without proper training and prone for accidents. The situation is more worsened as this age group is earning in family so this will create economical as well as other allied problems in their families.

Regarding manner of death, in our study out of 322 cases, 202 (62.7%) cases were accidental, 103 (31.9%) were suicidal and 17 (5.3%) were homicidal which are similar to study by Santhosh. C. S et al⁽⁶⁾ also in study conducted by Singh D et al⁽⁷⁾ In study by Srivastava P et al⁽⁵⁾

Unnatural deaths are known to claim a substantial number of lives, in the world over, with the Vehicular accidents accounting most important case of deaths.⁽⁸⁾ Being in rural area most of the suicides are by farmers by poisoning as easily available. In 2014, 5650 farmers committed suicide as per National Crime Records Bureau (NCRB)⁽⁹⁾

CONCLUSION

Unnatural deaths are one of the most preventable culprit who takes number of lives in India. Study and pattern of unnatural deaths reflects the socio-economic status of the society. The ongoing increase in mechanization, fast moving vehicles, drunken drivers, non-maintained roads especially in rural region has led to the increase in the number of RTAs. Suicides by poisoning are most common in farmers due to economical

and other problems. By improving the literacy rate and providing employment to the youth, crime rate and ultimately unnatural deaths can be lowered. Preventive measures should be adopted promptly wherever possible to avoid all unnatural deaths. If not preventable, prompt and immediate care should be provided in order to save the life of the victim.

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Source of Funding: Nil.

Ethical Clearance: Obtained from the institutional ethical committee.

REFERENCES

1. Gautam Biswas; thanatology; review of forensic medicine and toxicology; 2nd edition; 2013; Jaypee brothers medical publishers(p) LTD; PP:110.
2. Reddy KSN. The Essentials of Forensic Medicine & Toxicology. 33rd ed. New Delhi: Jaypee Brothers Medical Publishers (P) Ltd; 2014. Pg 142.
3. Sharma BR et al Unnatural deaths in Northern India – a profile. J Indian Acad Forensic Med 2004;26(4):140-6.
4. Ahmed M. et al Pattern of unnatural death in two districts. TAJ. 1992; 5: 65-66.4.
5. Srivastava P et al Journal of Indian Medical Association 2010 Nov;108(11):730-3.
6. Santhosh. C. S et al J Indian Acad Forensic Med. Jan-Mar 2011, Vol. 33, No. 1.
7. Singh D et al, Spectrum of unnatural fatalities in the Chandigarh zone of North-West India, Journal of Clinical Forensic Medicine 2003; 10(3):145-152.
8. Aryappan A and Jayadev CJ. Society in India; Social Science Publication; 1985.
9. National Crime Records Bureau. ADSI Report annual 2014, GOI p.242, table 2.11

Tumour Marker and Diagnosis of Cancer

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ABSTRACT

Tumour markers in clinical oncology comprises substances that are produced by malignant cells or the substances that are produced by other cells under the influence of malignant cells and that can be determined in body fluids. Tumour markers can be found in cells, tissues or body fluids. These are biochemical substance. Tumour markers can be classified in according to their chemical structure, their tissue of origin, types of malignancies in which they are elevated. The concentration of tumor marker are related to the growth of malignant tumours in patients. Application of molecular tumor markers, which make histology more accurate and additionally help to prognosticate cancer. Early detection would significantly decrease the mortality rate of oral cancer. The utilization of tumour markers depends upon the sensitivity, specificity and upon reliability of methods that are being used for the same purpose. This review include different types of markers their application and limitation.

Keywords: tumour markers, oncology, biochemical substance.

INTRODUCTION

“A tumor marker is a substance present in or produced by a tumor or by the tumor’s host in response to the tumor’s presence that can be used to differentiate a tumor from normal tissue or to determine the presence of a tumor based on measurement in the blood or secretions¹. can also be defined as “specific, novel or structurally altered cellular macromolecules or temporarily spatially or quantitatively altered normal molecules that are associated with malignant (and in some cases benign) neoplastic cells².

Markers can be endogenous or the products of newly mutated genes that remained dormant in the normal cells. They may be present as intracellular substances in tissues, body fluid or in serum. Continuing search

for suitable tumour markers in serum, tissue and body fluids during neoplastic process is of clinical value in the management of patients with various malignancies.

The first tumour marker described in Egyptian Papyrus was 2000 years ago for malignancy in breast cancer³. The first tumor marker was identified by Bence Jones in 1846 : detected a protein precipitate in boiled acidified urine from patient of Multiple Myeloma In 1965 Gold identified the first tumor antigen CEA from specimens of human colonic cancer. It is detected in solid tumors, tumor cells circulating in peripheral blood, lymph nodes, bone marrow. It is use in screening diagnosis, staging, prognosis, localization, therapy, surveillance, monitoring.

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Classification of tumour markers:

According to T. Malati ⁴

1	Oncofetal antigens (e.g. alpha-fetoprotein [AFP], carcinoembryonic antigen, pancreatic oncofetal antigen, fetal sulfoglycoprotein).
2	Tumor associated antigens/cancer antigens e.g. CA- 125, CA19-9, CA15-3, CA72-4, CA50 etc.
3	Hormones, e.g. beta HCG, calcitonin, placental lactogen, etc.
4	Hormone receptors (e.g. estrogen and progesterone receptors)
5	Enzymes and iso-enzymes (e.g. prostate specific antigen, prostatic acid phosphatase, neuron specific enolase, glycosyltransferases, placental alkaline phosphatase, terminal deoxynucleotidyl transferase [TdT], lysozyme, alpha amylase)
6	Serum and tissue proteins (beta-2 microglobulin, monoclonal immunoglobulin/para proteins, glial fibrillary acidic protein (GFAP), protein S-100, ferritin, fibrinogen degradation products)
7	Other biomolecules, e.g. polyamines.

B. According to Küstner et al. in 2004⁵

1	Tumor growth markers	1. Epithelial growth factor (EGF) 2. Cyclins 3. Nuclear cell proliferation antigens 4. Agryophilic nucleolar organizer region 5. S-phase kinase-interacting protein 2 6. Heat shock proteins 27 and 70 7. Telomerase.
2	Markers of tumor suppression and anti-tumor response	1. Retinoblastoma protein (pRb) 2. Cyclin dependant kinase inhibitors 3. p53 4. bax 5. Fas/FasL.
3	Angiogenesis markers	1. Vascular endothelial growth factor/receptor 2. Platelet-derived endothelial cell growth factor 3. Fibroblast growth factor.
4	Markers of tumor invasion and metastatic potential	1. Matrix-metalloproteases 2. Cathepsins 3. Cadherins and catenins 4. Desmoplakin
5	Cell surface markers	1. Carbohydrates 2. Histocompatibility antigen (HLA) 3. CD57 antigen
6	Intracellular markers	Cytokeratins (CKs).
7	Markers of anomalous keratinization	1. Filagrins 2. Involucrin 3. Desmosomal proteins 4. Intercellular substance antigen 5. Nuclear analysis.

8	Arachidonic acid products	1. Prostaglandin E2 (PGE2) 2. Hydroxyeicosatetraenoic acid 3. Leucotriene B4.
9	Enzymes	Glutathione S-transferase.

C. According to Scully and Burkhardt (1993)⁶

1	Cell surface marker	1. Carbohydrates-particularly blood group antigen. 2. Squamous carcinoma antigen Ca-1, TA-4, SQM-1,3H-1. 3. HLA. 4. Growth factor and receptors.
2	Intercellular marker	1. Cytoskeletal components – CKs 2. Markers of abnormal keratinization – filaggrin, involucrin, desmosomal proteins 3. Carcinoma antigen 17, 13 4. Silver binding nucleolar organizing regions 5. Oncogenes 6. Tumor suppressor genes 7. Arachidonic acid products - PGE2, leukotriene B4 and 5, 12, and 15 hydroxyeicosatetraenoic acids 8. Enzymes – gamma-glutamyl transpeptidase, lactate dehydrogenase
3	Basement membrane marker	1. Fibronectin, 2. Laminin.
4	Matrix marker	1. Tenascin

D. By Enzinger & Weiss⁷

1	Intermediate filament	Vimentin Cytokeratin
2	Markers of Muscle Differentiation	Desmin Actin Myoglobin & other markers Myogenic transcription factor
3	Markers of Endothelial Differentiation	Factor viii related antigens CD 34 CD 31 FLI- 1 Ulex lectin VEGFR- 3 LANA Type iv collagen
4	Markers of distinction between Myoepithelioma and carcinoma	Carcinoembryonic antigen CD 15 Tumor associated glycoprotein WT-1
5	Markers of Nerve Sheath differentiation	S-100 Claudin-1 Glut-1 CD 57 p57 NTR
6	Neuroectodermal markers	CD 99 CD 56 NB 84
7	Marker of Melanocyte differentiation	Melan A Microphthalmia transcription factor Tyrosinase

Cont... D.By Enzinger & Weiss⁷

8	Markers for gastrointestinal stromal tumors	CD 117 Protein kinase
9	Other markers	CD 88 Beta catenin MDM-2 Bcl-2
10	Prognostic markers	Ki- 67 P53 P 21 p27 p16

E. Markers according to cell of origin⁸

1	Epithelial markers	CKs Epithelial membrane antigen Oncofetal antigens Desmoplakin.
2	Mesenchymal markers	Muscle antigens • Desmin • Actin • Myoglobin • Myosin. Vascular antigen • CD 34. Neural markers • S-100 • GFAP • neurofilaments • CD57 Endothelial markers • CD31, CD34, and factor VIII – related antigen. Lymphoid markers • CD3, CD15, CD20, CD30, CD45, CD68, CD79a, anaplastic lymphoma kinase -1, and TdT.

F. Classification by Virji³

1	Tumor derived	Hormones HCG ADH Parathyroid Calcitonin Insulin like growth factors Catecholamines & metabolites
2	MUCINS & OTHER GLYCOPROTEIN	CA – 125 CA – 19-9 CA- 15-3 Oncofetal antigens Alpha feto proteins Carcinoembryonic antigen Oncogenes & their products Src N-myc H-ras

Cont... F. Classification by Virji³

3	ISOENZYMES	Prostatic acid phosphatase Neuron specific enolase Regan ALP LDH 1 Others Polyamides Sialic acid Glycolipids
4	SPECIFIC PROTEINS	Immunoglobulins Prostate specific antigen Alpha lactalbumin Beta microglobulin
5	TUMOR ASSOCIATED (HOST RESPONSE)	Ferritin Immune complexes Enzymes (LDH, GDH, CK-BB) Acute phase proteins

Criteria for ideal tumour marker

- Should be highly specific
- Should be highly sensitive
- Should provide a lead time over clinical diagnosis
- Levels should correlate reliably with tumor burden

Role of markers**Alpha-Fetoprotein (AFP)**

AFP is a 70 kDa glycoprotein homologous to albumin. It perform some of the functions of albumin in the foetal circulation. Reference range is 0 - 10 kU/L or 0-12 mg/L. Half life in serum approx. 5 days. Mainly confined to three malignancies, i.e.

- Non-seminomatous germ cell tumours (NSGCT) of testis, ovary and other sites.
- Hepatocellular carcinoma (HCC).
- Hepatoblastoma (in children, extremely rare in adults).
- AFP may be occasionally elevated in patients with other types of advanced adenocarcinoma.

CA 125

CA 125 refers to the antigen originally detected by the OC-125 antibody. The protein detected by this antibody is Muc16, a mucin with a single

transmembrane domain. The major forms in serum have molecular weights of 200 kDa to 400 kDa. Epithelial ovarian cancer; 80 - 85% of all cases; but increased in only half of early (stage 1) cancer. May be elevated in any adenocarcinoma with advanced disease. Reference range 0 - 35 kU/L. Half life in serum approx. 5-7 days.

CA 15-3

Ca 15-3 is heterogeneous 300 KD glycoprotein antigen was defined by using two monoclonal antibodies 115D8 and DF3 raised against breast carcinoma cells. The diagnostic sensitivity of the CA15.3 for breast carcinoma is low as its elevated levels are also observed in benign breast diseases and in liver cirrhosis, acute and chronic hepatitis. The marker concentrations is also elevated in metastatic cancers of pancreas, ovary, colorectal, lung, stomach, uterus

CEA

A 200 kDa (approx.) glycoprotein. Appears to play a role in cell adhesion and inhibition of apoptosis. Malignancies with elevated levels Can be elevated in almost any advanced adenocarcinoma, i.e., where distant metastases are present. Almost never elevated in early malignancy. Reference range 0 - 3.5 µg/L to 0 - 5.0 µg/L. Half life in serum approx. 3 days but can vary from 1 to 5 days.

Thyroglobulin

It is an intracellular glycoprotein responsible for the production and storage of thyroxine. In low concentrations, it can be found in the sera of most

healthy persons (0-75 ng/ml), while extremely high concentrations can be detected in the patients with well differentiated follicular (rarely anaplastic) thyroid carcinoma

S-100

It is a protein was first isolated from bovine brain. Normal serum concentration of this marker is below 0.3 ng/ml. In addition to being a good indicator of traumas to CNS, S-100 can be applied as tumor marker in the patients with neurinoma, glioblastoma, astrocytoma, and meningioma. It has a special role as prognostic factor and in the follow-up of the patients with malignant melanoma (<0.3 ng/ml - 85% 3 years' survival; 0.3-0.6 ng/ml - 50% 3 years' survival; >0.6 ng/ml - 10% 3 years' survival).

Cytokeratin

Epithelial marker found in intermediate filament. It has 19 Types and 2 subfamilies: Acidic & Basic. It is to distinguishing epithelial from non epithelial tumors and In distinguishing the type of epithelial tumor. Is Reliable marker for Undifferentiated & Anaplastic carcinoma Metastasizing carcinomas

Vimentin

It is Mesenchymal marker, Predominant subunit of fibroblastic Intermediate filament. Expressed in a tissue specific pattern in cells of mesenchymal origin(fibroblast & hemopoietic cells) also in Expressed in all cells during embryogenesis & is gradually replaced by type specific intermediate filaments. It has Drawback : Expressed in sarcomatoid carcinomas also so cannot be used to differentiate sarcomas from carcinomas

Desmin

It is mesenchymal marker Predominant subunit of fibroblastic and in intermediate filament. It is expressed in muscle tissue during early embryogenesis, increases in cells near terminal differentiation. Is highly sensitive marker for endothelial cell differentiation & tumor invasiveness in colon cancers, GI stromal tumors, embryonal sarcomas & endometrial carcinomas

Tissue polypeptide antigen (TPA)

TPA, which is regarded as a marker of cell proliferation, is a mixture of proteolytic fragments containing the relatively stable α -helical rod domains of

simple epithelium-type cytokeratins. These fragments are probably released during necrosis and lysis of the carcinoma cells. Thus TPA should be regarded as a broad-spectrum epithelial tumor marker and not as a specific molecular marker for epithelial neoplasms. TPA is a constituent of intermediary filament proteins. It has a mixture of low molecular weight cytokeratins 8, 18 and 19.

Epidermal growth factor receptor (EGFR)

EGFR a 170 KD, glycoprotein binds to epidermal growth factor (EGF) with high affinity and shows significant sequence homology with V-erbB oncogene product. EGFR gene over expression is observed in SCC. EGFR levels are raised in breast cancer, gliomas, lung cancer, blood cancer, SCC and tumors of female genital tract.

Proliferating cell nuclear antigen (PCNA)

These are nuclear proteins associated with DNA polymerase. They appear in the final phase of G1 and in the S-phase. In addition, they are thought to form part of the D-cdkcyclin complex, where they are involved in phases of the cell cycle. They are indicative of cell proliferation. PCNA is an auxiliary protein to DNA polymerase- δ , a nuclear non-histone antigen[27] and is essential for the synthesis of DNA in cells.

Limitations of markers in diagnosis

Lack of Specificity and sensitivity, heterogeneity of cancer.

Benign diseases shows positive for CA 125 or CEA. Smokers have raised CEA.

Normal persons also have small amounts.

High levels only with large tumor volume. Some cancers never have high levels.

Thus, it becomes necessary to choose a threshold at which level particular marker is considered abnormal and suggestive of the presence of that tumor type

Factors (in addition to malignant disease) that affect serum concentrations of tumor markers

False positive results

Presence of inflammatory processes; benign liver

diseases and consequential disturbances in metabolism and excretion (AFP, TPA, CEA, CA 19-9, CA 15-3); disturbances of renal function (beta-2-microglobulin, calcitonin, PSA, CEA, CA 19-9, CA 15-3); extensive tumor necrosis; as a consequence of diagnostic and therapeutic procedures (digitorectal examination, mamography, surgery, radio and chemotherapy); as a consequence of different physiological conditions (pregnancy - β HCG, CA 125, CA 15-3, MCA, AFP, menstrual cycle - CA 125).

False negative results

complete absence of production (e.g. CA 19-9 in Le(a-b-) persons); insufficient expression of a certain antigenic determinan (or production in only some of tumor cells); insufficient blood circulation in the tumor; production of immune complexes with autoantibodies; rapid degradation and clearance of antigens.

CONCLUSION

Biomarkers help in detection of genetic & molecular changes related to early, intermediate & late end points in the process of oral carcinogenesis. Use of tumor markers in clinical oncology has increased tremendously with identification of new tumor markers & expansion of techniques of detection. However, such use is not without its pitfalls. Hence, the search for such definite markers of potential malignancy should be the ultimate goal in oral pathology.

Ethical Clearance- Taken

Source of Funding- Self

Conflict of Interest: Nil

REFERENCE

1. Sharma U, Rathore VPS, Diagnostic Markers in the Head and Neck Malignancy, J Adv Oral Res, 2014; 5(1): 17-24.
2. Lehto VP, Pontén J. Tumor markers in human biopsy material. Acta Oncol 1989;28:743-62.
3. Virji MA, Mercer DW, Herberman RB. Tumor markers and their measurements. Pathol Res Pract 1988;183:95-9.
4. Malati T. Tumour markers: An overview. Indian J Clin Biochem 2007;22:17-31.
5. Küstner CE, Costa FI, López LJ. Oral cancer risk and molecular markers. Med Oral Patol Oral Cir Buccal 2004;9:377-84.
6. Scully C, Burkhardt A. Tissue markers of potentially malignant human oral epithelial lesions. J Oral Pathol Med 1993;22:246-56.
7. Enzinger & Weiss soft tissue tumor, 5th edition, Elsevier 2008
8. Jordan RC, Daniels TE, Greenspan JS, Regezi JA. Advanced diagnostic methods in oral and maxillofacial pathology. Part I: Molecular methods. Oral Surg Oral Med Oral Pathol

An Analytical Study of 118 Hanging Cases Autopsied at Dr. B.R. Ambedkar Medical College, Bengaluru, Karnataka

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ABSTRACT

Suicidal tendencies are increasing at an alarming rate all over the world. Hanging is one of the common method of committing suicide and is considered as a painless form of death. This prospective study was conducted among victims of hanging brought to Dr. B.R. Ambedkar medical college mortuary, Bengaluru during June 2016 to December 2016. A total of 118 cases of alleged hanging were selected for this prospective study. The pattern of hanging revealed from this study showed a male predominance. The maximum number of cases were in the 21 to 30 years age group. Overall the most common ligature material used for hanging was saree and dupatta. Hanging was typical in 06 cases (5.08%) and atypical in 112 cases (94.91%). Salivary dribble marks was seen in 29 (24.57%) cases and protrusion of tongue present in 37 (31.35%) cases. The direction of ligature mark was oblique in 105 (88.98%) cases and transverse in 13 (11.01%) cases. Ligature mark was above the thyroid cartilage in 92.37% cases and over the thyroid cartilage in 7.62% cases. Hyoid bone fracture was noted in 05 cases and thyroid cartilage fracture was seen in 01 case.

Keywords : Hanging, Suicide, Ligature material, Ligature mark, Hyoid bone, Thyroid cartilage.

INTRODUCTION

Hanging is a form of asphyxia death, which is caused by the suspension of the body by a ligature that encircles the neck, the constricting force being the weight of the body. Asphyxia in hanging is secondary to compression or constriction of the neck structures by a noose or other constricting band tightened by the weight of the body. In complete hanging, the constricting force is the weight of the body as the body is fully suspended in air. In partial hanging, the constricting force is the weight of the head and the lower part of the body such as toes, feet, knees or buttocks touches the ground. Hanging is ordinarily presumed to be suicidal unless the circumstantial and other evidences are strong enough to

rebut the presumption¹.

Hanging is the most common method of suicide because of painless death and easy availability of the ligature material at the surroundings. Suicide is a major socio-economic and public health issue worldwide. Hanging is one of the 10 leading causes of death in the world, accounting for more than a million deaths annually. ⁽²⁾

The number of hanging deaths is increasing day by day. Even though hanging is suicidal, postmortem suspension is not uncommon. Most of the cases of hanging encountered at autopsy are atypical hanging. The ligature mark is a vital evidence of asphyxia deaths. The source and direction of the ligature mark helps in differentiating the type of asphyxia death as hanging or strangulation. ⁽³⁾

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Medico-legal questions likely to arise in case of hanging are mainly, whether the death caused by hanging was suicidal, homicidal or accidental, or whether person

was intoxicated with any drugs or alcohol, time since death, any concealed injuries over body. Simulated suicidal hanging interferes the investigating process in unnatural deaths. To arrive at conclusion, detailed external and internal examination, analysis of samples play vital role. Apart from autopsy the ligature material used, place, point of suspension and review of scene of crime may add to the conclusion. ⁽⁴⁾

MATERIAL AND METHOD

The prospective study was conducted among victims of hanging brought to Dr.B.R.Ambedkar medical college mortuary, Bengaluru during the period June 2016 to December 2016. Cases with alleged history of hanging by the investigating officer are considered for this study. The natural deaths, accidental deaths and deaths due to multiple injuries are excluded in this present study. Detailed information regarding the deceased and circumstances of death was collected from the police and relatives. In some cases, this information was supplemented by either, visit to scene of occurrence or from the photographs of scene of occurrence.

Neck dissection is done in bloodless field. Dissection is done layer by layer with respect to skin, neck muscles, vessels, other soft tissue and internal deep structures of neck. Hyoid bone and thyroid cartilage examined and dissected to rule out injury or fracture. Focusing light and magnifying lens is used during external and internal examination. All the data was analyzed, compared statistically and the results are tabulated.

Table 1 : Age wise distribution of cases.

Age group (Years)	Cases	Percentage
0 – 10	0	0
11 – 20	10	8.47
21 – 30	45	38.13
31 – 40	43	36.44
41 – 50	13	11.01
51 – 60	03	2.54
>60	04	3.38

Table 2 : Ligature materials used for hanging.

Ligature material used	Cases	Percentage
Saree	46	38.98
Dupatta	42	35.59

Rope	15	12.71
Dhothi	06	5.08
Others	09	7.62

Table 3 : Sex wise case distribution.

Sex	Cases	Percentage
Male	79	66.94
Female	39	33.05

Table 4 : External postmortem findings.

Postmortem finding	Number of cases
Salivary dribble marks	29 (24.57%)
Protrusion of tongue	37 (31.35%)
Purging of stools	18 (15.25%)
Nasal bleeding	05 (4.23%)
Postmortem staining over back surface	84 (71.18%)
Postmortem staining over lower limbs	34 (28.81%)
Seminal ejaculation	9 out of 79 (11.39%)
Menstruation	10 out of 39 (25.64%)

Table 5 : Characteristics of ligature mark.

Ligature mark	Number of cases
Typical	06 (5.08%)
Atypical	112 (94.91%)
Oblique direction	105 (88.98%)
Transverse direction	13 (11.01%)
Ligature mark above thyroid cartilage	109 (92.37%)
Ligature mark over thyroid cartilage	09 (7.62%)
Parchmentisation of skin	100 (100%)
Peri-ligature injuries	15 (12.71%)

RESULTS AND DISCUSSION

Deaths due to hanging constituted 31.97% of the total 369 cases that were brought to the mortuary for postmortem examination during the study period. Out of 118 cases of hanging, 79 were males (66.94%) and

39 were females (33.05%). The most vulnerable sex was male and the male to female ratio being 2.02:1. These were consistent with other authors ^(2,3,4). Male preponderance can probably be due to the fact that females have higher mental stability than males.

The highest incidence was in the age group of 21 to 30 years (38.13%), which is similar to the observations made by other authors ^(3,4,5), followed by 31 – 40 years (36.44%) and 41 – 50 years (11.01%). Ten cases were from juvenile tender age group below 18 years. The most vulnerable age group for hanging was observed as 21 to 40 years. This particular age group is the most stressful period as it is the time for oneself to settle in life like education, getting job, marriage, starting a business. Failure drives the individual to frustration and may decide to end life.

According to marital status in our study, 86 cases (72.88%) were married and 32 cases (27.11%) were unmarried. No deceased in divorced state found. These findings were consistent with other authors. ^(4,5,6)

Place of hanging was home in 91 cases (85.04%) of the total 107 cases which took place indoor. 11 cases (9.32%) of hanging occurred outdoor. Home was the preferred site of hanging because usually victims prefer any secluded place which will suit the purpose of committing suicide. Few authors are of the same opinion. ^(4,5,6)

Overall the most common ligature material used for hanging was saree (38.98%) and dupatta (35.59%). This is probably due to the ease of availability of these materials to the deceased persons at the time of hanging.

Typical hanging was observed in 5.08% cases and atypical hanging in 94.91% cases. Similar results were noted by authors. ^(3,5,6)

On external examination, salivary dribble marks seen in 29 cases (24.57%), protrusion of tongue was present in 37 cases (31.35%), purging of stools was present in 18 cases (15.25%), nasal bleeding noted in 4.23% cases. Postmortem staining over the back was noted in 84 cases (71.81%) and over the lower limbs in 34 cases (28.81%). Semen emission was present in 9 cases (11.39%) out of 79 males. Menstrual bleeding was seen in 10 cases (25.64%) out of 39 females. Similar observations were noted by authors. ^(3,4,6,7) The probable reason for protrusion of tongue could be that

the constricting force of the ligature caused upward pressure on the neck structure causing elevation of the tongue.

Salivary dribble marks is an important antemortem sign of hanging as stimulation of salivary glands by the ligature leads to secretion of saliva, which being a vital function cannot occur after death.

Direction of ligature mark was oblique in 105 cases (88.98%), whereas in 11.01% of cases, the ligature mark was running in a transverse manner. The similar patterns were observed in the studies conducted by other authors. ^(6,8,9)

In our study, it was observed that in 118 cases, the level of ligature mark was above the thyroid cartilage in 109 cases (97.37%) and overriding the thyroid cartilage in 9 cases (7.62%). This was also observed in various other authors' studies. ^(3,4,6,8,9)

Periligature injuries in the form of rope burns around the ligature were found in 15 cases (12.71%). These occur due to the friction produced by the tightening ligature material on the skin of the neck at the point of contact and these are of immense value in establishing the antemortem nature of hanging.

In our study, injuries to the soft tissue under the ligature mark were present in 16 (13.55%) cases, fracture of hyoid bone was present in 5 (4.23%) cases and fracture of thyroid cartilage was present in 1 (0.84%) case. Fracture of cricoid cartilage was not found in our study. Similar findings were observed in the studies conducted by other authors. ^(3,4,6,8,9) Neck structure fractures increases with age. There is significantly higher incidence of fractures in individuals aged 40 years or more, due to calcification and fragility of bony structures.

CONCLUSION

The number of deaths by hanging is increasing as it is considered as a painless death, non-expensive and ligature material is easily available. Hanging is always considered suicidal in nature until contrary is proved. High incidence of suicidal hanging in the middle age group, especially the males impose huge economic burden on the families of the victims. A well designed, comprehensive and targeted program to identify the major causative factors behind suicidal hanging and their appropriate preventive modalities is the need of

the hour.

Ethical Clearance – Obtained from Institutional ethics committee.

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Conflict of Interest – None

REFERENCES

1. P.C.Dikshit. Textbook of Forensic medicine and Toxicology. 2nd ed. New Delhi. Pawaninder P.Vij and Anupam Vij. 2014:297 – 303.
2. Bharathi Rama Rao, V Chand Basha, K Sudhakar Reddy. A study of ligature mark in deaths due to hanging in Warangal area, Andhra Pradesh. IJFM&T 2014; 8(2):85 – 88.
3. Pradeep kumar MV, Anand P Rayamane. Pattern of neck injuries in hanging deaths and its correlation with recent concepts and theories. J-SIMLA 2015; 7(1) : 20 – 25.
4. P.B.Waghmare, B.G.Chikhalkar, S.D.Nanandkar. Analysis of asphyxia deaths due to hanging. JIAFM 2014; 36(4) : 343 – 345.
5. Narendra kumar Vaishnawa, Shashank Sharma, M.P.Joshi, Jagdish Jugtawat, P.C.Vyas. Study of epidemiological profile of hanging in Jodhpur region of Rajasthan : An autopsy based study. JIAFM 2016; 38(3) : 306 – 312.
6. Bharath Kumar Guntheti, Sheik Khaja, Uday Pal singh. Profile and pattern of hanging cases at a tertiary care hospital, Khammam; Telangana. JIAFM 2016 ; 38(1) : 67 – 71.
7. Ashwini Narayan K, Bharathi Vaidyam. An autopsy study conducted at district hospital mortuary, MIMS, Mandya on violent asphyxia deaths. J-SIMLA 2016; 8(1) : 26 – 31.
8. Rajeev Sharma, Rajesh kumar, Neha Gupta, Manoj kumar Panigraha. A retrospective study of pattern of neck injuries in the cases of hanging. IJFM&T 2015 ; 9(2) : 160 – 162.
9. T.Saisudheer and T.V.Nagaraja, A study of ligature mark in cases of hanging deaths. Int J Pharm Biomed Sci 2012; 3(3) : 80 – 84.

Pattern and Outcomes of Head Injuries in Egypt: A Study of the Egyptian Revolution

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ABSTRACT

Like many other traumas, head injuries is a growing health problem and is attributed to deaths among the young and productive population. The intention of this study was to compare the difference in the pattern and outcome of head injuries between year 2010 versus 2011. A retrospective comparative study carried out based upon data collected from medical records of patient with head injuries admitted to emergency room, El-Demerdash , Ain Shams University Hospitals starting from January 2010 to December 2011. Socio-demographic, full history, clinical examination and criteria of severity were collected from the sheets for the study. During the study period, the total number of head injured cases received by EL-Demerdash hospital was 1020; 407 in 2010 and 613 in 2011. Due to in-completed sheets 206 of the head injured patients were discarded from the study, 72 in 2010 and 134 in 2011, out of the 134 cases 69 were head gunshots. So the actual numbers of cases subjected to this study were 335 cases in 2010 and 479 in 2011. The male percentage was higher than female in both years. In 2011, the mean age was 24.63 ± 19.19 . In 2010, Post -concussion state was in 82.4% of patients, while poly-trauma were present in only 17.6% and no cases of head gunshot were present. In 2011, poly-trauma were 53.03%, while post-concussion were present in 34.86% and head gunshots in 12.11% of cases. In 2010, fall 37.6% followed by motor car accidents (28.4%).

Keywords: Head Trauma, Brain Traumatic Injury, Post-Concussion, Head Gunshots, Egyptian Revolution, Accident.

INTRODUCTION

The most common cause of death and disability in the UK under 40 years was identified as head injuries. Most the cases of head injuries develop into complete recovery but others lead to disability or death both of which might be prevented by proper investigations and management.⁽¹⁾ Despite the fact that guns are prohibited in the Egyptian law, yet all types of assault were witnessed ⁽²⁾

Articles that describe head injuries among adults are still insufficient and may focus on one aspect rather than others. A lot of information exists about head injuries and its epidemiology but very little is specific to

Egypt especially during the Egyptian revolution 2011, so there is an increasing need for studying the pattern and outcome of head injuries especially in the period of revolution.⁽³⁾

AIM OF THE WORK

1-Portray the pattern of head injuries via a cross-sectional hospital-based study on patients presented to emergency room, El-Demerdash , Ain Shams University hospitals from January 2010 to December 2011.

2-To Evaluate and compare the difference in the pattern and outcome of head injuries between year 2010 versus 2011.

METHODOLOGY

This cross-sectional retrospective comparative study was performed based on data collected from medical records of head injured patients, admitted to El-

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Demerdash, Ain Shams University hospitals in duration of two years from the beginning of January 2010 to the end of December 2011.

Patients:

This study included head injured patients attending emergency room in El-Demerdash hospital. Approval of the director of El-Demerdash hospital was taken. The obtained data were documented and recorded in a special sheet constructed for each patient.

METHOD

The sheets obtained recorded the following data for each patient:

1-Sociodemographic Data:

- Age.
- Gender.
- Residence.
- Occupation.
- Level of education.

2-Full history including:

- Date of injury.
- Delay time between injury and medical consultation.

- Causative agents.
- Presenting symptoms.
- Mode of transportation.
- Manner of injury.
- Presence of underlying medical or psychiatric disease.

3- Clinical examination:

- General Examination.
- Local examination.

4- Criteria of severity: (according to hospital disposition):

- Duration of hospitalization.
- Causes and duration of admission to the ICU.
- Outcome (complete recovery- recovery with complications- death).

The obtained results were revised, coded and organized for statistical analysis. SPSS (Statistical package for Social Science) version 19 software was used. Data were presented and suitable analysis was done according to the type of data obtained for each parameter.

The results from statistical analysis were tabulated and presented in figures for interpretation and discussion.

FINDINGS

Table (1): Chi square test for comparison of the socio-demographic data of cases of head injuries arrived to El-Demerdash hospital during the year 2010 versus cases of head injuries arrived during the year 2011 (gender, residence, education, occupation).

		Year 2010 (N=335)		Year 2011 (N=479)		Chi Square test	P value
		N	%	N	%		
Gender	Female	104	31.0%	108	22.5%	7.39	0.01
	Male	231	69.0%	371	77.5%		
Residence	Cairo	328	98.5%	427	89.1%	29.80	<0.001
	Delta	5	1.5%	49	10.2%		
	Upper Egypt	0	0%	3	0.6%		
Education	Highly educated	38	13.4%	32	22.5%	18.28	<0.001
	Educated	117	41.2%	75	52.8%		
	Un-educated	129	45.4%	35	24.6%		
Occupation	Office Job	14	23.0%	34	37.4%	3.51	0.06
	Manual worker	47	77.0%	57	62.6%		

N: number, P value <0.05 = Significant, P value > 0.05 = Non-significant.

Table (2): Chi square test for comparison of the type of wound, causative instrument, leading cause of injury and manner of injury in cases of head injuries arrived to El-Demerdash hospital during the year 2010 versus cases of head injuries arrived during the year 2011.

		Year 2010 (N=335)		Year 2011 (N=479)		Chi Square test	P value
		N	%	N	%		
Type of injury	Post-concussion	276	82.4%	167	34.9%	186.67	<0.001
	Poly-traumatized	59	17.6%	254	53.0%		
	Head gunshots	0	0%	58	12.1%		
Causative instrument	Broad, blunt	332	99.1%	408	85.2%	49.14	<0.001
	Localized blunt	0	0%	17	3.5%		
	Sharp	3	0.9%	8	1.7%		
	Firearm	0	0%	45	9.4%		
	Electric shock	0	0%	1	0.2%		
Leading cause of head injury	Fall from height	73	21.8%	76	15.9%	72.14	<0.001
	Motor car accident	95	28.4%	159	33.2%		
	Direct trauma	14	4.2%	59	12.3%		
	Fall	126	37.6%	89	18.6%		
	Quarrel	27	8.1%	70	14.6%		
	Firearm	0	0%	24	5.0%		
	Animal attack	0	0%	2	0.4%		
Manner	Accidental	311	92.8%	374	78.1%	35.99	<0.001
	Homicidal	22	6.6%	102	21.3%		
	Suicidal	2	0.6%	3	0.6%		

N: number, P value <0.05 = Significant, P value > 0.05 = Non-significant.

Table (3): Chi square test for comparison of the complications following the injury and management in cases of head injuries arrived to El-Demerdash hospital during the year 2010 versus cases of head injuries arrived to El-Demerdash hospital during the year 2011.

		Year 2010 (N=335)		Year 2011 (N=479)		Chi Square test	P value
		N	%	N	%		
Complications	Negative	294	90.5%	369	77.0%	27.21	<0.001
	Hemorrhagic shock	1	0.3%	5	1.0%		
	Respiratory failure (ventilated)	3	0.9%	5	1.0%		
	Diffuse axonal injury	3	0.9%	5	1.0%		
	Rupture globe	0	0%	2	0.4%		
	Arrest	24	7.4%	93	19.4%		
Management	Conservative	319	95.2%	408	85.2%	20.84	<0.001
	Operative	16	4.8%	71	14.8%		

N: number, P value < 0.05 = Significant, P value > 0.05 = Non-significant.

Table (4): Chi square test for comparison of the outcome and permanent complications in cases of head injuries arrived to El-Demerdash hospital during the year 2010 versus cases of head injuries arrived to El-Demerdash hospital during the year 2011.

		Year 2010 (N=335)		Year 2011 (N=479)		Chi Square test	P value
		N	%	N	%		
Patient's outcome	Complete recovery	278	86.1%	351	73.3%	23.62	<0.001
	Complicated	21	6.5%	34	7.1%		
	Death	24	7.4%	94	19.6%		
Permanent complications	Scar	9	2.8%	11	2.3%	27.60	<0.001
	Motor, sensory loss	4	1.2%	13	2.7%		
	Epilepsy	2	0.6%	2	0.4%		
	Special sensory loss	4	1.2%	4	0.8%		
	Amnesia	2	0.6%	4	0.8%		
N: number, P value < 0.05 = Significant, P value > 0.05 =Non-significant.							

In the present study males predominate in both study years; 69%, 77.5% in 2010 and 2011 respectively.

According to the retrospective study of Gisladdottir et al. (2014), male victims constituted 67% of the sample. ⁽⁴⁾

Males showed and expected domination of the sample for many proposed reasons including the likelihood that they engage in high risk sports like boxing for example. They also tend to engage in street fights and aggressive behaviors far more than females as well as the fact that manual labor and jobs involving use of heavy equipment are usually occupied by males. ⁽⁵⁾

These results in this study highlighting residence of victims were in concordance with Halldorsson et al. (2007) where 409 cases were recorded from the Reykjavik area which is an urban area compared to 141 cases from the rural areas. ⁽⁶⁾

It may be inferred that cases of head injuries in urban areas are more likely receive diagnosis and treatment, while in rural areas there are relatively few recorded head injury cases. Also, the common outdoor working time, heavy traffics and overcrowding in urban and industrial areas increase the risk for accidents and violence. ⁽⁶⁾

However, Peek-Asa et al. (2004) concluded that head trauma was more common in rural rather than urban

areas and this is because rural highways are narrow and not well equipped for high speed or big traffic flow. Certain types of crashes, such as those involving farm machinery, are unique to rural environments. Rural residents wear seat belts and use safety child seats less than urban residents. It is also a fact that Rural traffic accidents result in more deaths than Urban accidents. This is probably attributed to the delay in seeking medical attention and delay in discovery ⁽⁷⁾.

In India a Retrospective, cross-sectional, hospital-based study was conducted where most patients resided in nearby rural areas. ⁽⁴⁾

An analysis of the Australian Institute of Health and Welfare National Hospital Morbidity Database showed that youth and young adults from rural areas had a three times greater rate of head injury than urban areas and a two and a half greater rate of injuries that were high threat to life. ⁽⁸⁾

Findings related to causative instruments coincides with the study of sethi et al. (2014) in which 64% of the injuries were caused by blunt objects. ⁽⁹⁾

The same was found in study of akber et al. (2016)⁽¹⁰⁾

In 2011 firearm was the cause of injury in 5% of the cases. In 2010 there wasn't any case of firearm injury and this can be due to the events which had happened in the revolution.

Firearm injuries were exclusively found in cases presented during 2011 and there wasn't any case in 2010. By analysis firearm related cases in relation to gender it was found that firearm injuries were found in 5.4% of male cases and in 3.7% of female cases in 2011. This may be due to the spread of firearm existence after the revolution.

This coincides with the study of Ahmed and Zaki (2013) during the year 2011. They noticed a significant rise in the percentage of homicidal injuries especially those caused from non-rifled weapons.⁽¹¹⁾

Similar to the current study, a study conducted in 2013; where the three leading causes responsible for head injuries were falls (42.17%), blunt force injuries (27.46%) and road traffic injuries (23.33%).⁽¹²⁾

In a study by Xu et al. (2015) 62% victims of motor accidents and 27% were victims of falls which is concomitant with the present study.⁽¹³⁾

In the present study accidental manner is the commonest in both years 92.8%, 78.1% in 2010 and 2011 respectively. There was increase in the homicidal manner in 2011. This may-be due to absence of security in the year 2011 after the revolution.

The same results were recorded in University Hospital for head injuries in the years 2000-2005 and 2008-2009. The manner of the injuries were accidental (80.5%) and homicidal (12.7%)⁽¹⁴⁾

On the contrary Kamp et al. (2011) conducted a study on 704 TBIs cases and they found that the major cause of trauma was due to assault (98.8%).⁽¹⁵⁾

In this study most of the injuries passed uncomplicated as in 2010, most of the cases showed no complications (90.5%) and 7.4% developed arrest after the head injury. In 2011, most of the cases showed no complications (77%) and 19.4% developed arrest after the head injury.

In the study of Yu et al. (2012), analysis of the trauma registry database was done and data collected at two trauma centers and from 698 patients included in the study 581 (83.2%) had no complications and recovered completely.⁽¹³⁾

The same in study of Smits et al. (2008) which was

a prospective study, a multi-center study of consecutive patients, 63% of the cases showed complete recovery without any complication.⁽¹⁶⁾

In the present study management was mainly conservative in both years, 95.2% in 2010 and 85.2% in 2011.

According to a prospective observational study of Chong et al. (2016) utilizing data from the trauma surveillance system from January 2011 to March 2015, only 5.5% of the head injured patients underwent neurosurgery.⁽¹⁷⁾

In the current study, in 2010, 86.1% of the cases recovered, 6.5% had complications and 7.4% died. In 2011, 73.3% of patients recovered, 7.1% had complications and 19.6% died. The commonest complication in 2010 was scar (2.8%) but in 2011 the commonest complication was motor and/or sensory loss (2.7%).

This can be explained by the fact that in 2011 there were many riots, that is why there was increase in mortalities in this year.

Most head injuries are non-life threatening and require no admission to the hospital and generally do not result in death.⁽⁹⁾

Head and neck trauma results in injuries from minor lacerations to life-threatening airway obstruction. Few studies provide analysis of injuries to the head and neck aiming to describe prevalence and investigate mortality. The majority of patients (97%) were discharged home. Mortality rate was less than 1%.⁽⁹⁾

CONCLUSION

Regarding filing and documentation of traumatic head injuries cases in El-Demerdash hospital, many important data were not available or improperly recorded (i.e. missed data). Time delay between occurrence of the injury and hospital admission, mean of transportation to the hospital, marital status and occupation of the victim were not available at all. Vital signs, site and type of injuries were not recorded in some files.

There was a discrepancy in prevalence and pattern of head injuries between the year 2010 and the year 2011 indicating a strong change in the violence pattern of Egyptian streets during the year of the revolution.

Conflict of Interest: Non declared

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Ethical Clearance: Taken from Ainshams Faculty of Medicine IRB committee

REFERENCES

1. Ro YS, Shin SD, Holmes JF, Song KJ, Park JO, Cho JS, et al. Comparison of clinical performance of cranial computed tomography rules in patients with minor head injury: a multicenter prospective study. *Acad Emerg Med*. 2011;18(6):597-604.
2. El-Bakary AA, Hamed SSh, Ismaeel HKH. Homicidal injuries during January and February, 2011 in Mansoura City, Egypt. *J Forensic Leg Med*. 2013;20(6):740-6.
3. Abdelaziz OS, Elwany MN, Abbassy MA, Mostafa MS. Profile of Road Traffic Accidents-related Head Injuries in Alexandria During the Egyptian Revolution 2011. *Neurosurgery Quarterly*. 2015;25(1):1-5.
4. Agrawal A, Galwankar S, Kapil V, Coronado V, Basavaraju SV, McGuire LC, et al. Epidemiology and clinical characteristics of traumatic brain injuries in a rural setting in Maharashtra, India. 2007-2009. *Int J Crit Illn Inj Sci*. 2012;2(3):167-71.
5. Al-Habib A, A-Shail A, Alaqeel A, Alqeel A, Zamakhshary M, Al-Bedah K, et al. Causes and patterns of adult traumatic head injuries in Saudi Arabia: implications for injury prevention. *Ann Saudi Med*. 2013;33(4):351-5.
6. Halldorsson JG, Flekkoy KM, Gudmundsson KR, Arnkelsson GB, Arnarson EO. Urban-rural differences in pediatric traumatic head injuries: A prospective nationwide study. *Neuropsychiatr Dis Treat*. 2007;3(6):935-41.
7. Peek-Asa C, Zwerling C, Stallones L. Acute traumatic injuries in rural populations. *Am J Public Health*. 2004;94(10):1689-93.
8. Harrison JE, Berry JG, Jamieson LM. Head and traumatic brain injuries among Australian youth and young adults, July 2000-June 2006. *Brain Inj*. 2012;26(7-8):996-1004.
9. Sethi RK, Kozin ED, Fagenholz PJ, Lee DJ, Shrimel MG, Gray ST. Epidemiological survey of head and neck injuries and trauma in the United States. *Otolaryngol Head Neck Surg*. 2014;151(5):776-84.
10. Akber EB, Alam MT, Rahman KM, Jahan I, Musa SA. Pattern of Head Injuries (Cranio-cerebral) due to Homicide in Association with Other Injuries: A Retrospective Post-mortem Study Autopsied at Dhaka Medical College Morgue House. *Mymensingh Med J*. 2016;25(2):296-302.
11. S. A. Forensic analysis of firearm ocular injuries. In: Zaki R, editor.
12. Ji C, Duan L, Wang L, Wu C, Wang Y, Er Y, et al. [Study on head injuries through data from the National Injury Surveillance System of China, 2013]. *Zhonghua Liu Xing Bing Xue Za Zhi*. 2015;36(4):360-3.
13. Yu AH, Cheng CH, Yeung JH, Poon WS, Ho H, Chang A, et al. Functional outcome after head injury: comparison of 12-45 year old male and female hormonally active patients. *Injury*. 2012;43(5):603-7.
14. Gisladdottir EH, Karason S, Sigvaldason K, Ulfarsson E, Mogensen B. [Visits to an emergency department due to head injuries]. *Laeknabladid*. 2014;100(6):331-5.
15. Kamp MA, Slotty P, Sarikaya-Seiwert S, Steiger HJ, Hänggi D. Traumatic brain injuries in illustrated literature: experience from a series of over 700 head injuries in the Asterix comic books. *Acta Neurochir (Wien)*. 2011;153(6):1351-5; discussion 5.
16. Smits M, Hunink MG, van Rijssel DA, Dekker HM, Vos PE, Kool DR, et al. Outcome after complicated minor head injury. *AJNR Am J Neuroradiol*. 2008;29(3):506-13.
17. Chong SL, Chew SY, Feng JX, Teo PY, Chin ST, Liu N, et al. A prospective surveillance of paediatric head injuries in Singapore: a dual-centre study. *BMJ Open*. 2016;6(2):e010618.

Profile of Fatal Road Traffic Accidents at Puducherry – An Autopsy based Study

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ABSTRACT

Road traffic accident (RTA) is the leading cause of mortality and disability all over the world. The scenario is much worse in India where there is high density of vehicles on the roads. This study highlights the profile of fatal road traffic accidents occurred in the Union Territory of Puducherry in the calendar years 2012 and 2013. Male fatalities outnumbered the female fatalities and age group between 21 and 30 years (28%) was most commonly affected. Majority of the fatal accidents occurred in national highways (36.5%) and occupants of two wheeler vehicles were more vulnerable (40.3%). Highest number of fatalities were reported during first 2 hours of accident (47.3%), and it was observed that head injuries were the dominant cause of death (41.9%).

Keywords: Road Traffic Accidents, Fatalities, Cause of death, Vehicles.

INTRODUCTION

Accident is an unplanned, unexpected event which causes harm, injury, damage or loss of lives. About 50 million people are injured and 1.2 million people die worldwide every year due to RTA.¹ Women or children walking, biking or riding to school or work, playing in the streets or setting out on long trips, will never return home, leaving behind shattered families and communities. Millions of people each year will spend long weeks in hospital after severe crashes and many will never be able to live, work or play as they used to do. Current efforts to address road safety are minimal

in comparison to this growing human suffering. The World Health Organization and the World Bank have jointly produced this World report on road traffic injury prevention. Its purpose is to present a comprehensive overview of what is known about the magnitude, risk factors and impact of road traffic injuries, and about ways to prevent and lessen the impact of road crashes. The document is the outcome of a collaborative effort by institutions and individuals. Over 100 experts, from all continents and different sectors - including transport, engineering, health, police, education and civil society - have worked to produce the report. Road traffic injuries are a growing public health issue, disproportionately affecting vulnerable groups of road users, including the poor. But road traffic crashes and injuries are preventable. Road traffic injury prevention must be incorporated into a broad range of activities, such as the development and management of road infrastructure, mobility planning, the provision of health and hospital services, child welfare services, and urban and environmental planning. The health sector

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is an important partner in this process. Its roles are to strengthen the evidence base, provide appropriate pre-hospital and hospital care and rehabilitation, conduct advocacy, and contribute to the implementation and evaluation of interventions. The time to act is now. Road safety is no accident. It requires strong political will and concerted, sustained efforts across a range of sectors. Acting now will save lives.

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The traffic accidents not only lead to morbidity and mortality but also pose an economic threat to family concerned and the nation. India has one of the largest road networks in the world with about 73 million motor vehicles on road.³ Every year more than a lakh people die due to this preventable non communicable ailment.⁴ The recent economic development and modernisation of India may aggravate the existing scenario. So an immediate preventive strategy is the need of the hour. Implementation strategy cannot be formulated without a detailed profile of accidents. But the irony is complete accident data is not available even in most developed countries like New Zealand and United Kingdom⁵. This study was conducted in Puducherry, a small township in southern India, with an aim to provide a strategic data for the policy makers to implement effective preventive and lifesaving measures against RTA.

MATERIALS AND METHOD

The present study was conducted in the department of Forensic Medicine, Indira Gandhi Government General hospital and Post-Graduate research institute (IGGGH & PGI), Puducherry in the calendar year 2012 and 2013. All the autopsy cases in which fatality was due to RTA were included in this study. The information regarding the deceased and details of the accident from the time of occurrence till the death of the deceased were gathered from police, inquest report, deceased family members, witness present at the time of accidents and hospital records. The site of fatal injuries over the body and cause of death was determined based on autopsy findings.

OBSERVATIONS AND RESULTS

Out of 2878 autopsies conducted during the calendar year 2012 and 2013, 575 died due to fatal RTA. In the present study 487 cases were males and 88 cases were females. Males outnumbered females in all age groups with maximum gender ratio (10.9:1) in 31-40 years age group. There is a swift increase in fatalities up to 21-30 years age group and declines gradually thereafter. Maximum fatalities were noticed in the 21-30 years age group (28%). The least number of fatalities was in 0-10 year group (2.6%) followed by above 70 years group (4.7%). Age-gender trends of RTA fatalities are depicted in Figure I. About 75% of victims belonged to rural region (75.7%) followed by semi urban region (16.5%). Out of 575 fatalities 340 were married and 213 were unmarried and most victims are Hindus (Table I).

Majority of RTAs were occurred on national highways (36.5%) and state highways (21.9%), and on roads connecting to highways (23.5%). Fatalities were maximum among road users of two-wheelers occupants (40.3%) and pedestrians (32%). Two wheelers were most common offending vehicles due to which 46.3% fatalities occurred. The second most common offending vehicles in our study was heavy non-transport vehicles (18.6%) shadowed by heavy transport vehicles (15%) and light transport vehicles (12.3%) (Table II). RTA fatalities are highest in the month of September (11.8%) compared to next higher number in April (11.5%) and October (10.8%). Since month of April and September recorded high incidence of RTA a biphasic pattern was obtained (Figure II). About 35 % of RTA fatalities occurred in weekends and maximum on Saturdays

(18.1%). In the weekdays more road traffic fatalities occurred on Mondays (15.3%) and the least on Fridays (10%) (Figure III). Maximum of fatalities occurred between 3pm and 6pm (23%) followed by 9am to 12pm (21.4%) and between 6pm and 9pm (18.8%). About 272 cases died within 2 hours of accident, of which 103 cases died on spot and 45 cases died during transportation. 90 cases died within 3 to 6 hours of the accident. In the present study the fatalities gradually decreased as the survival period increased.(Table II)

In the present study the most common site of injury is head and face (40.5%) followed by injury to multiple regions of the body (35.5%)(Figure IV) and most of the fatalities are due to head injuries (41.9%) followed by haemorrhagic shock (18.6%)(Table III)

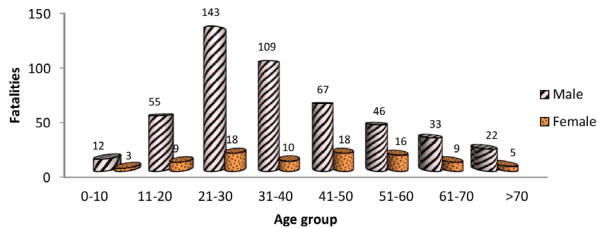


Figure I: Age-gender wise distribution of fatalities.

Table I: Distribution of demographic characters in RTA victims

Demographic Characters	Trait	Number & Percentage
Gender	Male	487(84.8%)
	Female	88(15.3%)
Residence	Rural	435 (75.7%)
	Semi-urban	95 (16.5%)
	Urban	41 (7.1%)
	Not known	04 (0.7%)
Marital status	Married	340 (59.1%)
	Unmarried	213 (37.0%)
	Widow / divorced	22 (3.8%)
	Not known	10 (1.7%)
Religion	Hindu	497 (86.4%)
	Muslim	40 (6.9%)
	Christian	34 (5.9%)
	Others	05 (0.9%)

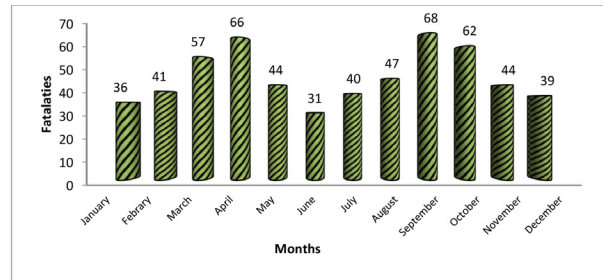


Figure II: Month-wise distribution of fatalities

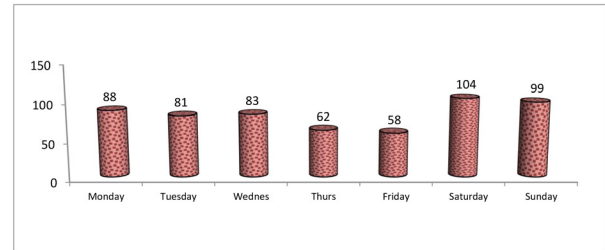


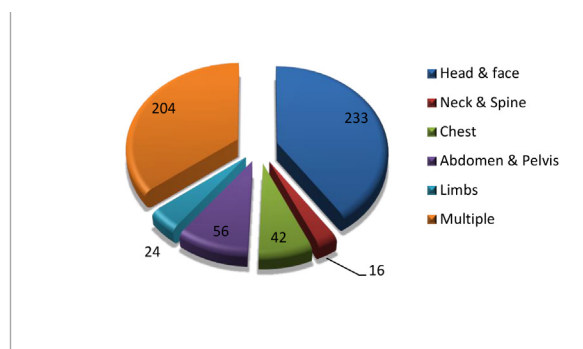
Figure III: Distribution of fatalities in different days of the week

Table II: Distribution of epidemiological characters in RTA fatalities

Epidemiological characters	Trait	Number and percentage
Roads involved	National highway	210 (36.5%)
	State highway	126 (21.9%)
	Connecting roads	135 (23.5%)
	Village highway	104 (18.1%)
Road users	Two-wheeler	232 (40.3%)
	Three-wheeler	21 (3.6%)
	Light motor vehicle	37 (6.4%)
	Heavy non-transport vehicle	48 (8.3%)
	Heavy transport vehicle	42 (7.3%)
	Pedestrians	184 (32.0%)
	Others	11(1.9)
Offending vehicles	Two wheelers	266 (46.3%)
	Three wheelers	32 (5.6%)
	Four wheelers	71 (12.3%)
	Heavy non-transport vehicle	107 (18.6%)
	Heavy transport vehicle	86 (15.0%)
	Others	13 (2.3%)
Time of occurrence	12AM -6AM	30 (5.2%)

Cont... Table II: Distribution of epidemiological characters in RTA fatalities

	6AM -9AM	74 (12.9%)
	9AM -12PM	123 (21.3%)
	12PM -3PM	59 (10.2%)
	3PM -6PM	132 (22.9%)
	6PM -9PM	108 (18.8%)
	9PM -12AM	49 (8.5%)
Survival period	0-2hour	272 (47.3%)
	3- 6hour	90 (15.7%)
	7-12hour	58 (10.1%)
	13-24hour	39 (6.8%)
	2-6days	52 (9.0%)
	7-30days	41 (7.1%)
	>30 days	23 (4.0%)
Cause of death	Haemorrhage & shock	107 (18.6%)
	Head injuries	241 (41.9%)
	Spinal injuries	16 (2.8%)
	Chest injuries	40 (6.9%)
	Abdomen-pelvic injuries	33 (5.7%)
	Polytrauma	103 (17.9%)
	Sepsis	35 (6.1%)

**Figure IV: Distribution of fatalities with regional site of fatal injury**

DISCUSSION

RTA fatalities constituted nearly 20 percentage of total unnatural deaths in the present study which is much lower compared with studies conducted in Chandigarh(50.3%)⁶, Rohtak (29%).⁷ Male fatalities (84.7%) outnumbered females (15.3%) in all age groups with a gender ratio of 5.5:1 and this finding is in comparable with many studies conducted in India^{8,9,10} the Injury Severity Score (ISS) and abroad¹¹ except for a study conducted in Norway¹² 1446 violent deaths were examined--82.6% males and 17.4% females. The

mean age was 40.2 years (range 0-98 where the females outnumbered male fatalities. The discrepancy in gender might be because males contribute a greater share of family's economy and have to travel more compared with females.

Persons in 3rd decade of life are more prone for fatal accidents according to the present study which is similar to many other studies^{8,9,10} the Injury Severity Score (ISS).¹³ People belonging to this age group have a compulsion to travel for education, employment and for recreation purposes.⁸

The accidents were minimum when the age was less than 20 years and greater than 50 years which is similar to a study conducted by Jha et al⁸, Sharm et al⁹ and Rautji et al¹⁰ the Injury Severity Score (ISS). The reason being the younger and the older age groups were under supervision of the elders and use vehicles less frequently respectively.⁸

Most of the fatalities occurred in rural area followed by semi urban which is comparable to various studies conducted.¹⁴ sex, area of residence, etc. These deaths constituted 9.4% of total road accident deaths reported at this hospital. Out of a total of 709 RTA deaths in children, about 16% were reported in the block year of 1974\201378 and this proportion decreased to 9.4% during the block year of 1984\201388 and has remained almost constant since then. The maximum number of victims belonged to the states of Haryana (36%)¹⁵ The rural dominance might be because of inadequate knowledge about traffic rules, poorly maintained roads, lack of emergency care services and decrease protective gears while riding vehicles.¹⁶

Fatal RTA occurred more commonly in national highways (36.5%) followed by state highways 21.9 % which is similar to a study conducted in Rohtak, Haryana⁷. This is because of vulnerability of local population living besides highway which harbours a vital inter and intra state traffic.¹⁷

According to the present study the most common offending vehicles are two wheelers (46.3%) followed by heavy non-transport motor vehicle (18.6%), but in a study conducted at Delhi the most common offending vehicle was bus (25.5%)¹⁰ the Injury Severity Score (ISS). Two wheeler occupants fatalities contributed a major share of total fatalities (40.3%) which is comparable to many other studies.¹⁰ the Injury Severity

Score (ISS)¹⁶ These results vary with the results of Jha et al where the pedestrian fatalities top the list⁸. The incidence is high because the number of motorcycle is five times as numerous as compared with cars³ and the traveling in two wheelers is an affordable means of transport. Furthermore the helmet wearing laws are not strictly enforced.

In the current study about 46 % of fatalities occurred within 2 hours of accident and 79 % of fatalities occurred within 24 hours of accident and the finding is consistent with the findings of Rautji et al¹⁰ the Injury Severity Score (ISS and Chandra et al¹⁸. But the incidence is slightly higher compared study by Sharma et al.

Month of September (11.8%) recorded highest fatalities whereas a study by Jha et al had highest number of accidents in the of January⁸. This may be attributed to the monsoon season prevailing during this month where road become wet and slippery.

Maximum fatalities occurred during 3pm-6pm (23%) followed by 9am-12pm (21.4%) and the findings are comparable with the other studies conducted at Pondicherry. On the contrary studies conducted at Chandigarh had more fatalities between 4pm to 8pm and according to National crime records bureau most of the accident fatalities in India occurred between 6pm and 9pm⁴. This could be because in these hours people use the road to go and return from work places, offices, factories, business place, and drop & pick-up their children from schools.

In the present study weekends contributed to about one-third of total fatalities compared with weekdays. Saturday has highest number of accidents similar to a study conducted in Delhi¹³. The possible explanation is people use the road more frequently on Saturdays for shopping, recreation and for household purposes. Furthermore Pondicherry is also a tourist place which attracts tourists from the surrounding regions leading to increased traffic in the weekends.

The most common region involved in fatal accidents is head and face and this finding is congruent with the study conducted in a study conducted at Delhi,¹⁰ the Injury Severity Score (ISS Chandigarh¹⁶ and Haryana⁷.

According to Rautji et al¹⁰ the Injury Severity Score (ISS the most common cause of death in RTA is head

injuries followed by haemorrhage shock. In the present study a similar pattern was observed. Also head injuries were the leading cause of death in studies conducted at various regions in india^{7,16}. The head injuries may be due to the vulnerability of head to injuries and reduced use of helmets among the local population.

CONCLUSION AND RECOMMENDATIONS

RTA is the leading cause of death in 15-29 years age group in the world. About a lakh people are killed every year because of this non-communicable ailment. The recent economic development in India may accelerate the deaths due to road accidents. So an immediate and effective strategy is the need of the hour.

Recommendations from the authors based on the pattern of RTA-

Except for a short stretch, most of the roads in Pondicherry lack median dividers. Installing such dividers may segregate the vehicles moving in opposite directions.

Strict helmet wearing practice should be imposed as head injuries and two wheelers occupants contribute a greater share of accident fatalities.

Sidewalks for pedestrians shall be constructed in every road.

Educating the public regarding traffic rules, accident scenarios shall be done periodically.

Most of the accident fatalities die within 2 hours of incident, so mobile units such as ambulance equipped with lifesaving equipment shall be stationed at accident prone locations.

Expert committees shall be formed to prevent and review the accident status in Pondicherry.

Ethical Clearance: Taken from the Institutional Ethical Committee

Source of Funding: Self

Conflict of Interest: None

REFERENCES

1. Peden M, Scurfield R, Sleet D et al. World report on road traffic injury prevention. Geneva: World Health Organization, 2004. www.who.int/world-

- health-day/2004/infomaterials/world_report/en/summary_en_rev.pdf (accessed 5 March, 2010).
2. Global status report on road safety 2013-Supporting a decade of action. WHO 2013. http://www.who.int/violence_injury_prevention/road_safety_status/2013/en/index.html (accessed Feb 2013)
3. Mohan D, Tsimhoni O, Michael S et al. Road safety in India: Challenges and Opportunities. <http://deepblue.lib.umich.edu/bitstream/handle/2027.42/61504/102019.pdf?sequence=1> (accessed 3 Aug 2015)
4. Accidental deaths and suicide deaths in India 2010: National Crime Records Bureau Ministry of Home Affairs. <http://ncrb.nic.in/ADSI2010/ADSI2010-full-report.pdf> (accessed 1 Dec 2012)
5. Ameratunga S, Hajar M, Norton R. Road-traffic injuries: Confronting disparities to address a global health problem. *Lancet* 2006;367(9521):1533-40
6. Singh D, Dewan I, Pandey AN et al. Spectrum of unnatural fatalities in the Chandigarh zone of north-west India – a 25-year autopsy study from a tertiary care hospital. *J Clin Forensic Med* 2003;10:145–52
7. Singh H, Dhatarwal SK. Pattern and distribution of injuries in fatal road traffic accidents in Rohtak (Haryana). *J Indian Acad Forensic Med* 2004;26:20–3
8. Jha N, Srinivasa DK, Roy G et al. Epidemiological study of road traffic accidents cases: A study from south India. *Indian Journal of Community Medicine*. 2004; 24(1):20–4.
9. Sharma D, Singh US, Mukherjee S. A study on road traffic accidents in Anand-Gujarat. *Health line*. 2011;2(2):12–5
10. Rautji R, Bhardwaj D N, Dogra T D. The Abbreviated Injury Scale and its Correlation with Preventable Traumatic Accidental Deaths: A study from South Delhi. *Med Sci Law* 2006;46:157-65
11. Jha N, Agrawal CS. Epidemiological Study of Road Traffic Accident Cases : A Study from Eastern Nepal. *Reg Heal Forum*. 2004;8(1):15–22.
12. Nordrum I, Eideo T, Jorgensen L. Medicolegal autopsies of violent deaths in northern Norway 1972–1992. *Forensic Sci Int*. 1998;92:39–48.
13. Mehta SP. An epidemiological study of road traffic accident cases admitted in Safdarjang Hospital, New Delhi. *Indian Journal of Medical Research* 1968; 56(4): 456-66.
14. Singh D, Singh SP, Kumaran M, Goel S. Epidemiology of road traffic accident deaths in children in Chandigarh zone of North West India. *Egypt J Forensic Sci*. 2015;:4–10
15. Kanchan T, Menezes RG, Bakkannavar SM. Age and gender variations in trend of road traffic fatalities. *Med Sci Law* 2010;50:192-6
16. Singh D, Moorthi K, Singh SP, Goel S. Profile of Road Traffic Fatalities in Adults- A 40 Year Study in Chandigarh Zone of North West India. *J Indian Acad Forensic Med* 2014;36:47-51
17. The global impact - Chapter 2. World report on road traffic injury prevention. http://www.who.int/violence_injury_prevention/publications/road_traffic/world_report/chapter2.pdf (accessed 12 Dec 2012)
18. Chandra J, Dogra TD, Dikshit PC. Pattern of cranio-intracranial injuries in fatal vehicular accidents in Delhi, 1966--76. *Med Sci Law*. 1979;19(3):186–94.

Study on Prevailing Factors of Domestic Violence Deaths in and around Guntur City, Andhra Pradesh

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ABSTRACT

Domestic violence in India is endemic and widespread predominantly against women. Around 70% of women in India are victims to domestic violence according to ministry for women and child development. World Health Organization (WHO) defines violence as the intentional use of physical force or power, threatened or actual, against a group or community, which either results in or has a high likelihood of resulting in injury, death, psychological harm, mal development, or deprivation. Violence, in general is prevalent all over the world. No group, sex, caste, religion, region, race etc. is exception to this violence. Irrespective of the cause of violence, it finally leads to disease, disability, infirmity or death of the individual. Most of the victims of violence are women.

Keywords: Domestic violence, women, intentional, injury.

INTRODUCTION

Humans are described as social animals capable of showing sympathy with other beings, and living life with values and ethics. There are various species in the universe; among these humans are highly evolved species. We are in the form of society. Basic unit of the society is Family. Family is the peaceful resting place for all family members which have inherent centripetal force acting on the members of the family. The house should have an ideal civil masonry structure and the people residing in it should have sentimental, emotional and social adjustment mutually and adjustment with each other, like mutually taking care of small children and elderly and indirectly preventing any type of domestic violence.

World Health Organization (WHO) defines violence as the intentional use of physical force or power,

threatened or actual, against a group or community, which either results in or has a high likelihood of resulting in injury, death, psychological harm, maldevelopment, or deprivation.¹ It further divides the general definition of violence into three sub-types according to the victim-perpetrator relationship i.e. Self-directed violence, Interpersonal violence nad Collective violence.

Domestic violence is considered to have occurred when one intimate partner uses physical violence, coercion, threats, intimidation, isolation, and/or emotional, sexual, and economic abuses over the other intimate partner to maintain power and control.² According to the Merriam-Webster dictionary definition, domestic violence is: “the inflicting of physical injury by one family or household member or another; also a repeated/habitual pattern of such behavior.”³

According to NCRB (National Crime Records Bureau) the total number of domestic violence cases registered are 89,646 in the year 2007 including 8,093 deaths, 95,071 cases in the year 2008 including 8,172 deaths, 1,03,579 cases in the year 2009 including 8,383 deaths, 1,07,614 cases in the year 2010 including 8,391 deaths, 1,14,372 cases in the year 2011 including 8,618 deaths. 1, 23,798 cases in the year 2012 including

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8233 deaths.⁴

According to DCRB (District Crime Records Bureau), Guntur, the total number of domestic violence cases registered was 491 in the year 2010 including 35 deaths, 550 cases in the year 2011 including 56 deaths, 597 cases in the year 2012 including 66 deaths.⁵ It emphasizes the requirement of the present study.

Some facts about domestic violence are

Around the world, at least one in every three women has been beaten, coerced into sex or otherwise abused during her lifetime. Most often, the abuser is a member of her own family.

Domestic violence is the leading cause of injury to women—more than traffic accidents.

Studies suggest that up to 10 million children witness some form of domestic violence annually.

Nearly 1 in 5 teenage girls who have been in a relationship said a boyfriend threatened violence or self-harm if presented with a breakup.

MATERIALS AND METHOD

This study has been carried out in the year 2012, after from the ethical committee of Guntur Medical College/ General Hospital.

The present study was conducted in the Department of Forensic Medicine, Guntur Medical College, Guntur from January 2012 to December 2012 i.e., 12 months, total postmortem cases were 1448. An attempt was made to work on cases with history of domestic violence that came to our department i.e., 51 cases out of 1448 cases. The statistics of these cases were analyzed with available data in our department, crime scene visits and by psychological autopsy.

The records maintained for each case in this department are post mortem requisition given by Investigating Officer in their inquests, treatment records from hospital if treated, history from blood relatives and friends, observation of the circumstances at the scene by visiting the scene of offence, photographs taken from the scene of offence and findings in the Post mortem Examination certificates. In cases of deaths due to poisoning, chemical analysis reports from the Forensic Science Laboratory were taken into consideration.

The materials used are inquest Reports, inpatient Case sheets, perusal of police papers, data from district crime records bureau (DCRB), Guntur, Records from Medical Record Section of Guntur General Hospital, Post mortem Reports of all cases, Information collected from the Investigation Officer, Relatives and friends of the deceased accompanying dead bodies.

The factors taken to enumerate the study are, prevalence of deaths in comparison with rural and urban areas, prevalence of cases in different family types, marital period of women in domestic violence deaths, cases associated with the socio-economic status of the deceased, prevalence of deaths in relation to literacy and different causes of violence.

OBSERVATIONS AND RESULTS

Violence, in general is prevalent all over the world. No group, sex, caste, religion, region, race etc. is exception to this violence. Irrespective of the cause of violence, it finally leads to disease, disability, infirmity or death of the individual. Most of the victims of violence are women.

In the present study, an attempt was made to analyze the scenario of domestic violence deaths in and around Guntur during the period January 2012 to December 2012.

In this study from Table No. 1 it can be concluded that incidence of deaths due to domestic violence is more or less equal in Urban and Rural areas i.e., 29 cases (56.8%) and 22 cases (43.1%) respectively. The incidence of deaths in Urban and Rural areas may be due to traditional cultures like male dominations, demand for dowry or demand for extra money and low socio-economic status.

In this study on perusal of Table No. 2, the deaths are more in nuclear families i.e., 35 cases (68.6%), followed by Joint families i.e., 15 cases (29.4%). But very low no. of cases were seen in the women who are living alone i.e., one case (1.9%).

Table No. 3 shows that, out of 51 deaths, 42 cases are female deaths. Out of which 4 cases (7.8%) are involved in less than 1 year of marital life, 8 cases (15.6%) in 1 – 3 years of marital life, 13 cases (25.4%) in 3 – 7 years of marital life and 17 cases (33.3%) in >7 years of marital life. More no. of cases i.e., 25 deaths (48.8%) occurred

within 7 years of marriage.

In this study on perusal of Table No. 4, the incidence of domestic violence deaths is more or less same in lower and middle socio-economic group i.e., 27 (52.9%) and 24 (47%) respectively. No case was recorded either in the upper middle class or the upper socio-economic group. The high incidence in the Lower socio-economic group is mainly due to economic crisis, alcoholism and traditional cultures like male dominance, dowry related complications etc.

Table No. 5 indicates more number of cases i.e., 33 cases (64.7%) are moderately literate persons followed by illiterate persons i.e., 18 cases (35.2%). No cases were recorded in my study in the Literate persons. The incidence of these cases in illiterate and moderately literate persons is mainly due to lack of awareness of the legislative measures, and the gender inequality that is prevalent in the Indian society.

Table No. 6 indicates, the common cause of violence is Alcohol consumption followed by Violence i.e., 14 cases (27.4%). The next common causes of violence are Harassment by husband and relatives includes 13 cases (25.4%), dowry related issues includes 10 cases (19.6%), extra marital affairs includes 6 cases (11.7%) and others include 8 cases (15.6%). A combination of alcohol consumption followed by Violence, Harassment by husband and relatives, dowry related issues and extra marital affairs constitute 43 cases (84.1%) of the cases, which indicate that male dominance is the underlying factor.

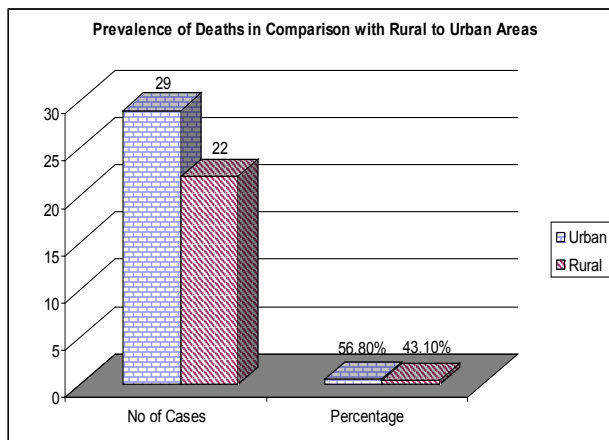


Figure 1

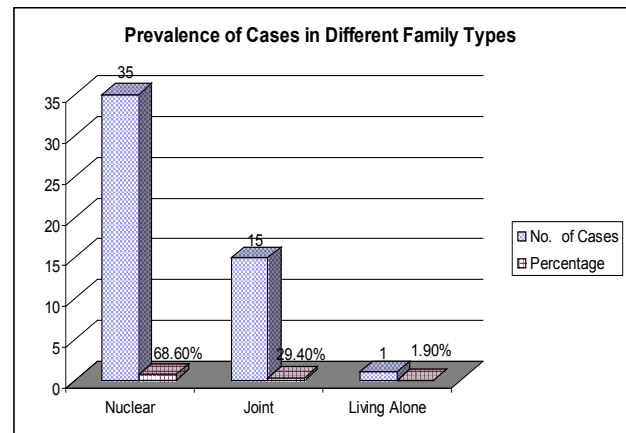


Figure 2

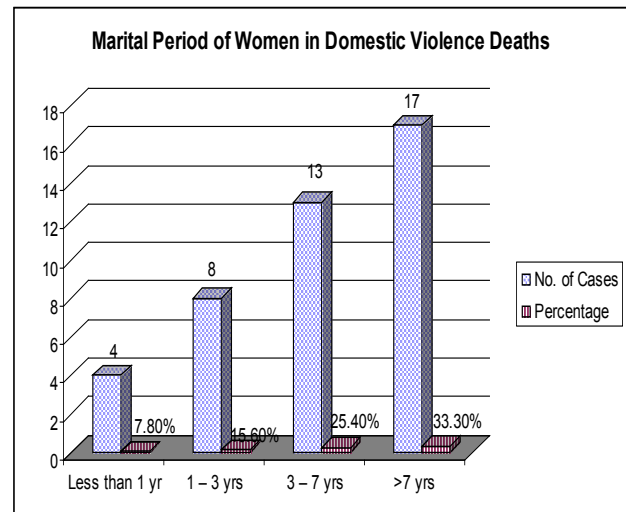


Figure 3

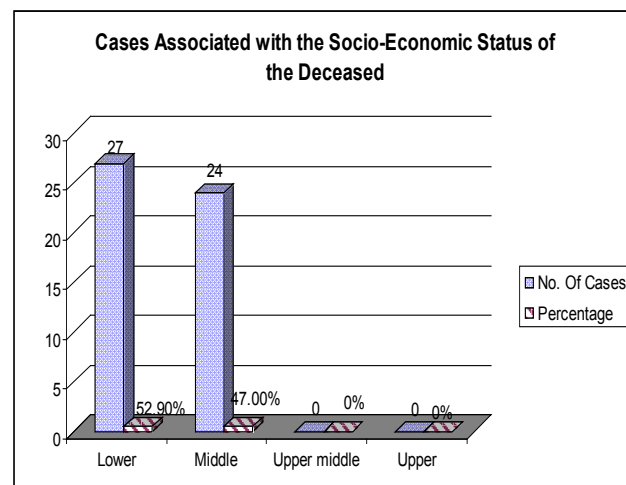


Figure 4

Table 1: Prevalence of Deaths in Relation to Literacy

Educational Status	No. Of cases	Percentage
Illiterate	18	35.2 %
Moderately Literate	33	64.7 %
Literate	0	0.0 %

Table 2: Different Causes of Violence

Cause of Violence	No. Of Cases	Percentage
Dowry Related	10	19.6 %
Harassment by husband and relatives.	13	25.4 %
Alcohol consumption followed by Violence	14	27.4 %
Extra marital affair	06	11.7 %
Others	08	15.6 %

DISCUSSION

Violence, in general is prevalent all over the world. No group, sex, caste, religion, region, race etc. is exception to this violence. Irrespective of the cause of violence, it finally leads to disease, disability, infirmity or death of the individual. Most of the victims of violence are women.

In this study from Table No. 1 it can be concluded that incidence of deaths due to domestic violence is more or less equal in Urban and Rural areas i.e., 29 cases (56.8%) and 22 cases (43.1%) respectively. The incidence of deaths in Urban and Rural areas may be due to traditional cultures like male dominations, demand for dowry or demand for extra money and low socio-economic status. In a 2000 multi-site household survey conducted in India, it was found that while overall approximately 50% of women surveyed had experienced some form of domestic violence throughout their married life, the rates varied significantly by specific location as well as overall region. In rural areas and urban slums, that rate was approximately 55%, whereas in urban non-slum areas the rate was less than 40%.⁶

In this study on perusal of Table No. 2, the deaths are more in nuclear families i.e., 35 cases (68.6%),

followed by Joint families i.e., 15 cases (29.4%). But very low no. of cases were seen in the women who are living alone i.e., one case (1.9%). Biggs et al.⁷ (2009) report that 51% of abuse incidents are committed by a partner or spouse, 49% by another family member, 13% by a care worker, and 5% by a close friend or neighbor. The effect of analyzing the problem in this fashion means that abuse is viewed as a family problem and is not a social concern.

Table No. 3 shows that, out of 51 deaths, 42 cases are female deaths. Out of which 4 cases (7.8%) are involved in less than 1 year of marital life, 8 cases (15.6%) in 1 – 3 years of marital life, 13 cases (25.4%) in 3 – 7 years of marital life and 17 cases (33.3%) in >7 years of marital life. More no. of cases i.e., 25 deaths (48.8%) occurred within 7 years of marriage.¹⁵

In this study on perusal of Table No. 4, the incidence of domestic violence deaths is more or less same in lower and middle socio-economic group i.e., 27 (52.9%) and 24 (47%) respectively. No case was recorded either in the upper middle class or the upper socio-economic group. The high incidence in the Lower socio-economic group is mainly due to economic crisis, alcoholism and traditional cultures like male dominance, dowry related complications etc.

A 1998 study conducted by Bina Agarwal found that while only 13% of all women in India with landowning fathers inherited that land as daughters, 24% of such women were able to do so in the state of Kerala. This is important because it has been shown that measures to improve such access to property and economic independence through channels such as education not only directly improve women's wellbeing and capabilities, but also reduce their risk of exposure to marital or any sort of domestic violence.⁸ According to a study made by Michael Koenig about the determinants of domestic violence in India published by the American Journal of Public Health in 2006, higher socioeconomic status tends to be protective against physical but not sexual violence.⁹

Table No. 5 indicates more number of cases i.e., 33 cases (64.7%) are moderately literate persons followed by illiterate persons i.e., 18 cases (35.2%). No cases were recorded in my study in the Literate persons. The incidence of these cases in illiterate and moderately literate persons is mainly due to lack of awareness of

the legislative measures, and the gender inequality that is prevalent in the Indian society.¹¹ Women who are educated are less likely than those who are not to return to an abusive partner. It was hypothesized that higher education can contribute to the presence of social networks (Schutte, Malouff, & Doyle, 1988).¹⁰

Table No. 6 indicates, the common cause of violence is Alcohol consumption followed by Violence i.e., 14 cases (27.4%). The next common causes of violence are Harassment by husband and relatives includes 13 cases (25.4%), dowry related issues includes 10 cases (19.6%), extra marital affairs includes 6 cases (11.7%) and others include 8 cases (15.6%). A combination of Alcohol consumption followed by Violence, Harassment by husband and relatives, dowry related issues and extra marital affairs constitute 43 cases (84.1%) of the cases, which indicate that male dominance is the underlying factor. Devi¹³(2005) states that domestic violence against women is a global phenomenon. The domestic violence may take the form of wife battering, demand for more dowry, divorce, bride burning, psychological torture, petty quarrels, neglected attention and so on. The increased economic insecurity, unemployment, poverty alcoholism, lack of mutually satisfying relationship and lack of a sense of belonging are the reasons for the increased domestic violence.¹²

Devi and Prema¹⁶(2005) explain that the main cause of domestic violence against women are unequal power relations gender discrimination, patriarchy, economic dependence of women, dowry, low moral values, negative portrayal of women's images in media, no participation in decision-making, gender stereotypes and a negative mindset. There are various manifestations of violence, which includes beating, mental torture, forced pregnancy, female infanticide, rape, denial of basic necessities and battering. The worst form of violence is dowry murder.¹⁴

CONCLUSION

The Indian society is build up with the relationship between the human beings among the families and it is often associated with love, support and bonding among members. Though these characteristics are often present, it has become evident through recent researches that the home is also frequently the site of violent human relationships.

By comparing the data of the present study of 2012 with that of the previous studies, the incidence of domestic violence cases are gradually increasing in number day by day.

- Females were predominantly affected than the males.
- The vulnerable age group was 11– 40 years as compared to other age group.
- Married women were most predominantly affected than the unmarried women.
- Most of the female deaths occurred within 7 years of marriage.
- Prevalence of death is more common in urban areas compared to rural areas.
- Prevalence of domestic violence cases is most common in nuclear families than the joint families.
- Low socio-economic people are more affected than other socio-economic people.
- Our study showed a greater percentage of domestic violence cases in the moderately literate group of people compared to the illiterate group.
- The victim was mostly harassed by both the spouse and in-laws compared to others.
- Alcohol consumption played prime role in domestic violence deaths followed by dowry harassment and extramarital affair.

Ethical Clearance: This study has been carried out in the year 2012, after from the ethical committee of Guntur Medical College/ General Hospital.

Source of Funding: Self

Conflict of Interest: Nil

REFERENCES

1. Krug et al., "World report on violence and health", World Health Organization, 2002.
2. Nageshkumar G Rao – Textbook of Forensic Medicine and Toxicology, 2nd edition, 2010, 338.
3. Merriam Webster, Domestic Violence. Retrieved 14 Nov. 2011.
4. National crime records bureau (NCRB) – statistics, 2012.

5. District crime records bureau (DCRB) Guntur, AP.—statistics,2012.
6. International Centre for Research on Women. Domestic Violence in India. International Centre for Research on Women and The Centre for Development and Population Activities, 2000. 18 Mar. 2013.
7. Biggs, S., Manthorpe, J., Tinker, A., Doyle, M. and Erens, B. “Mistreatment of Older People in the United Kingdom: Findings from the First National Prevalence Study”. *Journal of Elder Abuse and Neglect*, 2009, 21, 1-14
8. Martin, Sandra; Amy Tsui, KuhuMaitra, and Ruth Marinshaw (1999). “Domestic Violence in Northern India”. *American Journal of Epidemiology*: 150.
9. Koenig, Michael. “Individual and Contextual Determinants of Domestic Violence in North India.” *American Journal of Public Health* (2006). 18 Mar. 2013.
10. Schutte, N.S., Malouff, J.M., Doyle, J.S. (1988). The relationship between characteristics of the victim, persuasive techniques of the batterer, and returning to a battering relationship. *Journal of Social Psychology*, 128(5), 605-610.
11. Gordon, J.S. (1996). Community services for abused women: A review of perceived usefulness and efficacy. *Journal of Family Violence*, 11(4),315-329.
12. Levendosky, A.A., Bogat, G.A., Theran, S.A., Trotter, J.S., von Eye, A., & Davidson, W.S. II. (2004). The social networks of women experiencing domestic violence. *American journal of Community Psychology*, 34(1-2), 95-109.
13. Devi, Kamala and PremaPandey (2005) “Combating Violence Against Women: Some Initiatives”, *Women’s Link*, Vol.12, No.3, July-September.
14. Roberts, Gwenneth. “The Impact of Domestic Violence on Women’s Mental Health.” *Australian and New Zealand Journal of Public Health* 22 (1998). 17 Mar. 2013.
15. Ackerson, Leland, and S. Subramanian. “Domestic Violence and Chronic Malnutrition among Women and Children in India.” *American Journal of Epidemiology* 167 (2008). 17 Mar. 2013.
16. Devi, Kamala and PremaPandey (2005) “Combating Violence Against Women: Some Initiatives”, *Women’s Link*, Vol.12, No.3, July-September

A Study of Homicide in Nagpur with Respect to Method Adopted for Homicide

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ABSTRACT

Homicide is one of the heinous crimes against humanity and society, and it is as old as our civilization or history of humanity. The present study was carried out in the Department of Forensic Medicine, Govt. Medical College & Hospital Nagpur. In present study, males (85.51%) were exclusively predominate females (14.49%). most commonly affected victims were from age group 21 to 30 years (35.18%) followed by 31 to 40 years (24.14%). Among all homicidal deaths 55.86 % of victims were consumed alcohol at the time of incidence of homicide while 35.17% were not consumed alcohol. Hard and blunt weapon (46.89%) was the weapon of choice like stone, wooden stick, iron pipe, iron rod etc in the majority of cases followed by sharp edged weapon (35.18%). With Head Injury as the leading cause of death(45.52%).

Keywords: Homicide, male victim, hard and blunt weapons, head injury.

INTRODUCTION

Homicide is one of the heinous crimes against humanity and society, and it is as old as our civilization or history of humanity and reported as early as in the bible when Cane was murdered by the hands of Abel.¹

Pattern of homicide may be a useful indicator of the social stresses in the community and provide information about law and order situation of society as well as valuable information to law and enforcement strategies.

MATERIAL METHOD

The present study was carried out over a period of two year starting from November 2012 to October 2014 in the Department of Forensic Medicine, Govt. Medical College & Hospital Nagpur. Such a study was not carried out in our region to the best of our knowledge.

The history and sociological aspects of the deceased were obtained from accompanying persons/relatives and police. Each homicidal case was examined and evaluated at autopsy, both externally and internally.

Inclusion Criteria: All the cases of assault by hard and blunt, sharp edged weapon, firearm, assault by violent asphyxia and by thermal injury were included in the study.

Exclusion Criteria: All the cases other than assault or homicide and cases where the cause of death could not be ascertained due to insufficient/improper history were excluded from the study.

Ethical Committee approval No 369/12

RESULT

Table No. 1 : Gender Wise Distribution:

GENDER	NO.OF CASES	%
MALE	124	85.51
FEMALE	21	14.49
TOTAL	145	100

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Table No. 2: Age Wise Distribution:

AGE		MALE		FEMALE				
GROUP IN						TOTAL		%
YEARS	NO.OF		%	NO.OF	%			
	CASES			CASES				
0 - 10	2		1.6	1	4.77	3		2.07
11 - 20	8		6.4	4	19.04	12		8.27
21 - 30	46		36.8	5	23.80	51		35.18
31 - 40	27		22.4	8	38.10	35		24.14
41 - 50	23		18.4	3	14.29	26		17.93
51 - 60	11		8.8	0	0	11		7.59
61 - 70	6		4.8	0	0	6		4.13
71 - 80	1		0.8	0	0	1		0.69
81 - 90	0		0	0	0	0		0
TOTAL	124		85.51	21	14.49	145		100

As the male (85.51%) predominated the female (14.49%), the mostly affected age group (both sexes combined) was 21–30 years, constituting 35.18 % of all homicidal deaths, while 24.14 were found in 31 -40 years group.

Table No. 3 : Distribution Of Cases According Consumption of Alcohol By Victim At The Time Of Incidence:

	Male		Female			
CONSUMPTION OF ALCOHOL	NO.OF CASES	%	NO.OF CASES	%	TOTAL	%
YES	81	65.32	00	00.00	81	55.86
NO	30	24.19	21	100	51	35.17
NOT KNOWN	13	10.48	00	00.00	13	08.97
TOTAL	124	85.51	21	14.49	145	100

55.86 % of the victims found to have consumption of alcohol at the time of incidence of homicide as compared to 35.17% who were not having consumption of alcohol. In 8.97% of the cases, the status of alcohol consumption was not known.

Table No. 4 : Distribution Of Cases According Type Of Weapon Used.

KIND OF WEAPON	MALE		FEMALE		TOTAL	%
	NO.OF CASES	%	NO.OF CASES	%		
FIREARM	02	01.61	00	00.00	02	01.38
HARD AND BLUNT	61	49.19	07	33.33	68	46.89
SHARP	45	36.29	06	28.57	51	35.18
THERMAL	02	01.61	07	33.33	09	06.20
SHARP + HARD & BLUNT	11	08.87	01	04.76	12	08.26
OTHER	03	02.42	00	00.00	03	02.06
TOTAL	124	85.51	21	14.49	145	100

In 46.89% (n-68) cases only hard and blunt weapon was used while it was used along with other weapon in total 80 cases. Sharp cutting weapon alone was used in 51 (35.18%) cases and along with other weapon it was used in total 63 cases. Total 2 cases (1.38%) of injury by firearm weapon were found.

Table No. 5: Distribution Of Cases According Cause of Death of Victim:

Cause Of Death	No. Of Cases				Total	%
	Male	%	Female	%		
Injury To Vital Organs	14	11.29	01	04.76	15	10.34
Head Injury	58	46.77	08	38.10	66	45.52
Shock And Haemorrhage Following Injury	29	23.38	04	19.04	33	22.76
Death Due To Burn	02	1.61	07	33.33	09	6.20
Strangulation	07	5.64	01	04.76	08	5.51
Drowning	01	0.80	00	00	01	0.69
Cut Throat	03	2.41	00	00	03	2.07
Ligature Strangulation With Head Injury	01	0.80	00	00	01	0.69
Injury To Spine And Spinal Cord	03	02.41	00	00.00	03	02.07
Septicaemia Due To Injury Sustained	06	04.83	00	00.00	06	04.14
Total	124	100	21	100	145	100

DISCUSSION

The pattern of homicides varies from country to country and influenced by many factors like social, moral, political and cultural and the availability of weapons. The pattern of homicide has important implications for the creation of strategies to reduce its

incidence.²

In present study, males (85.51%) were exclusively predominate females (14.49%). Which were correlated by Marri M. et al.(2006)⁴ Ghangale et al.(2003)³ Cooper A. et al.(2011)⁶, Brady B. et al.(2006)⁵.

In India, males are generally working outdoor and are aggressive in nature moreover they are more exposed to stress, frustration, physical confrontation and violence and are most likely to be on receiving end of aggression. Hence are at greater risk of being victimized.⁷

Women often become victims of domestic homicide due to physical disadvantage and incapability of resistance to violence.⁸

In the present study, the age group wise distribution of victim of homicide shows that among both gender most commonly affected victims were from age group 21 to 30 years (35.18%) followed by 31 to 40 years (24.14%). Similar findings were observed by Mohanty S. et al. (2013),⁹ Edirisinghe et al.(2009)¹⁰ Ghangale S. et al (2003)³ Bhupinder S. et al (2010)¹¹ Marri M. et al(2006)⁴ Hugar B. et al (2011)⁶ Mittal S. et al (2007)¹²

It is explain by the fact that males in this age group are aggressive in nature. They may indulge in criminal activities due to unemployment, financial instability exposing them to violent trauma leading to homicidal output. This is the most active phase of an individual's life, including outdoor activities, increased aggression and early losing of temper, which leads to increase in crime rate by this age group.

Among all homicidal deaths 55.86 % of victims were consumed alcohol at the time of incidence of homicide while 35.17% were not consumed alcohol. This findings were consistent with Mohanty S. et al.(2013)⁹ Avis SP. (1996)¹³ Hugar B. et al. (2011)⁷

Alcohol consumption affects one's personality and social temperament, decreases the threshold of inhibition and potentially provocative the victims to be aggressive and quarrelsome leading to violence.

In the present study hard and blunt weapon (46.89%) was the weapon of choice like stone, wooden stick, iron pipe, iron rod etc in the majority of cases followed by sharp edged weapon (35.18%). Firearm was used only in 1.38 % cases as weapon of offence by accused. Our findings were consistent with another Indian study by Mohanty M.K. et al.(2010)¹⁴ and study from Delhi by Aggarwal NK. et al.¹⁵ Oberoi S.S. et al.(2011)¹⁶. Rathod SN. et al(2013)¹⁷ reported that the weapon used for assault was hard & blunt in 65.6% of the cases followed by sharp cutting in 16.6% of cases.

The reason behind it may be, because when any

person comes in heat of passion at any place, he find all these types of hard and blunt objects from concern field work, which are easily available without any preparation.³⁰ also the cheaper and easy availability of blunt weapons.

Among all the cases of homicide, Head Injury (45.52%) was the most common cause of death followed by shock and haemorrhage due to injuries sustained (22.76%). and injuries to vital organs. Burns and strangulation formed a very small portion of victim injuries as cause of death. consistence with Rathod SN. et. al. (2013)¹⁷ Gadge S. et al(2011)¹⁸

As the hard and blunt weapon was most commonly adopted for homicide, with the head being the targeted for inflicting the injuries in a majority of cases. As most of external injuries either by hard and blunt or sharp edged weapon mostly on the head, It can be explained by the fact that majority of the homicide were executed by using commonly available house hold weapons like wooden stick, axe, spade, iron pipe, stone, etc

CONCLUSION

From the present study we concluded that..

1. Male predominate female.
2. Most commonly affected age group was 21- 30 years, followed by 31-40 years age group.
3. 56.86% of victims were consumed alcohol at the time of incidence of homicide
4. Hard and blunt weapon (46.89%) was the weapon of choice.
5. In majority of cases (45.52%) Head injury was the cause of death

Conflict of Interest : No

Source of Funding: No

REFERENCES

1. Patel DJ. Analysis of Homicidal Deaths in and Around Bastar Region of Chhattisgarh. *J Indian Acad Forensic Med.* April-June 2012; Vol. 34(2): 139-42.
2. Metwally ES, Madboly AG. Homicidal Deaths Analysis in Two Egyptian Governorates (Gharbia and Qalubia): A Five-Year Retrospective Comparative Study (2006-2010). *Egypt J Forensic*

- Sci.Appli.Toxicol. 2014;14(1):143- 59.
3. Ghangale AL, Dhawane SG, Mukherjee AA. Study of Homicidal deaths at Indira Gandhi Medical College,Nagpur.Journal of Forensic Medicine and Toxicology.2003; 20(1):47-51.
4. Marri MZ, Bashir MZ. Analysis of homicidal deaths in Peshawar,Pakistan. J Ayub Med. Coll. Abbottabad.2006;18(4):30.
5. Brady B, Clarke L.The Changing Pattern of Homicide in Ireland. Trinity student medical Journal.2006;7.
6. Cooper A, Smith EL. PATTERNS & TRENDS:Homicide Trends in the United States, 1980-2008. U.S. Department of Justice, Office of Justice Programs, Bureau of Justice Statistics.2011;NCJ236018.
7. Hugar B, Chandra GYP, Harish S. Victim profile in homicides.Indian Journal of Forensic Medicine Toxicology.2011; 5 (1):16-19.
8. Ali EM, Elbakry AA, Ali MA. A study of elderly unnatural deaths in medicolegal autopsies at Dakahlia locality.Mansoura J.Forensic Med. Clinical. Toxicology.2007; XV (1):38-41.
9. Mohanty S, Mohanty SK, Patnaik KK. Homicide in southern India—A five-year retrospective study. Forensic Medicine and Anatomy Research. 2013;1(2):18-24.
10. Edirisinghe PAS, Kitulwatte IDG. Extreme violence– Homicide An analysis of 265 cases from the offices of JMO Colombo and Ragama – A Study from Sri Lanka. Legal Medicine 11 (2009): S363–65.
11. Bhupinder S, Kumara TK, Syed AM. Pattern of homicidal deaths autopsied at Penang Hospital, Malaysia, 2007-2009: a preliminary study. Malaysian J Pathol.2010;32(2):81 – 86.
12. Mittal S, Garg S, Mittal MS. Homicides by Sharp Weapons.JIAFM. 2007; 29 (2): 61-63.
13. Avis SP.Homicide in New Foundland- A 9-year review.Journal of forensic Science, 1996; 41: 101-05.
14. Mohanty MK,Panigrahi MK. Socio-demographic study of homicidal victims.Journal of South India Medico-legal Association. 2010;2(1):3-7.
15. Aggarwal NK, Bansal AK.Trends of homicide in capital city of India. Medico-Legal Update.2004; 4:41-45.
16. Oberoi SS, Singh SP, Aggarwal KK, BhullarDS, Aggarwal A, Walia DS, Thind AS. Profile of fatal assault cases in Patiala.J Punjab Acad Forensic Med Toxicology.2011;11(2): 87-89.
17. Rathod SN, Bharatwaj RS.A Five year Study of Homicides in Aurangabad, Maharashtra. Indian Journal of Forensic Medicine & Toxicology.2013; 7(1): 27-31.
18. Gadge S, Zine KU, Batra AK, Kuchewar SV, Meshram RD, Dhawane SG.Medico-Legal Study of Homicide in and Around GMC Aurangabad. Medico-Legal Update.2011;11(2):56-58.

Retrospective Analysis of Unclaimed/Unknown Dead Bodies

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ABSTRACT

Background: Unclaimed body refers to a person who dies in a hospital, prison or public place, and who has not been claimed by any near relatives or personal friends within such time period as may be prescribed. Such unknown people are exposed to increased incidence of diseases, accidents and mortality. Thane city situated in western region of India, is surrounded by rural towns and villages and has seen tremendous growth in the past few years; with increase in job opportunity, the problem of migrants and homelessness and thus unknown death has also increased.

Method: A retrospective study was conducted in department of Forensic medicine, of a tertiary care institute during the period from January 2011 to December 2015, which includes 297 unknown deceased persons brought for autopsy.

Results: During the period of 5 years, 297(10.74%) cases out of a total 2870 autopsies were unknown and unclaimed persons. The present study demonstrated preponderance of male victims and major bulk of the victims belonged to age group 31-40 years. Most of the people affected were beggars or destitute, majority of whom died from diseases like chronic infective lung diseases (n=92, 55.42%), most commonly tuberculosis (n=59, 19.87%).

Conclusion: The findings of our study indicate that lack of shelter is an important cause of morbidity and mortality in the study area and natural causes are major cause for unknown deaths

Keywords: *Unknown, unclaimed, natural, identification, cause of death.*

INTRODUCTION

“Unclaimed body” refers to a person who dies in a hospital, prison or public place, and who has not been claimed by any near relatives or personal friends within such time period as may be prescribed.¹ The body is preserved in the mortuary for 72 hours, from the time it is received in the mortuary. If no one claims the body after 72 hours the police are legally authorized to dispose of the body. However, if the police think that the body may be identified by relatives, it should

be preserved until a relative comes to claim the body. The cost of disposing of the body in unidentified cases is born by the police department. This is applicable in medico legal cases where the person dies either inside or outside of the hospital.²

Indian metropolitan areas are developing fast with lot of construction activities offering jobs to thousands of unskilled workers, leading to uncontrolled migration not only from India, but also from neighboring countries, who make it their abode³. This put strain on the local authorities to provide them with shelter and security to these unknown people. As a consequence, these people are faced with grave difficulties in self maintenance which are further exacerbated by adverse weather conditions.^{4,5}

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According to statistics compiled by the National Crime Record Bureau (NCRB) in 2012, Maharashtra

has the largest number of deaths on railway tracks and highways in the country, and also earned the notoriety of having the highest number of unidentified human bodies in the country where 5,906 unidentified bodies were left unclaimed in the state's morgues. With 5,319 unidentified bodies recovered during the same period, Tamil Nadu is the second most common state and Uttar Pradesh is third with 3996 unidentified people.⁶

Postmortem examinations reveals the disease and lesions that affected the person in his lifetime and not necessarily those that killed him.⁷ Therefore, not just the physical injuries, and poisoning but also diseases the dead bodies should be noted. The final opinion regarding the cause of death is given after receiving the Chemical analysis report and histopathology reports. As far as possible, an attempt is made at giving a definite opinion; otherwise "no definite opinion" is mentioned in the report as regards the cause of death.

AIM AND OBJECTIVES

1. To study the socio demographic factors associated with dead bodies.
2. To analyze the various efforts made on the part of the investigating officers and the

autopsy surgeons to establish the identity of the unidentified bodies.

3. To study the annual pattern of the cause and manner of death.

MATERIAL AND METHOD

The study was conducted in the Department of Forensic Medicine and Toxicology, Rajiv Gandhi Medical College, Thane, MH, India. This is a retrospective study of the five-year period from 1 January 2011 to 31 December 2015. All the medico legal autopsies of unknown/unclaimed bodies during this period were included in the study. Information regarding unclaimed bodies with regard to age, sex, cause of death and manner of death was sourced from the autopsy reports and the inquest papers of the investigating officers. The age of the deceased was ascertained with the available data from the investigating officer and was corroborated with anatomical features on the dead body.

RESULTS

During the period of Jan 2011 to Dec 2015, a total 2870 autopsy cases were received at mortuary of dept of Forensic Medicine, of a medical college in Thane, of which 297(10.74%) cases were unknown and unclaimed dead persons.

Table 1. Gender-wise trend of Unknown /unclaimed bodies.

Year	Male	%	Female	%	Total	%
2011	52	17.51	9	3.03	61	20.54
2012	40	13.47	12	4.04	52	17.51
2013	40	13.47	13	4.38	53	17.85
2014	60	20.20	9	3.03	69	23.23
2015	48	16.16	14	4.71	62	20.88
Total	240	80.81	57	19.19	297	100.00

Out of 297 cases majority of unknown deceased were males 240(80.81%) compared with females 57 (19.19%). Thus overall gender ratio for male and female was 4.21:1 (Table 1)

Table 2. Age-wise trend of Unknown /unclaimed bodies

Age/Year	2011	2012	2013	2014	2015	Total	%
0-10	3	4	0	3	0	10	3.37
11-20	2	3	2	2	3	12	4.04
21-30	8	12	9	8	9	46	15.49
31-40	21	14	21	25	25	106	35.69

Table 2. Age-wise trend of Unknown /unclaimed bodies

41-50	13	10	10	17	11	61	20.54
51-60	9	5	2	9	4	29	9.76
61-70	3	4	5	3	5	20	6.73
>71	2	0	4	2	5	13	4.38
Total	61	52	53	69	62	297	100.00

Majority of cases belongs to age group of 31 to 40 years comprises 106, (35.69%) cases followed by 41 to 50 years and 21 to 30 years age groups. Thus almost 72 % deceased belongs to 21 to 50 years age group. The number of unknown death were least in age groups less than 10 and above 70 years. (Table 2)

Table 3. Trend of Unknown death by month.

Month/Year	2011	2012	2013	2014	2015	Total	%
Jan	3	5	3	4	4	19	6.40
Feb	6	2	4	7	5	24	8.08
March	3	3	4	3	4	17	5.72
April	3	7	8	3	10	31	10.44
May	4	6	10	5	11	36	12.12
June	5	5	4	5	4	23	7.74
July	13	10	8	15	9	55	18.52
Aug	3	4	4	3	4	18	6.06
Sept	6	4	3	7	4	24	8.08
Oct	3	3	3	4	3	16	5.39
Nov	12	3	0	6	0	21	7.07
Dec	0	0	2	7	3	12	4.04
Total	61	52	53	69	62	297	100.00

Maximum number of unknown death were encountered in the month of July, 18.52%; followed by May, 12.12%; and April, 10.44% while the least number of cases was seen in the months of October and December. (Table 3)

Table 4. Age and sex wise pattern of natural cause of death.

Cause of death	FEMALE	MALE	Grand Total	%
Acute and Chronic Lung diseases	5	26	31	10.44
Pulmonary Tuberculosis	17	44	61	20.54
Acute and Chronic Liver diseases	4	27	31	10.44
Heart Diseases	4	14	18	6.06
Diseases of Central Nervous System	2	9	11	3.70
Kidney disease	2	2	4	1.35
Gastro-Intestinal diseases disease	1	2	3	1.01
Septicemia	0	4	4	1.35
Still birth	1	2	3	1.01

Most of the people affected were beggars or destitute who died from chronic infective lung diseases (n=92, 55.42%), most commonly tuberculosis(n=59, 19.87%). This is followed by drowning (42,14.4%). Other diseases such as alcoholic liver disease, coronary artery heart diseases, cerebro-vascular accident and septicaemia (Table 4)

Table 5. Gender distribution as per manner of death.

Manner of Death	MALE	%	FEMALE	%	TOTAL	%
Natural	129	54.0	37	63.8	166	55.9
Accidental	41	17.2	7	12.1	48	16.2
Suicidal	35	14.6	8	13.8	43	14.5
Homicidal	9	3.8	2	3.4	11	3.7
Undermined	25	10.5	4	6.9	29	9.8
Total	239	100.0	58	100.0	297	100.0

Natural death were the foremost cause of death (n=166, 55.89%) followed by accidental and suicidal deaths which comprises 16.16% and 14.48%, respectively. However, 9.76% deaths were undetermined mostly due to advanced state of decomposition (Table 5). Proportion of natural deaths is more in females than in males. Likewise, among males, proportion of accidental deaths (17.2%) is more than in females (12.1%).

Table 6. Frequency of presence of distinguishing identification marks such as a tattoo and mark of identification

Year	Clothes Handed over	Tattoos	Marks of identification	Bone piece for DNA
2011	61	24	4	19
2012	52	15	5	12
2013	53	16	9	16
2014	69	22	3	23
2015	62	19	6	18
Total	297	96	27	88

The investigating authority had routine protocol to take photographs, collect their clothes and give advertisements in daily in every unknown case. Police had collected fingerprints in 75.75 % cases. Autopsy surgeon noted the tattoos, deformities and other marks of identification in 41.41% of cases. In 88 cases bone piece sent for DNA analysis. (Table6). Due to the efforts of the investigating authority and forensic experts, out of the 297 unknown deceased, 27 persons got identified after the investigations.

DISCUSSION

Post-mortem examination of unknown bodies comprises a small portion but significant and important group in which forensic medicine specialists have to

opine regarding cause, manner and nature of death, time since death and provide detailed data gathered from a thorough examination dissection of body. Identification of deceased is important to help the legal system in case of homicides and suicides to establish their identities and know their motives. It is also beneficial to the legal heir of the deceased to claim their insurance and the property.

Most of the literature emphasised on the individual body identification or identification of victims of mass disasters^{8,9,10}. In the present study, unidentified bodies comprised 10.74% of the total autopsy load of the department during period under consideration similar to other studies accounted for about 4-10% of the total autopsy load.^{11,12} Male predominance accounted for 81%

as compared to 97% of cases in a study in Chandigarh¹³ and 87% in Kolkata¹⁴. In India rural population migrates to urban regions in search of earning their livelihood. Many a times, the family is even not aware of the place of employment of the person because of continuous change of contract work. In case of his death at such places, his body is brought to the morgue as “unidentified or unknown”, where legal formalities dictate a post-mortem examination. The age group 21-50, the most mobile age group for socio-economic reasons, was responsible for 72% of cases. Kumar A¹³ and Chattopadhyay¹⁴ reported similar findings.

During study period of five-year it was examined that more deaths were reported during the months of July i.e. rainy season, similar with the study done by Kumar et al³. The worsening of unhygienic living condition during the rainy season, together with increased exposure to infectious agents, make homeless people more prone to developing diseases.

Death due to natural causes were the most common followed by accident and suicide and least due to homicide (Table 6) These results are similar to other studies in south Delhi¹⁵ and Buyuku et al¹⁶ and in contrast with study done by Kumar S² where accidental death were predominant. Such people are at increased risk of infections because of the high prevalence of tobacco chewing, alcoholism, smoking and chronic diseases. In addition, poor socioeconomic conditions, lack of access to health care, unhygienic living conditions and malnutrition are significant contributors to disease and death³.

Accidental deaths were the second most common cause of death. The high risk of death from accident is a predictable result of poverty, substance abuse and living on the streets, footpath and along railway tracks and are thus very prone to accidents.³

During the process of identification autopsy surgeon has most vital role collection and preservation of appropriate material. Frequently bodies of unknown people were brought by investigating authority in an advanced state of decomposition. With advancing putrefaction, peculiar physical characteristics of the deceased may get distorted or disappear, hampering identification and at times causing difficulty in ascertaining the cause of death, manner of death. Other factors contributing to this problem are skeleton

remains, disfigurement of the body. In India, except for mortuaries attached to government hospitals and medical colleges, most mortuaries lack the basic infrastructure for preserving dead bodies. Investigating officers take photographs of the deceased for purposes of identification and also displayed in leading newspapers but they are usually in black and white and of poor quality³. These photographs are also displayed on official government sites with its proper description but due to lack of internet education, not approachable for people. Decomposition and disfigurement seen in photographs can also hamper identification.

CONCLUSION

The findings of our study indicate that lack of shelter is an important cause of morbidity and mortality in the study area. Males are the most affected population; the common age group affected is 21–50 years and the predominant manner of death is natural death. However, more studies are recommended to find the actual prevalence of homelessness and its health-related effects on morbidity and mortality, which will help in providing health care facilities to the needy.

RECOMMENDATIONS

1. The Standard Operative Procedures (SOP) for identification of unknown deceased which is in place, by the part of police personnel and should be followed strictly.
2. Bodies that are unknown/ unclaimed should be presented for autopsy forthwith without any delay, so that decomposition and other artefacts do not set in and obscure the findings of the postmortem examination.
3. Active investigation and modern investigative techniques are to be used, workload of the police officers needs to be redistributed, and accountability of the police has to be fixed to get the body identified.
4. To prevent unknown death, Government authorities should take a proactive approach in cities to make shelters for the homeless and vagabonds, particularly during the months of extreme temperatures and rainy season.
5. In cases, especially in accidents, where there is disfigurement of face and mutilation of body parts or decomposition, it becomes difficult to identify

the deceased. In these cases, if some type of identity card is kept in the pocket of the victim, (in lieu of metallic ID lockets as in armed forces) containing some UID Number (Adhar) will be useful. This is more practical in case of homeless persons.

6. Illegal immigrants from nearby countries are present in large number in this region. These people cannot be identified easily. Hence illegal immigration should be curbed.

Ethical Clearance: The study was carried out after obtaining ethical clearance from the Institutional Ethics Committee.

Source of Funding: Self

Conflict of Interest: Nil

REFERENCES

1. Saurav C, Aayushi G, Behera C, Karthik K, Millo T, Gupta SK. Medico-legal autopsy of 1355 unclaimed dead bodies brought to a tertiary care hospital in Delhi, India (2006–2012). *Medico-Legal Journal*. 2014; 82(3): 112-5.
2. Millo T, Agnihotri A, Gupta S, Dogra TD. Procedure for preservation and disposal of dead bodies in hospital. *Journal of the academy of hospital administration*. 2007;13(2).
3. Kumar A, Lalwani S, Behera C, Rautji R, Dogra TD. Deaths of homeless unclaimed persons in South Delhi (2001–2005): a retrospective review. *Medicine, Science and the Law*. 2009;49(1):46-50.
4. Altun G, Yilmaz A, Azmak D. Deaths among homeless people in Istanbul. *Forensic science international*. 1999;99(2):143-7.
5. Kumar S, Verma AK, Ali W, Singh US. Homeless and unclaimed persons' deaths in north India (Jan 2008–Nov 2012): A retrospective study. *Medicine, Science and the Law*. 2015;55(1):11-5.
6. Hindustan times. Unclaimed bodies fill up state's morgues., <http://www.hindustantimes.com/mumbai/unclaimed-bodies-fill-up-state-s-morgues/story-amIJuMUjKd9O85RyH1Q59H.html>. (2013, accessed on 20 July 2017)
7. Reddy KSN. *The essentials of Forensic Medicine and Toxicology* 28th ed; K Sugna Devi 2009; p.112-3.
8. Kumar A, Chavali KH, Harish D, Singh A. Pattern of cause of death in unknown dead bodies: a one year prospective study. *J Punjab Acad Forensic Med Toxicol*. 2012;12:92-5.
9. Job C. Determination of cause of death in decomposed bodies—a regional study. *J Indian Acad Forensic Med*. 2009;31(1):11-7.
10. Ludes B, Tracqui A, Pfitzinger H, Kintz P, Levy F, Disteldorf M, Hutt JM, Kaess B, Haag R, Memheld B, Kaempf C. Medico-legal investigations of the Airbus A320 crash upon Mount Ste-Odile, France. *Journal of Forensic Science*. 1994;39(5):1147-52.
11. Hanzlick R, Smith GP. Identification of the unidentified deceased: turnaround times, methods, and demographics in Fulton County, Georgia. *The American journal of forensic medicine and pathology*. 2006;27(1):79-84.
12. Evert L. Unidentified bodies in forensic pathology practice in South Africa Demographic and medico-legal perspective [MSc Thesis] University of Pretoria 2011. Available from <http://upetd.up.ac.za/thesis/submitted/etd-05232012-113345/unrestricted/dissertation.pdf>
13. Kumar A, Harish D, Chavali KH, Singh A. Patterns of cause of death in unknown dead bodies a three year study in a tertiary care hospital. *J Indian Acad Forensic Med* 2012;34(4):304-8.
14. Chattopadhyay S, Shee B, Sukul B. Unidentified bodies in autopsy—A disaster in disguise. *Egyptian Journal of Forensic Sciences*. 2013;3(4):112-5.
15. Yadav A, Kumar A, Swain R, Gupta SK. Five-year study of unidentified/unclaimed and unknown deaths brought for medicolegal autopsy at Premier Hospital in New Delhi, India. *Medicine, Science and the Law*. 2017;57(1):33-8.
16. Buyuk Y, Uzun İ, Eke M, Ceti G. Homeless deaths in Istanbul, Turkey. *Journal of forensic and legal medicine*. 2008;15(5):318-21.

A Study of Head Injuries in Fatal Road Traffic Accidents

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ABSTRACT

Introduction: To study the epidemiological distribution of fatal head injuries due to road traffic accidents (RTA) brought for autopsy to a tertiary – level hospital in Pondicherry in between September 2011 to August 2013.

Materials and Method: This study was conducted in Indira Gandhi Government General Hospital, Pondicherry from 1st September, 2011 to 31st March, 2013. Only fatal head injury cases due to RTA was taken up for the study. Bodies in advanced stages of decomposition, head injuries due to suicide or homicide, cases where the history of occurrence is ambiguous, intracranial haemorrhages, infarction or lesions due to natural diseases were excluded from the study.

Results: A total of 165 cases were taken up for the study. Male victims constituted 131 cases (79.39%) and females 34 (20.6%). A greater number of victims were pedestrians (94 cases or 56.96% of all cases). Majority of incidences (79 cases or 47.87%) took place on the highways. Young people in the age group of 21 to 30 years were the worst affected (34 cases or 20.61%). Majority of cases (63 cases 38.18%) occurred in the winter season between October to January. Bruise on scalp was the most common injury presented (75 cases 45.45%). Among the internal injuries of the head, sub arachnoid haemorrhage accounted for 107 cases or 64.8% of all cases. Most of the victims died on the spot (61 cases or 36.96%). A greater number of incidences (29 cases or 17.57%) occurred in between 5 PM – 8 PM. More than half of the victims (115 or 69.69%) were from rural areas. Most of the victims (63 cases or 38.18%) were unskilled workers like daily wage workers.

Conclusion: RTA, presently, have assumed an epidemic proportion, especially in developing countries, with increased morbidity and mortality and associated colossal economic losses. Effective steps to cut down on its incidences is the need of the hour. With a view to achieve this objective, WHO recommends a multidisciplinary approach to road safety, enforcement of strict legislations, use of helmets, child restraints and seat belts, safe speed limits and establishment of trauma care facilities in primary, secondary and tertiary healthcare centres.

Keywords: Head injury, road accident, fatal.

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INTRODUCTION

Road traffic accidents (RTA) are a leading cause of mortality and morbidity globally. As per World Health Organization, 1.3 million people die every year due to RTA. Ninety percent of these deaths occur in low – to – middle income countries. Economic burden on the world countries is estimated to be about 1 to 3% of the

respective GNP, reaching upto a total staggering amount of \$500 billion.¹ By 2020, RTA, if left unchecked, is predicted to be the third leading contributor to the global burden of disease and injury.²

Presently, RTA is the sixth leading cause of death in India with increased hospitalization, morbidity and economic losses affecting the young and the middle-aged population.³ Here the authors attempt to study the pattern of craniocerebral injuries in fatal RTA brought for autopsy to a tertiary – level hospital in Pondicherry in between September 2011 to August 2013.

MATERIALS AND METHOD

This study focussed on fatal head injury cases due to RTA brought for autopsy to Indira Gandhi Government General Hospital, Pondicherry between 1st September, 2011 to 31st March, 2013. Ethical clearance was obtained from the Institutional Human Ethical Committee (IHEC). History and data was collected from the relatives of the deceased and the accompanying police in the form of a proforma asking for details of age, sex, occupation, place of residence, place of occurrence, survival period and nature of injury. Bodies in advanced stages of decomposition, head injuries due to suicide or homicide, cases where the history of occurrence is ambiguous, cases with intracranial haemorrhages, infarction or lesions due to natural diseases were excluded from the study. Statistical analyses were done with SPSS 16.0 software.

RESULTS

A total of 165 cases of fatal head injury due to RTA brought for autopsy to Indira Gandhi Government General Hospital, Pondicherry between 1st September, 2011 to 31st March, 2013 were considered for this study. Of these cases, 131 (79.39%) were male and 34 (20.6%) female.

Pedestrians constituted the most number of victims (94 cases or 56.96% of all cases) followed by two – wheeler occupants (59 cases or 35.75%) and four-wheeler occupants (8 cases or 4.85%).

On the circumstances leading to accidents, pedestrians hit by two – wheelers accounted for 48 cases (29.09%) and those hit by four – wheelers constituted 45 cases (27.27%). Self – slip and accidental fall during riding of two – wheelers accounted for 3 cases (01.82%).

79 cases (47.87%) of fatal head injury occurred on highway followed by 39 cases (23.63%) in towns, 29 cases (17.57%) in villages and 18 cases (10.9%) in cross roads.

Most of these deaths (34 cases or 20.61%) occurred in the age group of 21 – 30 years while the age group of 0 – 10 years constituted the least number of cases (02 cases or 1.21%) (*Table 1*).

Table 1: Distribution of cases according to age of victim

Age in years	Total cases	% of cases
0 – 10	02	1.21
11 – 20	10	6.06
21 – 30	34	20.61
31 – 40	24	14.55
41 – 50	22	13.33
51 – 60	33	20
> 60	26	15.76
Unknown	14	8.48

104 of these cases (63.03%) were hospitalized prior to death while 61 cases (36.96%) died on the spot.

63 cases (38.18%) occurred in winter (October to January) while 52 cases (31.51%) occurred in rainy season (June to September) and 50 cases (30.3%) in summer (February to May).

Among injuries to the scalp, bruise was present in 75 cases (45.45%) followed by laceration in 29 cases (17.57%) and abrasion in 6 cases (3.6%).

Among the internal injuries to the cranium, most common was subarachnoid haemorrhage (107 cases or 64.8%) followed by subdural haemorrhage in 102 cases or 61.8% (*Table 2*).

Table 2: Distribution of cases according to internal injuries to the cranium

Internal Injuries	Number of cases	% of cases
Skull fracture	52	31.5
Extradural haemorrhage	23	13.9
Subdural haemorrhage	102	61.8
Subarachnoid haemorrhage	107	64.8
Intracerebral haemorrhage	05	3.0
Injury to brain	28	17.0
Basal fracture	08	4.8

Most of the cases died on the spot (61 cases or 36.96%). 45 cases (27.27%) had a survival period of 1 – 7 days followed by 24 cases (14.54%) with a survival period of 0 – 6 hours (*Table 3*).

Table 3: Survival period of victims

Survival period	Total cases	% of cases
Spot death	61	36.96
0 – 6 hours	24	14.54
7 – 12 hours	10	6.06
13 – 24 hours	08	4.84
1 – 7 days	45	27.27
8 – 14 days	11	6.66
> 14 days	06	3.63

Most of the incidents (29 cases or 17.57%) occurred in between 5 PM – 8 PM followed by 27 cases (16.36%) occurring between 8 PM – 11 PM, 26 cases (15.75%) between 8 AM – 11 AM, 24 cases (14.54%) between 2 PM – 5 PM, 20 cases (15.15%) between 12 AM – 5 AM, 16 cases (9.69%) between 5 AM – 8 AM, 12 cases (7.27%) between 11 AM – 2 PM and 6 cases (3.63%) between 11 PM – 12 AM.

115 victims (69.69%) were from rural areas, 37 victims (22.42%) from urban localities and, place of residence was unknown for 13 (7.87%).

Most of the victims (63 cases or 38.18%) were unskilled workers like daily wage workers. 35 victims (21.21%) were unemployed at the time of the incident. Shop owners or small business entrepreneurs constituted the least number of victims (4 cases or 2.42%) (*Table 4*).

Table 4: Occupation of victims

Occupation	Number of cases	% of cases
Professionals	6	3.63
Semi – professionals	15	9.09
Shop owners	4	2.42
Skilled workers	18	10.9
Semi – skilled workers	7	4.24
Unskilled workers	63	38.18
Unemployed	35	21.21
Unknown	17	10.3

DISCUSSION

This prospective study was conducted over a period of one and half years and a total of 165 cases were studied.

The preponderance of male victims in fatal accidents was also observed in another study conducted by Shetty BSK in Manipal, India where they found that 86% of the victims were male.⁴

In our study, pedestrian involvement was 56.96%, two – wheeler occupants 35.75% and four – wheeler occupants were 4.85% of all cases. These results are in contrast to another study done by Jha Nilambar et al who concluded that pedestrians constituted 22% of all victims, two – wheelers 10.9% and four wheelers 48%.⁵ The high percentage of pedestrian involvement may be due to the fact that in this place of study, most people tend to travel on foot. Due to less number of footpaths and narrow roads, people tend to walk by the side of the road and consequently more incidences of RTA occur.

In our study, most of the cases (20.61%) were of the age group of 21 – 30 years. This result corresponds to a study conducted by Junaid Muhammad et al who witnessed similar results.⁵

In this study, most of the cases (38.18%) occurred in the winter season (October to January). This result contradicts the findings of a study done by Ravi Kiran et al who concluded that most of the accidents (48.5%) occur during the rainy season. We infer that the winter months is the period of rains in this part of the country. Consequently, there is a spurt of incidence of such cases during this period.

Most of the cases in our study presented with scalp bruises (45.45%). This finding corresponds to the study done by Junaid M et al who observed that bruise was present in 11.7% of cases.⁵

Most common injury to the brain and meninges was sub arachnoid haemorrhage (64.8%). Sharma BR et al in their study concluded that the most common injury was subdural haemorrhage (62.40%) followed by sub arachnoid haemorrhage (23.5%).⁷

In this study, most of the victims (36.96%) died on the spot. Sharma BR et al, in their study observed that most of the victims (72%) had survived for 6 hours to 24 hours after the accident.⁷ This difference may be due to

the level of post traumatic health care facilities provided by the hospitals. Better the health care facilities, better is the survival period of the victims.

Incidence of most of the cases (17.57%) occurred between 5 to 8 PM in our study. Singh Harnam et al, in their study also noted that most of the fatal accidents had occurred between 6 to 8 PM.⁸

CONCLUSION

There can be no doubt that RTA presently have assumed an epidemic proportion, especially in developing countries, with increased morbidity and mortality and associated colossal burden to the public exchequer. Effective steps to contain its incidence is the need of the hour. To this end, WHO had made several recommendations in their “World Report on road traffic injury prevention”.⁹ Some of the recommendations included a multidisciplinary approach to road safety, enforcement of strict legislations, use of helmets, child restraints and seat belts, safe speed limits and establishment of trauma care facilities in primary, secondary and tertiary healthcare centres.

Conflict of Interests: Nil

Source of Funding: Self

Ethical Clearance: Study was conducted after approval of Institutional Ethics Committee, Mahatma Gandhi Medical College & Research Institute, Pondicherry, India.

REFERENCES

1. World Health Organization (WHO). Global Plan for the Decade of Action for Road Safety 2011–2020 [internet]. 2011[cited on 2017 Feb 28]. Available from: [http://www.who.int/roadsafety/decade_of_](http://www.who.int/roadsafety/decade_of_action/plan/plan_english.pdf)
2. Sreedharan J, Muttappillymyalil J, Divakaran B, Haran JC. Determinants of safety helmet use among motorcyclists in Kerala, India. *J Inj Violence Res*. 2010 Jan; 2(1): 49–54.
3. Tripathi M, Tewari MK., Mukherjee KK, Mathuriya SN. Profile of patients with head injuries among vehicular accidents: An experience from a tertiary care centre of India. *Neurology India*. 2014 Nov-Dec; 62(6): 610 – 617.
4. Shetty BSK, Kanchan T, Menezes RG, Bakkanavar SM, Nayak VC, Yoganarasimha K. Victim profile and pattern of thoraco – abdominal injuries sustained in fatal road traffic accidents. *J Indian Acad Forensic Med*. 2012; 34 (1): 16 – 19.
5. Junaid M, Rashid M, Afsheen A, Tahir A, Bukhari SS, Kalsoom A. Changing spectrum of traumatic head injuries: Demographics and outcome analysis in a tertiary care referral centre. *J Pak Med Assoc*. July 2016; 66 (7): 864 – 868.
6. Ravi Kiran E, Mudalidhar Saralaya K, Vijaya K. Prospective study on road traffic accidents. *J Punjab Acad Forensic Med Toxicol*. 2004; 4 (3): 12 – 16.
7. Sharma BR, Harish D, Singh Gauri, Vij Krishan. Patterns of Fatal Head Injury in Road Traffic Accidents. *Bahrain Medical Bulletin*. 2003 Mar; Vol.25(1): 22 – 25.
8. Singh Harnam, Aggarwal AD. Fatal road traffic accident in motorcyclists not wearing helmets. *J Punjab Acad Forensic Med Toxicol* 2011; 11(1): 9 – 11.
9. World report on road traffic injury prevention, Conclusion and Recommendations. World Health Organization; Geneva: 2004.

Drugs in Orthodontics: A Review

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ABSTRACT

Orthodontic tooth movement is a complex procedure in which changes occur from the tissue level to the molecular level. Orthodontic force when applied gives rise to a cascade of inflammatory steps in which chemical mediators are involved. Various metabolites in human body like prostaglandins, cytokines, interleukins are involved in the molecular level of tooth movement. There is a significant increase in the adult patients seeking orthodontic treatment. So influence of systemic diseases and their medications seem to positively or negatively effect the rate of orthodontic tooth movement. Also the analgesics advised also showed varying responses to tooth movement. Therefore a detailed knowledge of the molecular mechanisms of tooth movement and effects of drugs on it should be understood by the Orthodontist. This review provides a brief outline on the mechanism of tooth movement and effect of commonly used drugs

Keywords : *Hormones, Bisphosphonates, Prostaglandins, NSAIDs, orthodontic tooth movement*

INTRODUCTION

Orthodontic tooth movement is a complex process. A combination of certain mechanical, chemical and cellular events take place in teeth surrounding tissues due to orthodontic forces allowing structural changes that cause orthodontic tooth movement. The brief outline of the sequences of events that occurs in tooth movement is as follows: on the pressure side there is resorption which creates the space necessary for tooth movement and simultaneous deposition on the tension side to heal the path of advancing socket.

As the complete maneuver of orthodontic movement by cellular activities remains a mystery, recent researchers have duly discovered some factors like cyclic adenosine monophosphate (cAMP), calcium, collagenase, and prostaglandins (PGs) which play an important role in tooth movement.

The constituents of nutrients of food as well as drugs alike, consumed both regularly and occasionally by patients reach the periodontal tissues involved with orthodontic movement and target local cells. The

cumulative effects could be inhibitory, additive, or synergistic. This article discusses in general various drugs and their desired and undesired effects on orthodontic tooth movement.

Drugs Affecting Tooth Movement

WHO (1966) defined drug as any substance or product that is used to modify or explore physiological systems or pathological states for the benefit of the recipient. During orthodontic treatment, drugs are prescribed to manage pain from force application to biological tissues, manage temporomandibular joint (TMJ) problems and tackle some infection throughout the course of treatment. Table 1 depicts the general effects of drugs influencing the rate of tooth movement

Apart from these drugs, patients who consume vitamins, minerals, hormonal supplements, and other compounds for the prevention or treatment of various systemic diseases can also be found in every orthodontic practice. Hence, it is necessary to review the mechanism of action and effects of commonly used drugs on tissue remodeling and orthodontic tooth movement.

Table: 1 Drugs altering rate of tooth movement

Drugs increasing rate of tooth movement	Drugs decreasing rate of tooth movement
Prostaglandins Vitamin D PTH Thyroid hormone Corticosteroids Relaxin	NSAID's Fluorides Bis-phosphonates Estrogen Calcitonin
No effect on tooth movement-Acetaminophen	

Analgesics

An *analgesic* or painkiller is any member of the group of drugs used to achieve *analgesia*, relief from pain. *Analgesic* drugs act in various ways on the peripheral and central nervous systems. They are distinct from anesthetics, which temporarily affect, and in some instances completely eliminate, sensation. Analgesic is a drug that selectively relieves pain by acting on the CNS or peripheral pain mechanisms (COX-1,2,& 3) without significantly altering consciousness.

NSAIDs

NSAIDs inhibits PG synthesis and anti-inflammatory action may be exerted by reduced generation of superoxide by neutrophils, and TNF release, free radical scavenging, and inhibition of metalloprotease activity in cartilage. They suppress the production of all prostanoids (thromboxanes, prostacyclins, and prostaglandins) because of their inhibition of COX-1 and COX-2, which are essential enzymes in the synthetic pathways of the prostanoids. Most commonly used medications in orthodontics are for control of pain following force application to tooth. Inhibition of the inflammatory reaction produced by PGs slows the tooth movement. Also NSAIDs like aspirin(salicylates) decreases the tooth movement by effecting the differentiation of osteoclast thus decreasing the rate of bone resorption.^{1,2}

Acetaminophen (Paracetamol)

Analgesia and hypothermia due to paracetamol are mediated by inhibition of a third COX isoenzyme (designated COX-3) which is seen in brain and spinal cord, thus doesn't have any effect on prostaglandin synthesis. It has shown no effect on orthodontic tooth movement. Acetaminophen is effective for controlling pain and discomfort associated with the orthodontic treatment.^{3,4}

Vitamin D

A weekly intraligamentous injection of a 1,25,2(OH) D3 solution produced a significantly increased amount of orthodontic tooth movement after a 21-day experimental period. There was an increased rate of recruitment and activation of mononuclear osteoclasts resulting in greater bone resorption of the alveolus on the pressure side of the periodontal ligament than in control teeth⁵

1,25,2(OH)D3 acts directly on the nucleus of the circulating monocytes and osteoprogenitor cells, which have specific receptors for it. Cells in the early stages of the resorption cycle before they fuse and become classic multinucleated osteoclasts. Vitamin D and its active metabolite, 1,25,2(OH)D3, together with parathyroid hormone (PTH) and calcitonin, regulate the amount of calcium and phosphorus levels. Vitamin D receptors have been demonstrated not only in osteoblasts but also in osteoclast precursors and in active osteoclasts.

Fluorides

Fluoride is one of the trace elements having an effect on tissue metabolism. Fluoride increases bone mass and mineral density, and because of these skeletal actions, it has been used in the treatment of metabolic bone disease, osteoporosis. Even a very active caries treatment with sodium fluoride during orthodontic treatment may delay orthodontic tooth movement and increase the time of orthodontic treatment.⁶ Sodium fluoride has been shown to inhibit the osteoclastic activity and reduce the number of active osteoclasts. On the cellular level it has been shown to stimulate bone formation and, recently, it was discovered that the osteoclastic activity in rats is inhibited.⁷

Bisphosphonates

Pharmacological site of action is in the osteoclast, which removes the outer ruffled border, inactivates

function, and decreases the lifespan of the cell. Also it inhibits formation of actin ring in the cytoskeleton of osteoclasts. There is some evidence that this drug group might also inhibit osteoclast precursors and osteoblast communication with osteoclasts.^{8,9}

Bisphosphonates (BPNs) have strong chemical affinity to the solid-phase surface of calcium phosphate; this causes inhibition of hydroxyapatite aggregation, dissolution, and crystal formation. Bisphosphonates cause a rise in intracellular calcium levels in osteoclastic-like cell line, reduction of osteoclastic activity, prevention of osteoclastic development from hematopoietic precursors, and production of an osteoclast inhibitory factor.

Studies have shown that BPNs can inhibit orthodontic tooth movement and delay the orthodontic treatment. Histologic examination showed that in the experimental animals fewer osteoclasts appeared on the alveolar bone surface, and both bone resorption and root resorption were inhibited. Topical application of BPNs could be helpful in anchoring and retaining teeth under orthodontic treatment.

Parathyroid hormone

By local administration PTH analogues both osteoblast and osteoclast activities are stimulated. The receptors of parathyroid hormone are only expressed on the cell membrane of osteoblasts. After the binding of parathyroid hormone molecules to their receptors, the osteoblasts are stimulated to produce more IGF-I via a cyclic adenosine monophosphate (cAMP)-dependent mechanism, which functions as an autocrine/paracrine factor and activates its adaptor molecule insulin-receptor substrate-1 in osteoblast precursors in bone marrow, and causes osteoblast proliferation, differentiation, and function.^{10,11} On the other hand, osteoblasts stimulated by parathyroid hormone molecules also express more RANKL on the cell membrane, which binds to the receptor activator of nuclear factor kappa B (RANK) on the cell membrane of osteoclastic precursors through cell-to-cell contact and stimulates osteoclast proliferation, differentiation, and activation.

RANKL/osteoprotegerin and IGF-1 are essential molecules for the effect of parathyroid hormone on bone metabolism. RANKL/osteoprotegerin mediates osteoclastogenesis, whereas IGF-1 mediates osteoblastogenesis. The expression levels

of both RANKL and IGF-1 increased, indicating that intermittent parathyroid hormones stimulated both osteoclastogenesis and osteoblastogenesis. The biphasic effect of intermittent parathyroid hormone administration resulted in an increased bone turnover rate; this accelerated tooth movement

Unlike other osteoporosis-treating medicines (eg, bisphosphonates), parathyroid hormone has a more balanced effect on bone metabolism, stimulating both osteoblastic and osteoclastic activities

Estrogens

Estrogen is known to inhibit osteoclasts both directly and indirectly. It inhibits the production of various cytokines which are involved in bone resorption by stimulating osteoclast formation and osteoclast bone resorption. Studies have shown that estrogens decrease the velocity of tooth movement^{12,13}. Oral contraceptives, taken for long periods of time, can influence the rate of tooth movement. Androgens also inhibit bone resorption, modulate the growth of the muscular system, and may affect the length and results of the orthodontic treatment. Orthodontic therapy should be planned according to the menstrual cycle since tooth movement, under the application of force, is faster during low estrogen levels. Hypothesis were stated that orthodontic force after each ovulation may promote tooth movement, thereby shortening the course of orthodontic treatment.¹⁴

Thyroid hormones

Thyroid hormones are recommended for the treatment of hypothyroidism and used after thyroidectomy in substitutive therapy. Thyroxine administration leads to increased bone remodeling, increased bone resorptive activity and reduced bone density. Effects on bone tissue may be related to the augmentation of interleukin-1 (IL-1B) production induced by thyroid hormones at low concentrations, cytokine-stimulated osteoclast formation and osteoclastic bone resorption.

The thyroid hormone increases the speed of orthodontic tooth movement in patients undergoing such medication.¹⁵ Low dosage and short-term thyroxine administration are reported to lower the frequency of "force-induced" root resorption. Decrease in resorption may be correlated to a change in bone remodeling process and a reinforcement of the protection of the

cementum and dentin to “force-induced” osteoclastic resorption.

Relaxin

Relaxin has been known as a pregnancy hormone. It is released just before child birth to loosen the public symphysis, so that the relaxed suture will allow widening of the birth canal for parturition. In 2005, Liu and colleagues showed that the administration of relaxin might accelerate the early stages of orthodontic tooth movements in rats.¹⁶ Stewart and colleagues used gingival injections of Relaxin to relieve rotational memory in the connective tissues of maxillary lateral incisors that had been orthodontically rotated. In 2000, Nicozis and colleagues suggested that Relaxin might be used as an adjuvant to orthodontic therapy, during or after tooth movement, for promotion of stability, for rapid remodeling of gingival tissue during extraction space closure, for orthopedic expansion in non – growing patients, by reducing the tension of the stretched soft tissue envelope, particularly the expanded palatal mucosa, after orthognathic surgery.¹⁷

Calcitonin

Calcitonin inhibits bone resorption by direct action on osteoclasts, decreasing their ruffled surface which forms contact with resorptive pit. It also stimulates the activity of osteoblasts. Because of its physiological role, it is considered to inhibit the tooth movement; consequently, delay in orthodontic treatment can be expected.

Corticosteroids

Glucocorticoids enhance the responsiveness of osteoblasts to PTH by increasing the expression of PTH receptors in these cells. As the bone-resorbing actions of PTH require the presence of osteoblasts, an increase in PTH receptors in osteoblasts by glucocorticoids¹⁸. Evidence indicates that the main effect of corticosteroid on bone tissue is direct inhibition of osteoblastic function and thus decreases total bone formation. Decrease in bone formation is due to elevated PTH levels caused by inhibition of intestinal calcium absorption which is

induced by corticosteroids. Corticosteroids increase the rate of tooth movement, and since new bone formation can be difficult in a treated patient, they decrease the stability of tooth movement and stability of orthodontic treatment in general.¹⁹ When they are used for longer periods of time, the main side effect is osteoporosis. It has been demonstrated in animal models with this type of osteoporosis that the rate of active tooth movement is greater, but tooth movement is less stable since little bone is present and there is no indication of bone formation. A more extensive retention may be required.

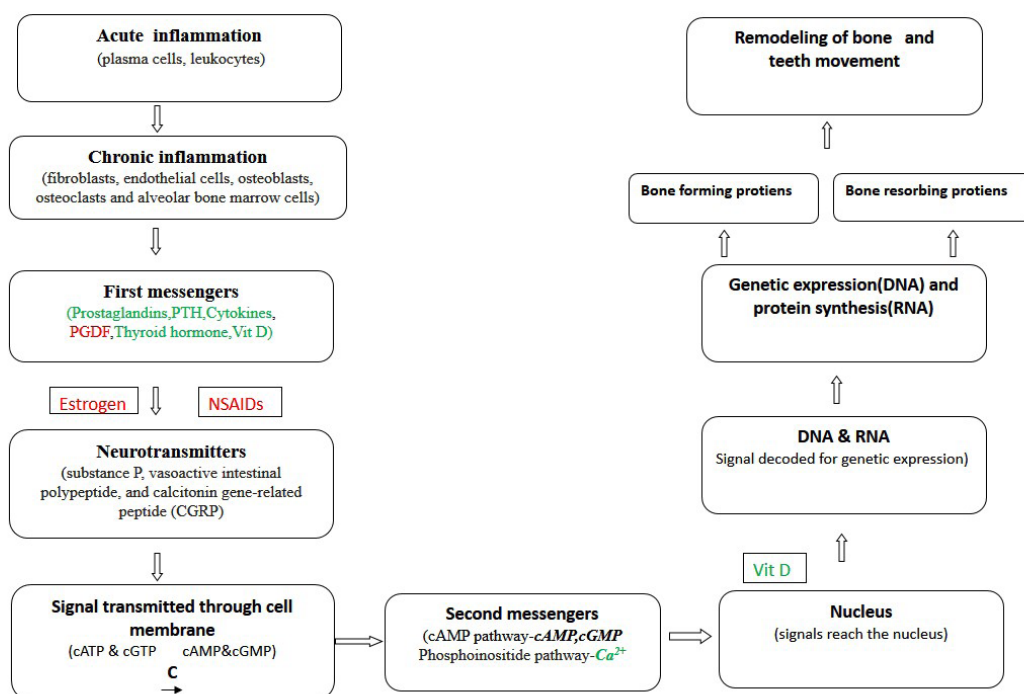
Phenytoin

It induces gingival hyperplasia due to overgrowth of gingival collagen fibers, which involve the interdental papilla, making application of orthodontic mechanics and maintaining oral hygiene difficult. Valproic acid has a potential to induce gingival bleeding even with minor trauma, making orthodontic maneuvers difficult. Gabapentin produces xerostomia, making oral hygiene maintenance difficult during orthodontic treatment.

Significant histologic changes in the periodontal tissues such as increased density of fibroblasts, decreased number of osteoclasts in contact with alveolar bone wall of the pressure side and deeper layer of non-mineralized osteoid on the tension side were observed in the phenytoin group.²⁰

Prostaglandins

Experiments have shown that PGs may be mediators of mechanical stress during orthodontic tooth movement. They stimulate bone resorption, root resorption, decrease collagen synthesis, and increase cAMP. They stimulate bone resorption by increasing the number of osteoclasts and activating already existing osteoclasts. A lower concentration of PGE2 (0.1 µg) appears to be effective in enhancing tooth movement. Higher concentration leads to root resorption. Systemic administration is reported to have better effect than local administration. Researchers have injected PGs locally at the site of orthodontic tooth movement to enhance the bone remodeling process and the pace of tooth movement.



CONCLUSION

Drugs affecting Orthodontic tooth movement Red indicating Inhibition and Green indicating Promotion

The flowchart represents a brief outline of the molecular level of orthodontic tooth movement and effect of drugs on it. All the aspects of the factors affecting tooth movement are yet to be unraveled. Some differences that take place are caused by bone remodeling rate changes that may be induced by various systemic and local drugs and varied systemic factors. Not all, but many of the drugs studied have useful therapeutic effects and accompanying side effects that may influence the cells instrumental in orthodontic tooth movement caused by different levels of orthodontic forces. Since, in this era, the consumption of drugs has gone up in all age groups due to increased illnesses in today's living conditions. Therefore, it must be made a routine investigation for the orthodontists to check drug levels, consumption and thorough history of every patient, before and during the course of orthodontic treatment, so that the best treatment protocol could be considered individually. Since, Acetaminophen in particular does not have significant influence on the rate of tooth movement, it can be prescribed for pain control during orthodontic tooth movement.

Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: Nil

REFERENCES

1. Vayda P, Loveless J, Miller R, Theroux K. The effect of shortterm analgesic usage on the rate of orthodontic tooth movement. *J Dent Res* 2000;79:614
2. Chumbley AB, Tuncay OC. The effect of indomethacin (an aspirin-like drug) on the rate of orthodontic tooth movement. *Am J Orthod*. 1986;89:312-4.
3. Kehoe, M.J.; Cohen, S.M.; Zarrinnia, K.; and Cowan, A.: The effect of acetaminophen, ibuprofen, and misoprostol on prostaglandin E2 synthesis and the degree and rate of orthodontic tooth movement, *Angle Orthod*. 66:339-349, 1996. 24.
4. Roche, J.J.; Cisneros, G.J.; and Acs, G.: The effect of acetaminophen on tooth movement in rabbits, *Angle Orthod*. 67:231-236, 1999.
5. Monte K. Collins, DDS, MSD, and Peter M. Sinclair, DDS, MSD, The local use of vitamin D to increase the rate of orthodontic tooth movement. *Am J Orthod Dentofac Orthop* 1988;94:278-84.
6. Hellsing E, Hammarström L. The effects of

- pregnancy and fluoride on orthodontic tooth movements in rats. *Eur J Orthod.* 1991;13:223–30.
7. Sven Lindskog, Myrae. Flores, Eva Lilja, Lars Hammarström Effect of a high dose of fluoride on resorbing osteoclasts in vivo Authors, ,European Journal of Oral Sciences
8. Rogers MJ, Gordon S, Benford HL, Coxon FP, Luckman SP, Monkkenon J, et al. Cellular and molecular mechanisms of action of bisphosphonates. *Cancer* 2000;88:2961-78.
9. Igarashi K, Mitani H, Adachi H, Shinoda H. Anchorage and retentive effects of a bisphosphonate (AHBuBP) on tooth movements in rats. *Am J Orthod Dentofacial Orthop.* 1994 Sep;106(3):279-89.
10. Jilka RL. Molecular and cellular mechanisms of the anabolic effect of intermittent PTH. *Bone* 2007;40:1434-46.
11. Bikle DD, Sakata T, Leary C, Elalieh H, Ginzinger D, Rosen CJ, Beamer W, Majumdar S, Halloran BP. Insulin-like growth factor I is required for the anabolic actions of parathyroid hormone on mouse bone. *J Bone Miner Res.* 2002 Sep;17(9):1570-8.
12. Tyrovola JB, Spyropoulos MN. Effects of drugs and systemic factors on orthodontic treatment. *Quintessence Int.* 2001;32:365–71.
13. Harris SA, Tau KR, Turner RT, Spelsberg TC (1996). Estrogens and progestins. In: Principles of bone biology. Bilezikian JP, Raisz LG, Rodan GA, editors. San Diego: Academic Press, pp. 507-520
14. Xu X, Zhao Q, Yang S, Fu G, Chen Y. A new approach to accelerate orthodontic tooth movement in women: Orthodontic force application after ovulation. *Med Hypotheses.* 2010 Oct;75(4):405-7.
15. Shirazi M, Dehpour AR, Jafari F. The effect of thyroid hormone on orthodontic tooth movement in rats. *J Clin Pediatr Dent.* 1999;23:259–64.
16. Madan MS, Liu ZJ, Gu GM, King GJ. Effects of human relaxin on orthodontic tooth movement and periodontal ligaments in rats. *Am J Orthod.* 2007;131:8.e1–8.10
17. A randomized, placebo-controlled clinical trial on the effects of recombinant human relaxin on tooth movement and short-term stability Susan P. McGorray, a Calogero Dolce, *Am J Orthod.* 2012;141:196-203
18. Clinical review 83: Mechanisms of glucocorticoid action in bone: implications to glucocorticoid-induced osteoporosis. *E Canalis - The Journal of clinical endocrinology & metabolism*, 1996
19. Kalia S, Melsen B, Verna C. Tissue reaction to orthodontic tooth movement in acute and chronic corticosteroid treatment. *Orthod Craniofac Res.* 2004;7:26–34
20. Effect of phenytoin on periodontal tissues exposed to orthodontic force--an experimental study in rat J Karsten & E Hellsing, *British Journal of Orthodontics* Volume 24, 1997 - Issue 3.

Study of Electrocution Deaths in Mumbai: A three Year Retrospective Analysis

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ABSTRACT

Background- Average fatalities due to electrocution in India have remained more or less the same over the years. These deaths are of concern mainly because they are occurring due to contact with low voltage current which is employed at home.

Material & Method- The study was conducted retrospectively between January 2014 to December 2016 at a tertiary health care centre in Mumbai and 87 deaths out of total 7432 autopsies were attributed to Electrocution in this period.

Observations- Fatalities were seen mostly in males (92%) with the majority (63%) falling in the working age group of 21-50 years. All the cases were accidental and majority of victims got electrocuted at home (57.47%) with commonest causative agent being home appliances (36.78%) & open wires (24.13%). Skilled or unskilled labourers were commonly involved in electrocution (50.56%) and the fatalities were mostly seen in uneducated and in those who studied below matriculation (81.6%). Electrical marks were seen in 70% cases with the mark mostly present on the upper limbs. In 16.09% victims sustained flash burns and no injury was seen in 13.79% cases.

Conclusion- Majority of deaths due to electrocution is preventable by simply educating people regarding handling of electric appliances and the hazards associated with its ill use. For autopsy surgeons, postmortem findings along with circumstantial evidence are important not only to arrive at a diagnosis but also to study the factors responsible in such fatalities.

Keywords- fatal, electrocution, current, accidental, entry wound, exit wound.

INTRODUCTION

As per the National crime records bureau data, Electrocution accounted for 2.6%, 2.1% & 2.4% fatalities amongst major causes of deaths in the year 2013, 2014 & 2015 respectively.¹ Further, in India, 42% of total fires occur due to electrical sources and 8% deaths that occur in factories are due to electricity.² Such high electrocution fatality in developing country like India is expected with the increased availability of electricity over the years compounded with inadequate

safety measures and lack of awareness among the general public. Deaths due to Electrocution are almost always accidental and in India they occur commonly due to accidental contact with low-voltage current (AC, 220–240 V) used in houses and small-scale industries.³

The severity of tissue damage including death is directly related to a number of physical factors, which include current, voltage, resistance and time. For biological damage to occur, the body must be incorporated into an electrical circuit, so that there is a passage of electrons through the tissues. A mere accumulation of electrons in the form of a static charge can do no harm.⁴ The only major evidence of deaths due to electrocution is an Electric mark, which is often, either not found or confused with other superficial surface

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injuries. Hence, many times, the death is attributed to electrocution only after ruling out other possibilities.

With this study, an attempt is made to analyse the various factors involved in electrocution deaths as well as to study the pattern of injuries sustained.

MATERIAL & METHOD

A retrospectively analysis was done involving all electrocution deaths coming for autopsy at the department of forensic medicine, Lokmanya Tilak Municipal Medical College & General Hospital, Mumbai, between the year January 2014 to December 2016. In the study period, a total of 87 electrocution deaths were identified. Autopsy reports and police records were used as the source of information. The information gathered was entered in a standardized proforma and analysed further to obtain results. All the cases were evaluated for demographic data, time of incident, place of occurrence, causative agent, autopsy findings and manner of death.

OBSERVATIONS & DISCUSSION

A total of 7432 autopsies were performed between January 2014 to December 2016 and 87 deaths were attributed to electrocution, i.e 1.17% cases.

Table 1- Distribution of cases according to age and sex

Age group (years)	Male	Female	Total
0-10	2	0	2
11-20	9	1	10
21-30	22	1	23
31-40	19	3	22
41-50	14	2	16
51-60	8	0	8
> 60	6	0	6
Total	80	07	87

Considering the sex of the victims, males outnumbered females with ratio of 11:1 and majority of males (63%) belonged to the working age group of 21-50 years. Our observation is consistent with other Indian studies.⁵⁻¹⁰ The youngest & oldest victim was 6yrs & 72yrs old respectively. Higher fatalities in males

are due to their risk taking behaviour as well as their employment in industries and as an electrician.

Table 2- Place of incident

Place of incident	No of cases	Percentage
Home	50	57.47
Work place	19	21.83
Road	04	4.60
Railway	14	16.09
Total	87	100

Comparing the place of incident, 57.47% deaths occurred at home whereas only 21.83% incident occurred at workplace. 14 deaths were due to contact with high tension railway lines. Higher incidences at home or indoors were similarly noted by Gupta et al.⁵ (73.54%) in Gujarat, by Dokov W¹¹ (78.06%) in Varna, Bulgaria & by Blumenthal R¹³ (78.41%) in Gauteng region of South Africa. In contrast to our observation, Ragui S et al⁶. in Manipur and Kumar S et al¹². in Northern India revealed majority deaths (68% & 59% respectively) occurring outdoors. Higher incidences at home in our study could be attributed to round the clock availability of electricity in all households in our city and the use of multiple electrical appliances requiring high voltage like refrigerator, geysers, air conditioners, water pumps etc. In contrast, the availability of electricity in households is far less in Manipur as stated by Ragui S et al⁶. and hence only 32% deaths were observed at home by them.

Table 3- Time of incident

Time of incident	No of cases	Percentage
06.00 – 12.00 hours	25	28.73
12.00 – 18.00 hours	39	44.82
18.00 – 00.00 hours	17	19.54
00.00 – 06.00 hours	06	6.89
Total	87	100

About 74% cases in our study occurred during day time between 6am to 6pm followed by 19.54% & 6.89% cases between 6pm to 12am and 12am to

6am respectively. A higher incidence during daytime is obvious in our study due to more usage of electric appliances at home and work place and use of local trains for commuting in our city. Similarly 71% electrocution accidents were observed during daytime in Puducherry by Reddy A et al.⁷

Table 4- Occupation of victims

Occupation	No of cases	Percentage
Housewives	07	8.04
Students	10	11.49
Electricians	11	12.64
Skilled labours other than electrician	25	28.73
Labourers	19	21.83
Office workers	10	11.49
Old age	05	5.74
Total	87	100

The majority of victims in our study were skilled and unskilled labourers (28.73% & 21.83%). Only 12.64% victims were employed as electricians. All the female victims (7) were housewives. Though the electricians are at high risk, they take enough precautions while working. Lack of awareness & safety measures along with stress of work amongst labourers could be the possible factors for such higher fatality. A higher incidence in workers other than electricians was also observed by Reddy A et al.⁷ & Shrigiwar M et al.¹⁰ In contrast, Gadge S et al.⁸ in study around GMC Aurangabad, Maharashtra, reported more fatalities amongst electricians (30.61%) as compared to labourers (12.24%).

A very high percentage of fatal electrocution was noted amongst uneducated (32.18%) and in those who studied only upto 10th standard (49.42%). Similar observation was made by Gadge S et al.⁸ where 87.75% deaths due to electrocution were amongst people having education less than matriculation.

Table 5- Causative agent of electrocution

Causative agent	No of cases	Percentage
Home appliance	32	36.78
Open wires	21	24.13
High tension railway lines	14	16.09
Heavy machinery	15	17.24
Water pumps	05	5.74
Total	87	100

The causative agents responsible for electrocution in our study showed Home appliances to be the main culprit (36.78% cases) followed by open wires (24.13%), Heavy machinery (17.24%), High tension railway lines (16.09%) and water pumps in 5.74% cases. Use of multiple electrical appliances at home is a common thing in big cities like Mumbai, which if not handled with due precautions can become hazardous. All High tension railway line fatalities in our study were seen amongst daily commuters only. In Mumbai, local trains are the most commonly used transport system for daily commuting. Often, people sit on top of the train due to excessive rush or as a part of fun, which increases the risk of coming in contact with high tension lines by many folds. Amongst the 21 fatalities due to contact with open wires, 9 belonged to the age group between 0-20 years.

All the deaths in our study were accidental in nature, homicide or suicide was not alleged in any of the case. Studies related to electrocution by various Indian & international authors⁵⁻¹³ too suggests the most common manner of death to be accidental. Suicidal or homicidal deaths were also not reported by Ragui S et al⁶ & Reddy A et al.⁷ in their study around Manipur and Puducherry respectively.

Table 6- Type of injury sustained

Type of injury	No of cases	Percentage
Entry wound only	52	59.77
Both entry & exit wounds	09	10.34
Burns	14	16.09
No injury	12	13.79
Total	87	100

Only Entry mark was seen in 52 (59.77%) cases and both entry and exit marks were present in 9 (10.34%) cases. In 9 cases, where entry & exit wounds were seen, 7 victims had come in contact with open wires and rest 2 got electrocuted by heavy machineries. All 14 burn cases (16.09%) were due to contact with high tension railway lines. No electric marks were seen in 12 (13.79%) cases. The causative agent in 09 cases without electric marks was Home appliance and Water pump in remaining 3 cases.

Electrical injury in the form of entry & exit wounds or burns was seen in 86% cases in our study and is in concurrence with various national & international studies.⁵⁻¹⁴ Few authors observed only exit wounds,⁷⁻⁸ which is in contrast with our observations. A higher percentage of both entry & exit marks in the range of 17% to 28% were observed in other studies.^{5,7,12,14} Presence of both entry & exit marks were observed in 72% cases in study done by Ragui S et al⁶ in Manipur, which is probably due to the involvement of high tension wires in 60% fatalities. Other injuries in the form of abrasion & contusion were seen in few cases but no fatal mechanical trauma was noted in the present study.

Table 7- Distribution of entry and exit wounds on the body surface.

Site of wound	Entry wound	Exit wound	Total
Upper limbs	54	04	58
Lower limbs	06	05	11
Chest	01	00	01
Total	61	09	70

As with all other studies⁵⁻¹⁴, the electric marks in the present study was commonly seen on upper extremities (66.66%), followed by lower extremities (12.64%) and on chest in 1 case. Entry mark was present on upper limbs in 54 cases (62.06%), lower limbs in 06 cases (6.89%) and on the chest in 1 case. Exit marks were seen on upper limbs in 4 cases (4.59%) and on the lower limbs in 5 cases (5.74%). In all 9 cases (10.34%) where both entry and exit wounds were present; the entry mark was always on the upper limbs.

SUMMARY & CONCLUSION

In our study period of three years, only 1.17%

deaths were attributed to electrocution. All the cases were accidental and majority of victims got electrocuted at home with commonest causative agent being home appliances & open wires. Skilled or unskilled labourers were commonly involved in electrocution. The fatalities were mostly seen in uneducated and in those who studied below matriculation. Electrical marks were seen in 70% cases with the mark mostly present on the upper limbs. In 12 cases where no electric mark was found, the death was attributed to electrocution after ruling out other causes and based on the circumstantial evidence.

Deaths in electrocution are mostly instantaneous and the chances of revival are minimal. The issue of maximum number of fatalities occurring indoors is of concern and decreasing such incidents is a responsibility together of legislators, government authorities and communities. For forensic experts, electrocution deaths may become tedious in the absence of injury or when the injury mimics other superficial trauma. Thorough medical autopsy along with circumstantial evidence must be sought for before arriving at the conclusion.

Conflict of Interest- Nil

Source of Funding- Self

Ethical Clearance- Not required as it is a review article.

REFERENCES

1. National Crime Records Bureau. Ministry of Home Affairs. Accidental deaths and Suicides in India 2015. Available at: <http://ncrb.nic.in/CD-ADSI-2015/ADSI2015.pdf> (last accessed May, 2017).
2. Sreejith PG. Global development in electrical safety. Electrical safety week, ICF, Perambur, June 2003.
3. Vij K. Textbook of Forensic Medicine and Toxicology: Principles and Practice. 4th edition. Noida, UP: Elsevier; 2009. pp. 237–8.
4. Saukko P, Knight B. Knight's forensic pathology. 3rd ed. London: Arnold; 2004. p. 326-38.
5. Gupta BD, Mehta RA, Trangadia MM. Profile of deaths due to electrocution: A retrospective study. JIAFM 2012;34(1):13–15.
6. Ragui S, Meera T, Singh KP, Devi PM, Devi AS. A study of electrocution deaths in Manipur. J Med

Soc 2013;27:124-6.

7. Reddy A, Balaraman R, Sengottuvel P. Accidental electrocution fatalities in Puducherry: A 3- year retrospective study. *Int J Med Sci Public Health* 2015;4:48-52.
8. Sachin Gadge, KU Zine, AK Batra, SV Kuchewar, RD Meshram, SG Dhawane. Medico-legal study of cases of death due to electrocution in and around Gmc Aurangabad. *Medico-Legal Update*. July - December, 2011;11(2):53-55.
9. Rautji R, Rudra A, Behra C, dogra TD. Electrocution in south Delhi: a retrospective study. *Med Sci Law* 2003;(43):350-2.
10. Shrigiriwar M, Bardale R, Dixit PG. Electrocution: A six year study of electrical fatalities. *Journal of Indian Academy of forensic medicine*. 2007;29(2):50-53.
11. Dokov W. Electrocution-related mortality: A review of 351 deaths by low-voltage electrical current. *Ulus Travma Acil Cerrahi Derg* 2010;16:139-43.
12. Kumar S, Verma AK, Singh US. Electrocution-related mortality in northern India – A 5-year retrospective study. *Egyptian Journal of Forensic Sciences* 2014;4: 1–6.
13. Blumenthal R. A retrospective descriptive study of electrocution deaths in Gauteng, South Africa:2001–2004. *Burns* (2009), doi:10.1016/j.burns.2009.01.009.
14. Kuhtic I, Bakovic M, Mayer D, Strinovic D, Petroveckii V. Electrical mark in electrocution deaths: A 20-years study. *Open Forensic Sci J*. 2012;5:23-7.

A Retrospective Study of Pattern of Organs Involved in Natural Deaths at Autopsy—Role of Histopathology as Ancillary Tool

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ABSTRACT

The deaths due to natural cause involving organ system like cardiovascular, respiratory or central nervous system either as a single system or with combination of several systems have increased in younger age group individuals with the increase in risk factors such as smoking, consumption of alcohol, stress, food habits and sedentary life style. The determination of the common organs involved will provide valuable data in the diagnosis and treatment of the condition at an early stage and also to focus more on the vulnerable group. The current study is a retrospective analysis of gross and histopathology features of organs contributing for natural death that were autopsied at Vydehi Institute of Medical Sciences and Research Centre, Bangalore. Where the incidence was more among the age group of 40 to 60 years with male predominance, Heart is the most common organ involved both in gross and microscopy. The histopathological examination also had a major contribution as ancillary tool in concluding the cause of death.

Keywords: *Natural Death, Heart, Gross examination, Histopathological examination.*

INTRODUCTION

In the routine practice of medicolegal autopsies, encountering the cases of sudden natural death, especially the deceased being young adult or in the middle age is a matter of concern. Detecting the cause of death in such cases becomes an important challenge in Forensic practice, as obscure autopsies and negative autopsies are commonly encountered. In such situations, ancillary investigations like chemical analysis, microbiology, serology and histopathological examination will become important. But in cases associated with decomposition and negative chemical analysis, autopsy surgeon has to completely rely on gross findings of post-mortem examination.

Sudden death is that of a death that is rapid and unexpected or unforeseen both subjectively and objectively occurring without any prior clinical evaluation in apparently healthy people or in patient during an apparent benign phase in the course of a disease.¹

According to Knight's Forensic Pathology, the death may appear sudden and unexpected but there may be chronic symptoms and also would have interpreted as harmless. In sudden death the immediate cause is almost always found in the cardiovascular system, even though topographically the lesion is not in heart or great vessels. Massive cerebral haemorrhage, subarachnoid bleeding, ruptured ectopic pregnancy, haemoptysis, haematemeses and pulmonary embolism may also join with heart disease and aortic aneurysm to contribute most of the vascular system reasons for sudden unexpected deaths.²

Among the natural deaths, ischemic heart disease is considered as leading cause of death followed by Cerebrovascular disease and Lower respiratory tract infection in 2004. It is projected to remain same in 2030.³

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The term natural death encounter difficulty in defining natural. It is thought as an opposite of unnatural type of death such as accidental, suicidal and homicidal death. The term becomes meaningful if it is applied with specific meaning in definite situation.⁴ Natural death means that the death is caused entirely by disease and the trauma or poison did not play any part in bringing it about.⁵ In the current study natural death is linked with involvement of organs.

In the current study cases considered are those which were brought dead to mortuary or casualty of vydehi institute of medical sciences and research centre Bangalore, here the manner of death is attributed to be natural. Among the total number of cases some of the cases are admitted in hospital and some were brought from residence or workplace directly to mortuary.

These cases are from different parts of the country, as some of them are migrated individual who had come with the history of pre existing disease for treatment purpose and some migrated for job as this part of Bangalore is an IT hub and here the opportunity for job is more.

AIMS & OBJECTIVES

To determine the organ/s involved in Natural deaths.

To determine the correlation of gross and microscopic findings in the most common organ/s causing Natural death.

MATERIALS AND METHODOLOGY

The data for the current study are collected retrospectively from the inquest forms 146(i) & (ii), autopsy case reports and relevant histopathological examination report, for a period of five years that is between 2010 to 2014. Data related to age, sex, gross pathological findings in the organs involved and histopathological findings are collected from all the cases where the manner of death is proved to be natural at autopsy. Descriptive analysis was done and chi square test has been used to find the significance of histopathology examination.

Inclusion criteria:

All the medicolegal autopsy conducted during the study period where the manner of death revealed to be natural.

Exclusion criteria.

1. All deaths due to unnatural causes.
2. All unknown and unidentified cases brought for autopsy.
3. All decomposed cases.

OBSERVATION AND RESULTS

In the current study total number of medico legal cases were 1140 cases, out of which cause of death was natural in 183 cases (16%). The most common organ involved in causation of death was heart, in 109 cases followed by lungs in 39 cases.

Among involvement of heart the incidence is common in male than in case of female. Age of occurrence is more in age group of 41-60years followed by 21-40 years.

Among 109 cases of death involving heart 70 cases were send for histopathological examination for confirmation of cause of death. Significance of histopathology over gross examination was carried over criteria's like weight of heart, thickness of left ventricular wall, stenosis of coronaries, plaques in aortic wall and infarct of heart. The significance of histopathology was elicited by applying chi square test and analysing data by SPSS software it was found that detecting infarct there was significant role of histopathology, in remaining criteria the significance was not found.

Table 1: Total number of Natural Deaths out of total medicolegal autopsies conducted during study period.

Year	Total autopsy	Total Natural Death
2010	173	26(15%)
2011	193	28(15%)
2012	232	35(15%)
2013	251	43(17%)
2014	291	51(17%)
Total	1140	183(16%)

Table 2: Age and Sex distribution of Natural Death according to organ system involvement

Age	CVS		RS		GI		CNS		GUS		Multiorgan	
	M	F	M	F	M	F	M	F	M	F	M	F
1- 20yrs	4	1	2	0	0	0	0	0	0	0	1	1
21-40yrs	31	4	11	3	3	2	3	1	0	0	5	1
41- 60 yrs	47	3	10	4	1	0	5	1	0	1	1	03
61-80 yrs	12	2	7	2	1	0	0	0	0	0	3	1
81-100 yrs	4	1	0	0	0	0	0	0	0	0	1	0
Total	98	11	30	09	05	02	08	02	00	01	11	06

Table 3: Male and Female Sex ratio in relation to cardiovascular system involvement.

Cardiac case year wise	Males	Females
2010	11	03
2011	16	00
2012	22	01
2013	18	05
2014	30	03
Total	97	12

Table 4: Increase in Weight of heart in gross and in histopathology among 70 specimens sent for histopathology examination.

Year	Gross	Histopathology
2010	09	10
2011	14	12
2012	13	12
2013	07	10
2014	12	13
Total	55	57

Table 5: Increase in thickness of left ventricular wall of heart in gross and in histopathology among 70 specimens sent for histopathology examination.

Year	Gross	Histopathology
2010	08	08
2011	10	09
2012	10	08
2013	08	07
2014	07	15
Total	43	47

Table 6: Stenosis of coronaries of heart in gross and in histopathology among 70 specimens sent for histopathology examination.

Year	Gross	Histopathology
2010	08	08
2011	15	13
2012	13	12
2013	09	09
2014	09	11
Total	54	53

Table 7: Plaques in Aorta of heart in gross and in histopathology among 70 specimens sent for histopathology examination.

Year	Gross	Histopathology
2010	08	08
2011	10	05
2012	10	08
2013	09	09
2014	08	11
Total	45	41

Table 8: Infarcts in the heart; Gross and in histopathology among 70 specimens sent for histopathology examination.

Year	Gross	Histopathology
2010	02	03
2011	03	08
2012	03	11
2013	00	00
2014	06	10
Total	14	32

Table 9: Data analysed after using SPSS software

		+veValues	-veValues	Calculated Chi Square Test value	P- Value
Weight	Gross	55	18	0.15	0.69
	HPE	57	16		
Left ventricle	Gross	43	30	0.46	0.49
	HPE	47	26		
Coronary	Gross	53	20	0.03	0.65
	HPE	52	21		
Infarct	Gross	14	59	8.32	0.004
	HPE	30	43		
Aorta	Gross	45	28	0.45	0.50
	HPE	41	32		

DISCUSSION

The current study is the retrospective analysis of Natural deaths for a period of five years in Department of Forensic Medicine and Toxicology, Vydehi hospital Bangalore from the year 2010 to 2014. The total cases autopsied during these five years were 1,140 out of which, in 183 cases manner of death is Natural. The ratio of total number of cases in relation to death due to natural cause remained relatively constant during ever year. This was similar to the study done in Karamasad, Gujarat, where the incidence of natural death was constant during study period.⁶

On considering systems involved cardiovascular system involvement is seen in 109 cases of natural death

followed by respiratory system which was 39 cases, multiorgan failure in 17 cases, 10 cases in central nervous system, gastrointestinal system in 7 cases and 1 case in genitourinary system. The present study is similar to the study done Khetre RR et al and Sree Lakshmi et al had shown Heart is the most common organ involved in sudden deaths followed by lungs.^{7,8} However the study is in contrary with a study done in Municipal Medical college Mumbai, India. Where majority of deaths due to non cardiac causes were more.⁹

The age of occurrence of the natural deaths were divided in 20 years range. The youngest incidence was noticed in a female of 9 years and the oldest case was male aged about 97 years, and both the cases showed

involvement of Heart. The age of occurrence among the Heart involvement was commonly observed between 41-60 years there are 50 cases. The rate of cases is more in this age group may be due to risk factors and also due to increase in incidence of some of non communicable disease like diabetes, hypertension and increase cholesterol level. This was comparable to a study done in Karamsad Gujarat, Kumar V et al, Dinesh S Rao, Khetre R R, Batra A K et al .^{6,7,10,12}

The incidence was more in males compared to females in all the organs considered in the study. Significance were more so in the heart. Ratio was 97cases in male and 12cases in females. This gender disparity observed is similar to a study done among Nigerian population may be due to cardio protective effects of estrogens in women before menopause as opposed to testosterone induced increase in cardiovascular risk.¹¹

In the current study out of 109 cardiac cases 70 cases were sent for histopathology examination.

In the current study where the gross evidence of cardiovascular disease, microscopic examination was done as an ancillary investigation. In cases where there is dispute in approaching to cause of death by gross finding, microscopic examination had been done and in cases with obvious disease on gross, microscopy was avoided to prevent delay in giving opinion. Histopathological examination is done in 70 cases. Most of the cases where microscopy is done there were more than one finding.

On considering the microscopic findings individually coronary artery stenosis was noticed in 54 cases which were more in the age group of 41-60 years. Increase in weight of heart has been noticed for the given age and built of individual which were 55 cases, tampanode was noticed in 3cases and valvular disease in 1case. The youngest case that was noticed in this study was 9years female, the case had congenital heart disease. The study can be compared to the study done by Dinesh S.Rao where the occlusion of coronaries was commonly noticed. Another study done by Thomas A. Gaziano et al and David S. Celermajer et al had shown the involvement of coronary heart disease were more compared to other causes more so in developing countries.^{10,13,14}

The histopathology examination showed positive finding in 65 cases, positive findings were more in the

individual of age ranging between 41-50 years which were about 20 cases of microscopy. Coronary artery disease were seen in maximum which was in similar with the study done by Sree Lakshmi K et al.⁸

On comparing gross finding with histopathology findings of those cases which were sent for microscopy, among all the criteria histopathology had a major role in detecting the infarct of heart thus having significant value compared to other criteria. Role of histopathology was studied in articles by FD C Bernardi and Geoffroy Lorin De La Grandmaison histological analysis has a major impact especially in the lungs, liver and kidney.^{15,16} In contrary to the above study Judith Fronczek concluded that histological examination of all organs in all forensic cases for the purpose of providing a medical cause of death is not supported.¹⁷

CONCLUSION

The study was involving the natural deaths among all the medicolegal autopsies. Cardiovascular related deaths overweighed compared to other system, with the risk group among 41-60 years of age. The condition is frequently seen in male on considering gender. On gross and microscopy coronary artery disease was common among cardiac cause. In cases of dispute and for the confirmation of diagnosis of death due to systems involved histopathology examination played significant role as an ancillary investigation. As the risk group are well identified in the current study, it also provides a statistic data for this part of Bangalore, to take protective and precautionary measures for the same.

Conflict of Interest: Nil

Ethical Clearance- Taken

Source of funding: Self

REFERENCE

1. Michael Tsokos. Sudden death from natural causes in: Forensic Pathology Reviews. Vol 1. New jersey:Humana press, 2004. P. 141.
2. Pekka saukko, Bernard Knight. The pathology of sudden death in: Knight'S Forensic Pathology.3Ed. London: Arnold, 2004.p.493.
3. G.Gururaj. Injury and violence in India: Facts and Figures in National institute of Mental Health and Neurosciences, Publication NO 82, Bangalore.

4. Oehmichen M, Meissner C. Natural Death. Gerontology. 2000 Mar-Apr; 46(2): 105-10
5. K.S Narayana Reddy, O.P.Murthy. Death and its causes :The essentials of Forensic Medicine and Toxicology. 33rd Ed. Jaypee, 2014 .P-150.
6. Sanjay Gupta, Ravi Panchal, Divyesh Sondarva. An Approach to Sudden Natural Deaths in Medicolegal Autopsies at Karamsad, Gujarat. J Indian Acad Forensic Med. Jan-Mar 2011, Vol. 33, No. 1.
7. Khetre R R, Batra A K, Shrigiriwar M B, Kuchewar S V, Jambure M P. A prospective autopsy based study of sudden natural non-traumatic deaths in a rural district. *International Journal of Recent Trends in Science and Technology* 12(2): 243-246 <http://www.statperson.com> (accessed 02 September 2015)
8. Sree Lakshmi K, Ashalatha N, S VenkataRaghava, Raghupathi A R, 5Dayananda S Biligi, Siddique M Ahmed, Natarajan M. Evaluation of Histopathologic Role in Providing Cause of Death in Sudden Unexpected Natural Death. J Indian Acad Forensic Med. January-March 2014, Vol. 36, No. 1
9. Chaturvedi M, Satoskar M, Khare M S, Kalgutkar A D. Sudden, unexpected and natural death in young adults of age between 18-35 years. A clinicopathological study. Indian journal patholmicrobial 2011; 54; 47-50.
10. Dinesh.S.Rao, Yadakul. SUDDEN AND UNEXPECTED NATURAL DEATHS - A FOUR-YEAR AUTOPSY REVIEW. JPAFMAT 2008; 8(2).
11. Olumuyiwa Eyitayo pelemo et al. An autopsy review of sudden unexpected natural deaths in suburban Nigerian population. Biomed central 2014: 12;26
12. Kumar V, San KP, Idwan A, Shah N, Hajar S, Norkahfi M. A study of sudden natural deaths in medicolegal autopsies in University Malaya Medical Centre (UMMC), Kuala Lumpur. Journal of Forensic and Legal Medicine. 2007; 14: 151–154
13. Thomas A. Gaziano, Asaf Bitton, Shuchi Anand, * Shafika Abrahams-Gessel, and Adrianna Murphy. Growing Epidemic of Coronary Heart Disease in Low- and Middle-Income Countries. Curr Probl Cardiol. 2010 Feb; 35(2): 72–115. Accessed on 02/11/15
14. David S. Celermajer, Clara K. Chow, Eloi Marijon, Nicholas M. Anstey, Kam S. Woo. Prevalences, Patterns, and the Potential of Early Disease Detection. J Am Coll Cardiol. 2012;60(14):1207-1216. Accessed on 02/11/15.
15. F D C Bernardi, P H N Saldiva, T Mauad, histological examination has a major impact on macroscopic necropsy diagnosis. J Clin Pathol 2005; 58: 1261-1264
16. Fronczek, J, Hollingbury, F., Biggs, M. et al. Forensic Sci Med Pathol (2014) 10: 39.
17. De La Grandmaison, G.L Charlier, P and Durigon M(2010), usefulness of systematic histological examination in routine Forensic Autopsy. Journal of Forensic sciences, 55: 85-88.

Knowledge and Attitude of Medical Students Towards Medico Legal Postmortems at NSCB Medical College Jabalpur MP

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ABSTRACT

There is shortage of specialists in Forensic medicine. Most of the autopsies in India are conducted by non-specialist doctors. To frame strategies for improving the knowledge and attitude of medical students towards medico legal postmortems, we must know the current status of these aspects. This study is conducted to know the attitude of medical students towards medico-legal autopsy. 204 medical students in second year and third year of Netaji Subhash Chandra Bose medical College Jabalpur were asked to respond to a premade questionnaire. 85.29% students reported that relatives cannot request a medico legal autopsy without police information. 73.52% think that if the case is brought dead to casualty, it is mandatory to send dead body for postmortem examination. 42.15% students opined that doctor can refer autopsy case to another doctor in a different hospital/city. 80.39% responded that information about postmortem report can be divulged under RTI (Right to Information) act. 74.50% students reported that partial autopsy is not permissible in India. 42.15% students recorded positive response to specialize in forensic medicine.

Keywords : Knowledge, attitude, medico legal postmortems

INTRODUCTION

Conducting medico legal postmortems and furnishing the postmortem report is a very important duty of an autopsy surgeon. There is shortage of specialists in Forensic medicine who are the expert in conducting autopsy^{1,2}. Major fraction of total autopsies in India, are conducted by non-specialist doctors. So it is very important for these non-specialist doctors to be knowledgeable and also to have right attitude towards medico legal postmortems. The best way to achieve this is training of medical students in this area. To frame strategies for improving the knowledge and attitude of medical students towards medico legal postmortems, we must know the current status of these aspects among them and this study is an attempt to know the same.

AIMS AND OBJECTIVES

To study the attitude of medical students towards medico legal autopsy.

MATERIAL AND METHOD

In the year of 2016, 204 medical students in second year (third and fourth semester) and third year of Netaji Subhash Chandra Bose medical College Jabalpur, participated voluntarily in the study. A premade questionnaire was distributed among them and their responses were noted. Questionnaire contains the questions regarding autopsy practice, the knowledge of the procedure and attitude and perception towards postmortem examination. Questionnaire responses were submitted anonymously. Time limit was set to submit the responses.

FINDINGS/ RESULTS

Out of 250 questionnaires distributed among the students 204 were submitted back successfully within time limit. All the students participated in study have witnessed at least 10 postmortems during their forensic

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medicine autopsy demonstration classes. Responses to the questions were as shown in Table 1.

RESULTS

Table 1:

1	Can relatives request a medico legal autopsy without police information?	Yes= 28 (13.72%)	No=174 (85.29%)	don't know=2 (0.98%)
2	Do you think body can be handed over to the relatives without post mortem examination, if the cause of death known in MLC Cases	Yes = 28 (13.72%)	no= 172 (84.31%)	don't know= 4 (1.96%)
3	Can visceral organs be removed during postmortem examination for research and study purposes	Yes=138 (67.64%)	no= 64 (31.37%)	don't know=2 (0.98%)
4	If the case is brought dead to casualty, is it mandatory to send dead body for postmortem examination?	Yes=150 (73.52%)	no=52 (25.49%)	don't know= 2 (0.98%)
5	Can doctor refer autopsy case to another doctor in a different hospital/city	Yes= 86 (42.15%)	no = 112 (54.90 %)	don't know= 6 (2.94%)
6	Can information about postmortem report be divulged under RTI act?	Yes= 36 (17.64%)	no=164 (80.39%)	don't know =4 (1.96%)
7	Is partial autopsy permissible in India?	Yes=24 (11.76%)	no=152 (74.50%)	don't know=28 (13.72%)
8	Do you think post mortem examination does disfigurement of body?	Yes=116 (56.86%)	no=78 (38.23%)	don't know=10 (4.90%)
9	What was your first response on observing autopsy?	comfortable = 180 (88.23%)	uncomfortable=18 (8.82%)	can't say=6 (2.94%)
10	Did you learn anything from autopsy you watched?	Yes= 184 (90.19%)	no=8 (3.92%)	can't say=12 (5.88%)
11	Should witnessing autopsy be scrapped from UG curriculum?	Yes= 20 (09.82%)	no= 170 (83.33%)	can't say=14 (06.86%)
12	Would you recommend that medical students should watch more autopsies?	Yes= 200 (98.03%)	no=4 (1.96%)	can't say=0 (00%)
13	After death would you like autopsy be performed on you or any of your near relative?	Yes= 124 (60.78%)	no= 74 (36.27%)	can't say=6 (02.94%)
14	Would you like to specialize in forensic medicine?	Yes= 86 (42.15%)	no=116 (56.86%)	can't say=2 (0.98%)

DISCUSSION

85.29% students reported that relatives cannot request a medico legal autopsy without police information and contrary was reported by 13.72% students. Many a times relatives request that investigating officer is on his way and you please start postmortem examination or sometimes even they don't know that requisition from police is must to start examination.

67.64% students opined that visceral organs can be removed during postmortem examination for research and study purposes. No is the opinion of 31.36% students. Practically other departments Pathology, Anatomy, Medicine ask for visceral organs from autopsy

for research and study purpose which is not legal.

In response to the question, if the case is brought dead to casualty, is it mandatory to send dead body for postmortem examination? Yes was the opinion of 73.52% students, no is the opinion of 25.48% students. When a person dies at a place other than hospital and he is brought in casualty, as a procedure doctor send it for post mortem examination. Relatives usually request to the police and doctors not to conduct postmortem examination.

42.15% students opined that doctor can refer MLC Autopsy to another doctor in a different hospital/city, no was the opinion of 54.90 % students. Usually at our

center, we ask the referring doctor to accompany and then he proceeds to postmortem examination under direct supervision of forensic medicine experts.

In response to the question, Can information about postmortem report be divulged under RTI act? 17.64% students replied yes and 80.39% students replied no. Lawyers, relatives and even some times NGOs ask for information about postmortem under RTI Act.

11.76% students reported that partial autopsy is permissible in India and no is the response of 74.50% students. Many times relatives request doctor to conduct as less dissection as possible and this point arises in mind of the doctor, can we do that legally?

All the above questions commonly rose practically during conducting postmortem examinations. Though most of the students have correct knowledge, a significant number of students don't have sufficient information regarding postmortem examinations. Before the students actually become doctors, and ready to conduct postmortem examinations, an orientation program can help them to correct their knowledge about procedure followed during postmortem examinations.

84.31% students were aware that medico-legal autopsy is required in all MLC cases even if the cause of death is known. However, 13.72% students have raised objections to autopsies in MLC cases in which cause of death is known. This compares favorably with the study of E W Benbow³ and Jadav et al⁴. where majority of the respondents were aware that medico-legal autopsy is required in all MLC cases.

In response to the question, do you think post mortem examination does disfigurement of body? Yes was the response of 56.86% students, no is the response of 38.23%. This is in accordance with the study done by G Venkat Rao and S Krishna Prasad⁵ in which 57% students were of the opinion that post mortem examination causes disfigurement of body. This is in contrast to the studies who gave variable response of 65% and 27% by Ekanem⁶ and Ahmad et al⁷ respectively.

88.23% students reported comfortable experience on observing their first autopsy. This is in contrast to study done by G Venkat Rao and S Krishna Prasad⁵, Ehsan et al⁸ and Nihal Ahmed⁷ where only 36.66%, 36.5% and 21% students answered that they were

comfortable on the first exposure to post-mortem examination respectively.

90.19% students reported they learn something from autopsy they watched. In study done by G Venkat Rao, S Krishna Prasad⁵ 82% of the students were of opinion that they learned subject after witnessing autopsies. 97.66% gave positive response in the study done by Ahmad et al⁷, whereas Rautji⁹ found that in their study 80.7% subjects learned something after witnessing autopsies.

In response to the question, Should witnessing autopsy be scrapped from UG curriculum? Yes was the response of 09.82%, no was the response of 83.33% students. Previous studies regarding same question gave variable results. In the study done by G Venkat Rao, S Krishna Prasad⁵ yes was the response by 25.33% students, with Nihal Ahmad⁷, finding 97.66% students agreeing to scrape autopsy from curriculum and Rautji⁸ finding that only 6% favored scraping autopsy.

In response to the question, would you recommend that medical students should watch more autopsies? Yes was the response of 98.03% students, no was the response of 1.96% students. In a study done by Jadav et al⁴, 88% of the students recommended that students should watch more postmortem examination also favored by the study of Ekanem⁶. Whereas Rautji⁸, Ekanem⁶ and Nihal Ahmad⁷ found that 72.3%, 57% and 62.3% of the participants agreed that the numbers of autopsies watched are sufficient respectively.

Yes 60.78% was the response recorded to the question that after death they would like autopsy to be performed on them or any of their near relative? No was the response of 36.27%. This is favored by study done by Jadav et al⁴ and Sanner¹⁰, where 82.5% and 90% of the student respectively, answered positive on wished to have postmortem examination on self/relative when required. In study done by Rautji et al⁹ 51% of students would not want autopsies to be performed on them or their relatives after death.

In response to the question would you like to specialize in Forensic Medicine? 42.15% students reported positive response, no was the response of 56.86%. Earlier studies gave variable responses In the study done by G Venkat Rao and S Krishna Prasad⁵, 21.66% of the students answered positively for the same. Ekanem⁶, Rautji⁹ and found 66% and 17% of the participants favoring to specialize in Forensic Medicine

specialty respectively.

CONCLUSION

Knowledge which is not reciprocating in attitude is waste. Though a fraction of students are not having knowledge about medico legal postmortems those having it are not showing right attitude towards it. Though many have right knowledge and attitude it is needed that teaching in the subject should have considerable portion of practical aspects. This can fulfill our goal of producing undergraduates who are ready to do medico legal work including postmortem examinations with correct knowledge and right attitude.

Ethical Clearance : Ethical clearance for the study was taken from institutional ethical committee of NSCB Medical College Jabalpur before starting the study

Source Funding : Self. The study was funded by authors themselves.

Conflict of Interest: Nil

REFERENCES

1. <http://indianexpress.com/article/cities/mumbai/mumbais-deadly-mortuaries-acute-lack-of-forensic-experts-medical-staff-at-post-mortem-centres-2884457/>
2. <http://www.indiamedicaltimes.com/2012/06/30/medical-colleges-facing-shortage-of-teachers-in-anatomy-forensic-medicine/>
3. Benbow EW. Why show autopsies to medical students? *J Pathol* 1990; 162: 187-8.
4. Jadav JC, Patel BN, Shah KA, Tandon RN. Knowledge and attitude of medical students on forensic autopsy in Ahmedabad city. *J Indian Acad Forensic Med.* 2013;35(1):26–28.
5. G Venkat Rao, S Krishna Prasad. Autopsy - Perception and Attitudes of Undergraduate Medical Students in South India: A Questionnaire Survey. *IAIM*, 2016; 3(10): 204-211.
6. Ekanem VJ, Akhigbe KO. Attitudes of Nigerian medical students to autopsy. *Turk J Med Sci.*, 2006; 36: 51-6.
7. Ahmad N et al. Attitude and Knowledge of Medical Students on Practical Aspects of Forensic Medicine. *Journal of Evidence based Medicine and Healthcare*, 2015; 2(27): 4002-4008.
8. Ehsan R, et al. Prejudice of Medical Students Towards Medico-Legal Autopsy. *MC*, 2015; 21(4): 27-32.
9. Rautji R, Kumar A, Behera C. Attitudes of Medical Students towards Medico-legal/Clinical Autopsy. *J Indian Acad Forensic Med.*, 2013; 35(4): 358-361.
10. Sanner MA. Medical student's attitudes toward autopsy. How does experience with autopsies influence opinion? *Arch Pathol Lab Med.*, 119:851-8, 1995.

Dowry and Domestic Violence Against Women – Knowledge and Awareness among Medical Students

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ABSTRACT

Background: Dowry and domestic violence against women is still much common in country like India even though various steps have been taken by Government time to time. Above issues must be abolished by bringing awareness among citizens and as a doctor one must aware of it. Present study was undertaken to assess the knowledge and awareness among medical students regarding above issue.

Materials and Method: Total 145 medical students of 2nd MBBS of GMERS Medical College, Gujarat were exposed to pre-tested and pre-validated Likert scale type questionnaire (1 to 7, 1 – Not at all true, 7 – Very true) regarding knowledge and awareness of dowry and domestic violence against women. Data obtained were analyzed via median score and tabulated.

Results: Most of the students know that demand of dowry is against the law and domestic violence against women is associated with dowry. Students had poor awareness regarding ‘The Dowry Prohibition Act, 1961’, ‘The Protection of Women from Domestic Violence Act, 2005’ and ‘The Protection of Human Rights Act, 1993’. Students were well aware of Indian Penal Code deals with dowry death and punishment as per Indian Penal Code deals with dowry death.

Conclusion: Knowledge and awareness regarding basic idea of dowry and domestic violence against women among 2nd MBBS students are good but in relation with various act and law is poor which in turn may lead to poor understanding of burning subject.

Keywords: Dowry, Domestic violence, Women, Knowledge, Awareness, Medical students.

INTRODUCTION

Dowry and domestic violence against women is still much common in country like India even though various steps have been taken by Government time to time. Medical students of 2nd MBBS as part of their syllabus usually learn Indian Penal Code dealing with dowry death and other aspects of it but in depth study of various laws and acts related to above matter are not taught in medical college at present neither in the school

life. Dowry and domestic violence against women are burning issues of Indian society which must be abolished by bringing awareness among citizens and as a doctor one must aware of it ^[1]. Present study was undertaken to assess the knowledge and awareness among medical students regarding above issue.

MATERIALS AND METHOD

Total 145 medical students of 2nd MBBS of GMERS Medical College, Gujarat were exposed to pre-tested and pre-validated Likert scale type questionnaire (1 to 7, 1 – Not at all true, 7 – Very true) regarding knowledge and awareness of dowry and domestic violence against women after obtaining their informed written consent. Study was undertaken after obtaining ethical approval from the Institutional Ethical Committee. Data obtained

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were analyzed via median score and tabulated.

RESULTS

Total 145 students of 2nd MBBS were participated in the present study, out of which properly filled and responded 125 questionnaires were taken into consideration for data analysis while rest of improperly filled questionnaire were not taken into consideration. Out of 125 respondents, 73 were male and 52 were female.

Most of the students know that demand of dowry is against the law. Students were also aware of that many

times domestic violence against women is associated with dowry. Students had poor awareness regarding 'The Dowry Prohibition Act, 1961', 'The Protection of Women from Domestic Violence Act, 2005' and 'The Protection of Human Rights Act, 1993'. Few students came across torture of women in demand of dowry in their life and few students knew that dowry may lead to judicial separation/ divorce of married couple. Most of the students were aware of that husband as well as his relatives may be involved in demand of dowry. Students were also aware of Indian Penal Code deals with dowry death and punishment as per Indian Penal Code deals with dowry death (Table – 1).

Table – 1: Knowledge and Awareness regarding dowry and domestic violence against women (Likert scale: 1 to 7, 1 – Not at all true, 7 – Very true)

Sr. No.	Perceptions of students	Median score
1	I know that demand of dowry is against the law.	6
2	I am aware of 'The Dowry Prohibition Act, 1961'.	2
3	I know that many times domestic violence against women is associated with dowry.	4
4	I came across torture of women in demand of dowry in my life.	3
5	I am aware of 'The Protection of Women from Domestic Violence Act, 2005'.	2
6	I know that dowry may lead to judicial separation/ divorce of married couple.	3
7	I am aware of 'The Protection of Human Rights Act, 1993'.	2
8	I know that husband as well as his relatives may be involved in demand of dowry.	6
9	I am aware of Indian Penal Code deals with dowry death.	5
10	I am aware of punishment as per Indian Penal Code deals with dowry death.	5

DISCUSSION

The Protection of Women from Domestic Violence Act, 2005 defines violence as any act, omission or commission or conduct of any adult male person of the family, which harms or injures or endangers the health, safety, life, limb or well-being, whether mental or physical of the women or tends to do so and includes causing physical abuse, sexual abuse, verbal and emotional abuse, and economic abuse and harassment or coercion to meet any unlawful demand for any dowry constitutes domestic violence" [2].

After independence, many acts and laws were enacted as well as amended time to time to enhance the power of women in India. Gender justice is of prime importance in Indian law at present. Constitution of

India provides action and positive look after for women issues with special provisions [3].

Dowry Prohibition Act, 1961; Indian Penal Code (IPC) like 228A, 294A, 304-B, 306, 354, 376, 376-B are the different laws framed to empower women in India. Women's empowerment may be defined as "a bottom-up process of transforming gender power relations, through individuals or groups developing awareness of women's subordination and building their capacity to challenge it" [4-7]. Women's empowerment does not imply that women take over control previously held by men. Rather, it lies in the need to transform the nature of power relations [5].

In present study, most of the students know that demand of dowry is against the law because nowadays

newspapers as well as social media are bringing awareness. Students were also aware of that many times domestic violence against women is associated with dowry. Students had poor awareness regarding 'The Dowry Prohibition Act, 1961', 'The Protection of Women from Domestic Violence Act, 2005' and 'The Protection of Human Rights Act, 1993' may be due to institutes or schools are not teaching fundamental rights or it is the raw subjects many time with little interest from the students side. Few students came across torture of women in demand of dowry in their life and few students knew that dowry may lead to judicial separation/ divorce of married couple. Most of the students were aware of that husband as well as his relatives may be involved in demand of dowry. Students were also aware of Indian Penal Code deals with dowry death and punishment as per Indian Penal Code deals with dowry death as subject of Forensic Medicine in 2nd MBBS is focusing to some extent on above legal matters.

A study at Sophia College, Mumbai showed that 50% of home victims were ignorant about the laws protecting women from violence [8]. Another study conducted in the state of Madhya Pradesh and Maharashtra showed that assaulted women were often unaware of their legal rights, and preferred to remain in the offensive relationship [9]. If people are well aware of their fundamental rights and duties, the carriage of justice in humanity becomes much easier. Lawful awareness and legal literacy make radical deviations in our democracy. Awareness of laws helps academic professionals as well as the general public to use the legal system more effectively. Only two percent of women in rural areas gain access to justice, even though several laws have been enacted in Parliament protecting them against violence and abuse [10].

CONCLUSION

Knowledge and awareness regarding basic idea of dowry and domestic violence against women among 2nd MBBS students are good but in relation with various act and law is poor which in turn may lead to poor understanding of burning subject. Educational programs like interactive lectures, debate as well various case scenarios of subjects should be required to increase knowledge and awareness among medical students.

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REFERENCES

1. Parmar P. Dowry death and law – Indian scenario. IAIM, 2014; 1(2): 44-49.
2. Jethi J. Commentary on Protection of Women from Domestic Violence Act-2005. Law House, Cuttack, Odisha, 2007, 1-37.
3. Dejene A. Integrated Natural Resources Management to Enhance Food Security; the Case of Community Based Approaches in Ethiopia. Rome, Food and Agricultural Organization of United Nations, Report, 2003; 16: 11-30.
4. Syed S.A.J. Women in India, Legal and Human Rights. Centre for Professional Development in Higher Education and Women's Studies and Development Centre. University of Delhi, 2004; 1-24.
5. Baden, S., Oxaal, Z. Gender and Development Definitions, Approaches and Implications for Policy. BRIDGE (Development-Gender) Briton, Institute of Development Studies, Report, 1997; No-40, 1-32.
6. Ogato G.S. The Quest for Gender Equity and Women's Empowerment in Least Developed Countries, Policy and Strategy Implication for Achieving Millennium Development Goals in Ethiopia. International Journal of Sociology and Anthropology, 2013; 5: 358-372.
7. Baden S., Reeves, H. Gender and Development. Concepts and Definition, BRIDGE (Development-Gender), Briton, Institute of Development Studies, 2000; 23-65.
8. Rao A. Stress and Health Implications of Domestic Violence in Women in Difficult Circumstances. NIPCCD, New Delhi. Summaries of Research, 2008; 65: 52-53.
9. Mitra N. Domestic Violence as a Public Issue: A Review Response in Women in Difficult Circumstances. NIPCCD, New Delhi. Summaries of Research, 2008; 63: 13-40.
10. Staff Reporter. Legal Issues and Violence against Women in Domestic Front. The Hindu, September, 2010; 27, 4-5.

Retrospective Analysis of Asphyxial Deaths Autopsied in Bareilly Region

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ABSTRACT

Asphyxial deaths are a common incidence in forensic practice, and determination of the manner of death whether it is accidental, suicidal, homicidal, or natural is of utmost significance. In such deaths, a detailed and meticulous autopsy plays a major role to solve the questions that arise, while the scene investigation and collection of samples have their own significance, though considered erroneously marginal in our country. Various epidemiological and demographical parameters of asphyxial deaths as recorded by the authors are described in the present study. Increasing deaths due to asphyxia are one of the most important causes in violent deaths. The changing demographics along with the increased incidence among certain age groups as well as the variations as observed in terms of various durations of time are depicted here. The authors would also like to stress on the differentiation as was noted in mode of death along with the intention of the perpetrator ie homicidal, suicidal or accidental. The authors also concluded that certain steps can be taken as to avoid fatalities however they are more of a preventive than a curative plan.

Keywords: asphyxia, death, suicide, homicide,

INTRODUCTION

Asphyxia is defined as “a broad term encompassing a variety of conditions that result in interference with the uptake or utilization of oxygen together with failure to eliminate carbon dioxide (CO₂)”.⁽¹⁾

In medico-legal usage, “asphyxia” almost exclusively refers to forms of external hypoxia and can be further divided into mechanical and environmental asphyxia. In practice however environmental asphyxia is of secondary importance, as a deficiency of oxygen in the environment demands a special constellation of circumstances, e.g. entrapment in an air-tight enclosure etc⁽²⁾. Violent asphyxial deaths are of common occurrence and classified as Hanging, Drowning,

Strangulation, Suffocation and Traumatic asphyxia. The hanging and drowning are commonly seen in suicidal cases while strangulation including throttling is usually homicidal. In addition to these accidental compression or trauma to chest that prevents respiratory movement, known as traumatic asphyxia or crush injury is also one of the cause of violent asphyxial 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 and males having more exposure to external environment, such cases are commonly seen in males. With urbanization, rural areas are also not left aloof and this can be seen from the increasing incidence of such cases from these areas ⁽⁴⁾.

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Bareilly is a city in Northwest Uttar Pradesh which is flanked on all sides by a richly rural population while having an urban populace in the main city. This provides a unique opportunity to ascertain if the demographics are skewed or uniform in this mixed population city with reference to asphyxia deaths. The aim of the study was to study the demographics and epidemiology

behind violent asphyxial deaths. The authors included all cases with a data on drowning, strangulation, all types of hangings and smothering. We took the victimo-epidemiological profile so created and attempted to correlate these findings with similar studies conducted in various parts of the world, in literature we had access to.

MATERIALS AND METHOD

The study was conducted on a total of 135 cases of asphyxial deaths that were recorded and autopsied in District Mortuary, Bareilly in the time period from May 2015 to May 2016.

The data was collected from the previous case reports and postmortem sheets that were stored in the mortuary.

Institutional ethical clearance was obtained prior to data collection.

The data was recorded in the tabulatory form using a microsoft windows excel sheets.

The data collected was sorted in categories based on sex, age, date of incidence as well as police reports that depicted that intent behind the act i.e. homicidal or suicidal. The place and time of occurrence was deciphered from police inquest reports and that data collected in hospital case sheets by the clinicians in charge of the patients admitted if any.

The resultant data was hereby analyzed with the aid of a statistician in software SPSS 11.5.

RESULTS

After an analysis of the results so deciphered we arrived at the following conclusions.

Of the total number of autopsies carried out between the study period, the total number of autopsies of asphyxial deaths was 9% i.e. 135 cases out of 1370 total autopsies which were conducted in the period from May 2015 to May 2016.

Month wise demograph showed an increasing trend among the spate and incidence of asphyxial deaths with a maximum incidence of 38 cases which were autopsied in the period from February to April 2016, which contributes singularly to an approximate 28.14% of the total case load. The next amount of cases were found in the period of November 2015 to January 2016

with 37 cases contributing to an incidence of 27.40%.

The lowest number of cases were recorded in the months of May to July 2015 i.e. 24 cases (17%). Largest number of cases were found in the month of February 2016 at 19 cases (14%), followed by September 2015 at 15 cases (11%). Lowest number of cases in a single month came in May 2015 at 7 cases (5%).

(b) Gender based distribution was determined for the autopsied cases and it was found that the distribution in total cases was almost equal in both sexes. Of the total 135 cases, 67 cases of males and 68 cases of females were found. The reports that males are predominant victims in cases of asphyxia deaths was not found in our study.

(c) Age wise distribution as assessed for the same time period and the results concluded that the largest number of cases in both sexes were in the age group of 21-30 years which means the third decade of life is the most common age for the occurrence and incidence of asphyxial deaths. In males the highest incidence was reported in the age groups of 21-30, followed by the fourth and fifth decades of life. However in females the largest incidences were reported in the third decade, with second decade and fourth decade showing second and third highest incidence respectively.

(d) Time wise distribution was calculated based on the time of occurrence of the incident of asphyxia as deciphered from history by relatives and police inquest. Males had a higher prevalence of 26.66% of incidence in the hours between noon and early evening (12-6pm), while in females the highest number of cases ie 14.81% were reported between early morning and noon (6 am-12noon). The highest number of cases irrespective of sex were reported in the time from noon to evening while the lowest incidence was among the time from late night to early mornings.

(f) Method wise distribution was done on all the cases as per the method causing the asphyxia. The broad categories were chosen as drowning, strangulation, hanging and throttling. In both sexes and among all age groups, the largest number of cases reported were of hanging as the method of inducement of asphyxia. In males hanging contributed to 30.07% of the total number of cases while amongst females the number was a substantial 19.22%. As far as drowning and strangulation were concerned they were placed as

second and third respectively. Throttling was lowest with one case each reported in males and females.

(g) Location wise distribution was decided on the basis of the place of occurrence of the incidence. It was categorized as house, workplace, hotel, outdoor etc in cases of hanging and others while in cases of drowning the place of immersion such as pond, lake, well etc were categorized. In cases of the highest asphyxial deaths which were hangings we found that the largest numbers occurred in the place of residence with a tally of 40.96%.

Males and females showed a similar preference for hanging in place of residence with 82.66% females choosing their house and 62.59% males showing preference. In drowning deaths, females preferred wells with a tally of 5.18% of the total number of cases as compared to males who preferred rivers and ponds.

(h) Manner of death distribution was assessed on the basis of the intent behind the death which was broadly categorized as homicide, suicide and accidental. The largest number of cases were reported as suicide in both sexes with a value of 31.07% among males in hanging and 20.20% among females in cases of hanging while in suicidal drowning among males was 7.40% and females was 4.44%. In cases of accidental drowning the incidence among males was 15.55% and among females was 5.92%/ homicidal drowning was reported as one case each in both the sexes. Homicidal hanging and throttling was reported as 5.18% among males while in females was 3.70%.

(i) Occupation wise Distribution was assessed from the police inquest and postmortem reports. In males the salaried individuals were at the highest incidence of suicidal deaths numbering 22 cases (16.29%), followed by students who held 14 cases (10.37 %). In females the suicidal cases were highest among housewives/unemployed persons numbering 16 (11.8%) followed by students comprising 11 cases (8.1%). Individuals involved in farming and agriculture were found in 11 and 6 cases in males and females respectively.

DISCUSSION

With the gradual improvement of our society, although we are able to control death rate by using advanced technology but we cannot overlook that there is certainly increase in unnatural deaths may be due to accidents, suicides and even homicidal deaths are

reported day by day.⁽⁵⁾

In a study by Shankar Bakkannavar et al, published in 2015, a 5 year retrospective analysis of asphyxia deaths in Manipal region of Karnataka revealed a male predominance in deaths as well a preponderance in choosing hanging as a method of suicide ⁽⁶⁾. In our study we found an almost equal distribution of male and female in victims. Suicide was the commonest manner of death in both these studies. Another factor concurring with our study was the fact that most of the victims preferred place of residence for committing suicide.

In a study in 2014 by Bhosale SH, conducted in Yavatmal region of Maharashtra, The authors found a male predominance which was not found in our study. The commonest place for suicide was home which is concurrent with our study. The study conflicts us in age group wherein our study found 21-30 years as commonest age group, Bhosale SH concluded a age group od 21-40 years. Farmers and laborers were the commonest occupational category committing suicide whereas in our study it was the salaried males.⁽⁷⁾

Another study that correlated with our findings was conducted over a 4 year period in varanasi region. It also stated that the commonest finding was suicidal hanging with a predominance in age group of 21-30 years. However our observation that there was a equal distribution in terms of gender is not concurrent with this study also.⁽¹⁾

Another conclusive evidence pointed to the fact that suicidal hanging in residential premises was far more as compared to other avenues. This data was corroborated with a similar data presented in the United Kingdom.⁽⁸⁾

In a study conducted in Oslo, it was concluded that asphyxial homicide seems to be a method favored by a physically superior person toward a victim with considerably less physical strength^(8,9). However our study was limited by the low number of cases of asphyxial homicide . The author feels that there should be a similar scope study conducted with special attention to blood alcohol levels and a psychiatric evaluation of the perpetrator's if possible ⁽⁹⁾.

A study published in 2015 made a statistical analysis of asphyxia deaths and focused on both the place of suicide and manner of death. This study also corroborated our findings that 21-30 years is the most

susceptible group with an increased incidence of suicide by hanging in the place of residence.⁽¹⁰⁾

CONCLUSION

As is prevalent with global standards we concluded that the rates of suicidal hanging was common among the younger generation (21-30 years) which leads us to recommend focused preventive strategies for the age group. A well-designed and comprehensive programme is needed to identify the causative factors and prevention of suicidal behaviors.

In reviewing literature present in the field we were made aware of various factors such as peer pressure, poor socio-economic status, failed relationships and impaired social skills led to the spate of suicides in this particular age group. A study conducted in the UNITED STATES OF AMERICA focused on the specific entity of depression and suicides in adolescents and young adults and found that identifying specific stressors and signs of depression early and providing appropriate psychological support may lead to improvement in the psychological well being and psycho-social behavior of the individuals.

Drowning prevention strategies should be comprehensive and include: engineering methods which help to remove the hazard, legislation to enforce prevention and assure decreased exposure, education for individuals and communities to build awareness of risk and to aid in response if a drowning occurs.

Another aspect that came up in our study was that females in the elderly age group (51-70) were more prone to choosing suicide by hanging or drowning as compared to men who account for a lower percentage in the above study. The lacunae behind this needs to be further evaluated.

The study was limited in the fact that the duration of cases evaluated was small as well as the fact that homicidal asphyxia cases were not in adequate representative sample, hence the authors choose not to conclude on the same.

Conflict of Interest: Nil

REFERENCES

1. Chaurasia N, Pandey SK, Mishra A (2012) An Epidemiological Study of Violent Asphyxial Death in Varanasi Region (India) a Killing Tool. J Forensic Res 3:174. doi:10.4172/2157-7145.1000174.
2. Franklin CA: Modi's text book of Medical Jurisprudence and Toxicology, 23rd edition;188-220.
3. Parikh C K. Textbook of Medical Jurisprudence, Forensic Medicine and Toxicology, CBS publishers New Delhi 6th edition 2002;3.33-3.40.
4. Gargi J, Gorea R K, Chanana A, Mann G. Violent asphyxial deaths. Journal of Indian Academy of Forensic Medicine. 1992;12(4):171-176.
5. Trends in Suicide by Method in England and Wales, 1979 to 2001". Office of National Statistics.
6. Shankar M Bakkannavar Et Al, Victimology-Epidemiological Profile Of Violent Asphyxial Deaths In Manipal, Karnataka. Ind J Of Forensic And Community Med, Jan – Mar 2015;2(1):29-34
7. Bhosle Sh, Batra Ak, Kuchewar Sv, Violent Asphyxial Death Due To Hanging: A Prospective Study. Journal Of Forensic Medicine, Science And Law. Vol 23, Number 1.Jan-June 2014
8. Sidsel Rogde et al ; Asphyxial Homicide in Two Scandinavian Capitals .Am J Forensic Med Pathol, Vol. 22, No. 2, June 2001 .pg 128-133
9. DiMaio VJ. Homicidal asphyxia. Am J Forensic Med Pathol. 2000 Mar; 21(1):1-4
10. Gupta V P, Mahanta P, A Study of Asphyxial Death Cases in Medico-Legal Autopsy. IJHRMLP, Vol: 02 No: 02, July, 2016
11. Fernando, Kumari; Carter, Janet D.; Frampton, Christopher M.A.; Luty, Suzanne E.; McKenzie, Janice; et al. Comprehensive Psychiatry52.6 (Nov 2011): 623-629.

Epidemiological Study of Deaths Due to Electrocution: A three Year Retrospective Study

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ABSTRACT

Background: Owing to extensive use of electricity in home and industries, electrocution injuries are one of the common causes of morbidity and mortality in India. Most of the deaths were either instantaneous or immediate and most of the deaths were preventable by electrocution. It signifies that people living at home did not have elementary knowledge of risks of electrocution; therefore awareness about use of good quality electric appliances and cables is the need of the hour. **Aims-** This study was carried out with the aim to find out profile of death due electrocution and spread awareness for it. **Materials & Method-** This retrospective 3 year autopsy study during the period of January 2014 to December 2016 of deaths due to electrocution from the medico-legal deaths reported to our institution. **Results-** Our study revealed that the most of the victims were men aged between 20 and 50 years who died at working place due to accidental manner. This study also shows a typical seasonal and diurnal variation, according to which the incidences of electrocution were typically higher in the season of monsoon. Most of the cases were spot dead. **Conclusion-** Majority of the electrocution deaths occurred in the day time. Prevention is the gold standard and it can be achieved with proper awareness about handling of electrical appliances.

Keywords- Electrocution, Fatal, Accidental deaths, electrical injury.

INTRODUCTION

In this modern era, electricity is such an integral part of life, that it's hard to imagine life without it. But, with the advantages and convenience of electricity come the hazards as well. Injury and death from the passage of electric current through the body are common in both industrial and domestic circumstances. Electrical injuries currently remain a worldwide problem. These injuries are responsible for considerable morbidity and mortality, but are usually preventable with simple safety measures. In India, the voltage of domestic supply is usually 220 V to 240 V. Electrocution fatalities are rare at less than

100 V and more deaths occur at voltages above 200 V.¹ The main effect of electricity is shock produced by its current and the injuries due to electrocution depend on many factors such as voltage and frequency of current, duration of contact with body, atmospheric conditions, and route of current in the body.² The term electrocution has been coined for skin lesions, organ damage or death caused by the passage of electric current through the body tissues. But sometimes the term has been used only in cases of fatal injuries or death caused by electricity. Majority of the electrical injuries are as a result of ignorance, misuse or carelessness.³

In a developing country like India deaths due to electrocution during 2008 and 2009 are 8067 and 8539 deaths respectively, i.e., 2.4% of all accidental deaths (National Crime Reports Bureau).⁴ Mortality rate is 3% to 5% in the United States.⁵ Though the incidences of death due to electrocution are less, but the cases of injuries are quite common due to accidental touching of a current.

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Hence, the present study has been carried out to study the various epidemiological factors related to electrical fatalities in this part of our state to generate public awareness.

MATERIALS AND METHOD

This is a 3 years retrospective study was conducted in the Department of Forensic Medicine and Toxicology of Dr. V. M. Government Medical College & S.C.S.M.G. Hospital, Solapur, Western Maharashtra region during the period of January 2014 to December 2016. Total 6057 autopsies were conducted out of which 78 cases (1.28%) in which death was alleged due to fatal electrocution were selected for this study.

All these cases were studied irrespective of their age and gender, and we also tried to found out the seasonal and diurnal variations, if any, in cases of electrocution. Information regarding the incidence of electrocution was collected from the history of the cases, the police papers, and autopsy reports. The findings were recorded in proformas, and they were scrutinised and statically analysed. Deaths caused due to lightning were excluded from this study.

OBSERVATIONS & RESULTS

Table No. 1: Incidence of Electrocution Deaths.

Year	Total Autopsies done	Number of Fatal Electrocution	%
2014	2014	21	1.04%
2015	2048	26	1.26%
2016	1995	31	1.55%
3 year	6057	78	1.28%

Out of 6057 cases of medico-legal autopsy done during the study period January 2014 to December 2016, a total 78 number of cases were due to fatal electrocution (1.28 % cases).

Table No. 2: Cases according to Age.

Age	No.	Percentage (%)
1-10	02	2.56
11-20	16	20.51
21-30	26	33.33
31-40	13	16.66
41-50	12	15.38
51-60	06	7.69
61-70	03	3.84
Total	78	100

Most of the victims (33.33%) were in the third decade of their life, while around three-fourths belonged to younger and adult age groups (e.g., from 21 to 50 years). In our study, 2 victims of fatal electrocution were found to be below the age of 10 years.

Cases according to Sex

Majority of the victims were men 70(89.74%) as compared to women 08(10.25%), with a male/female ratio of 8.75:1.

Table No. 3: Cases according to Place of Occurrence with sex.

Place	Male	Female	Percentage (%)
Domestic	25	07	41.02
Outdoor	06	01	08.97
Work Place	39	00	50.00

In most of the incidences, victims were injured by electrocution and died when they were at work place i.e. 39 (50.00%) and working with some electric source. While all the women's died at home.

Table No. 4: Seasonal and diurnal variations in cases of electric injury.

Months of Incidence	During Daytime 7am to 7pm	During Night time 7pm to 7am	Total
January -March	14(17.94%)	4(5.12%)	18(23.07%)
April-June	17(21.79%)	6(7.69%)	23(29.48%)
July-September	19(24.35%)	7(8.97%)	26(33.33%)
October-December	09(11.53%)	2(3.84%)	11(14.10%)
Total	59(75.64%)	19(24.35%)	78(100%)

In this study, incidences of death due electric injury were typically higher in the season of monsoon, which was in the months of July to September i.e. 26 cases (33.33%), Majority of the incidences (75.64%) happened during the daytime between 7 AM and 7 PM as compared to night.

In our study, all cases of fatal electric injuries were accidental in nature, and we did not found any case of suicidal or homicidal electrocution.

Table No. 5: Cases according to Site of Marks present over body.

Site of Marks	No.	Percentage (%)
Upper Limb	43	55.12
Lower Limb	19	24.35
Head & Neck	08	10.25
Chest	05	6.41
Abdomen	03	3.84
Total	78	100

In this study, Upper limbs were the most common sites to show the electrocution marks, 43 cases (55.12%). This was followed by lower limbs 19 cases (24.35 %).

Table No. 6: Cases according to Period of Survival.

Period of Survival.	No.	Percentage (%)
Instant(Spot) Death	64	82.05
Within 24 hours	14	17.94
More than 24 hours	10	12.82

Most of the cases were spot dead with a total number of 64 cases (82.05%), while 14 victims (17.94%) died within 24 hours after hospital admission.

DISCUSSION

The wide-spread commercial utilization of electrical power has been associated with a rapid increase of both fatal and non-fatal injuries.

In the present study, incidence of electrocution deaths accounted for 1.28% of total, which coincides with Rautji⁶ et al as of 1.98 per cent. Gupta⁷ et al reported the figure of 2.02% and Tirasci et al³ reported 3.3% which does not consistent with the present study. In terms of deaths due to electrocution per one lakh population the figure turns out to be 4.4. This is significantly higher when compared to studies done by Dokovet al⁸ in Bulgaria and Laupland et al⁹ in Canada who reported the figures of 0.94 and 0.14 respectively. Some difference in the incidence may be due to geographical variation.

Most of the victims (33.33%) were in the third decade of their life as the most vulnerable age group, which may be due to the fact that this is the most productive age group who often remain outdoors in search of occupations and involved in production units of factories wherein power source is electricity. The findings of this study are similar to the studies conducted by Chakroborty et al¹⁰ i.e. 26.39%.

While most of the cases belonged to younger and adult age group from 21 to 40 years i.e. 65.37% which also consistent findings of study of Rautji⁶. Obviously many factors like illiteracy amongst the general public regarding electric appliances, lack of awareness about the hazards of electricity, poor maintenance of equipment's and wire linings etc. must have been responsible for any

difference.

Majority of the victims were men 70(89.74%) as compared to women 08(10.25%), this is in consistency with the work of other researchers^{3,6,7,9} with a male/female ratio of 8.75:1 which coincides with study of Chakrobortyetal¹⁰. In the study region generally the males were mostly involved with the household skill full repairing work and in production unit of the work place while females were involved in household work and at work place they were placed in safe environment usually office work respectively hence females exposure to electric appliances is less as compared to males.

In most of the cases regarding place of incidences, male victims were injured by electrocution when they were at work i.e. 39 (50.00%) and working with some electric source while all the women's died at home due to some faulty wiring and exposure of live wire of the appliances of routine use. These findings are coincides with studies conducted by Ardeshir Sheikhasadi¹¹ & Chakrobortyetal¹⁰. But does not coincide with study of Gupta etal⁷ as place of incidence is home.

We made an effort to analyze the cases according to seasonal and diurnal variations and observed characteristic higher incidences of fatal electrocution in the season of monsoon, a rainy season which is in the months of July to September in this area. i.e. 26 cases (33.33%), Majority of the incidences (75.64%) happened during the daytime between 7 AM and 7 PM as compared to night. These results were consistent with the observations made by Gupta et al.⁷ and Kumar et al.¹³, whereas Sheikhasadi et al¹¹ found higher incidences of fatal electrocution in summer seasons. The wetness of the environment in rainy season is responsible for the increased incidences as water is a very good conductor of electricity.

Manner of death in this study was concluded with the help of alleged history regarding the incidence, information from police papers, and finding's of autopsy report, and we found that all deaths in our study were accidental in manner and there was no case of death due to suicidal or homicidal electrocution. Almost similar types of findings were observed by other authors in their studies of Gupta et al⁷ and Rautiji⁶ found only one case of suicide whereas Sheikhasadi et al¹¹ reported 3.4% cases of suicide.

Our study shows that in majority of the cases upper limbs were the most common body part affected followed by lower limbs, which is similar to the observations of almost all other Indian authors like Gupta etal⁷, Kumar Setal¹², Rautji et al⁶ and Dokov et al⁸.

Shows the period of survival of the victims from fatal electrocution and it is seen that 82.05% of the cases died on the spot and only 10 victim survived for more than 24 hours. The findings are consistent with the study findings of Sheikhasadi¹¹, Kumar¹².

CONCLUSION

Electric injury varies from nil to severe destruction of tissues, so in all cases of death due to electrocution meticulous autopsy should be performed to help the investigations for the purpose of compensation and to plan future safety measures. Our study revealed that the most of the victims were men aged between 20 and 50 years who died at working place due to accidental manner. Hence mere use of nonconductive rubber gloves while dealing with electric appliances might have been saved these lives. This study also shows a typical seasonal and diurnal variation, according to which the incidences of electrocution were typically higher in the season of monsoon as compared to other seasons. Most of the cases were spot dead i.e. fatal. In all these cases, history regarding the incidence with detailed examination of scene of crime and autopsy report may help us to conclude the cause of death and its manner so the data can be used further to plan and implement the preventive policies to reduce such incidences.

Conflict of Interest: None

Source of Funding—Self

Ethical Clearance— A retrospective study without disclosure of any identity. Permission of head of department is taken for retrieval of data

REFERENCES

1. Reddy KSN. The essentials of forensic medicine & toxicology. 31st edn. Hyderabad, K Suguna Devi 2012:314.
2. Modi JP In: A Textbook of Medical Jurisprudence and Toxicology, Kannan K, Mathiharan K (Eds.), 24th ed. Nagpur, India: LexisNexis Butterworths Wadhwa, 2012. pp. 494–96.

3. Tiraschi Y, Goren S, Subasi M, Grukan F. Electrocution related mortality: A Review of 123 Deaths in Diyarbakir, Turkey between 1996 and 2002. *Tohoku J Exp Med* 2006;(208):141-45
4. Accidental Deaths and Suicides in India-National Crime Records Bureau. Available from: <http://www.ncrb.nic.in/CD-ADSI2009/ADSI2009-full-report.pdf>. [Last accessed on 2013 Jan 2]. ↑
5. Lucas J. Electrical fatalities in Northern Ireland. *Ulster Med Journal* 2009;78(1):37-42.
6. Rautji R, Rudra A, Behra C, dogra TD. Electrocution in south Delhi: a retrospective study. *Med Sci Law* 2003;(43):350-2.
7. Gupta BD, Mehta RA, Trangadia MM. Profile of deaths due to electrocution: A retrospective study. *J Indian Acad Forensic Med* 2012;34(1):13-15.
8. Dokov W, Baltov M. A study of Fatal Electrical Injuires in Smolyan District. Republic of Bulgaria. Anil Aggrawal's Internet Journal of Forensic Medicine and Toxicology[serial online] 2009; (10): 6
9. Laupland KB, Korbeek JB, Finlay C, Kirkpatrick AW, Hameed SM. Population based study of severe trauma due to electrocution in the Calgary Health Region 1996-2002. *Can J surg* 2005;(48):289-92
10. PradiptaChakroborty, Prasenjit Das. Epidemiological study of fatal electrocution cases-a mortuary based 3 years retrospective study. *J. Evolution Med. Dent. Sci*: 2017; 6(09);665-67.
11. Sheikhazadi A, Kiani M, Ghadyani MH. Electrocutionrelated mortality: a survey of 295 deaths in Tehran, Iran between 2002 and 2006. *AMJ Forensic Med Pathol* 2010;31(1):42-5.
12. Kumar S, Verma AK, Singh US. Electrocution-related mortality in northern India: A 5 year retrospective study. *Egyptian J Forensic Sci* 2014;4(1):1-6.

Pattern of Head Injury in Road Traffic Accidents in Mewar Region, Rajasthan: A Retrospective Study at Tertiary Care Teaching Hospital

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ABSTRACT

The incidences of head injuries are growing with increasing number of high speed motor vehicle, more movement of the public and mechanization in industry. Head injury is most common cause of mortality in road traffic accidents. A retrospective record based study was conducted. Information pertinent to all head injury cases reporting to Trauma & Emergency and Neurosurgery Department, Geetanjali Medical College and Hospital, Udaipur during the period between January 2015 to December 2015 was collected. The study was undertaken in victims of road traffic accidents to find out the pattern of head injuries, their age and sex distribution and site distribution of different types of fractures.

The highest incidence (31.32%) was seen in age group of 21-30 years and among males (76.6%). In present study, most (49.8%) accidents occurred between 6 PM to 12 AM. The motor-cyclists were the commonest group of victims (38.49%) and four wheeler being the commonest offending vehicles (50.56%). Intracranial haemorrhages were seen in 248 (93.6%) cases, skull fractures were found in 190 (71.69%) cases. Subdural haemorrhage was the commonest (40.72%) haemorrhage observed. Linear fracture of skull (24.5%) was the commonest type and frontal region (25.28%) was involved predominantly.

Our study shows that head injuries are very common in road traffic accidents, males are mostly affected and mainly four wheelers are the offending vehicles responsible for accidents of motorcyclists and pedestrians. Head injury is the main reason for mortality and it is alarming and highlights the need for urgent action.

Keywords: Head Injury, Skull Fractures, Intracranial Haemorrhages, Road Traffic Accidents

INTRODUCTION

Head Injury is defined by the National Advisory Neurological Diseases and Stroke Council as “a morbid state resulting from gross or subtle structural changes in the scalp, skull and/or the contents of the skull, produced by mechanical forces”¹. Head is also an easy and successful target for homicidal injuries. Head injuries are responsible for more than one-fourth of all

traumatic deaths and nearly two-third deaths among road traffic accident cases². It is a modern epidemic with rising vehicles density, high velocity, technology, along with congestion of roads and traffic rules violation. India has just 1% of the total vehicles in the world but it contributes to 6% of the global Road Traffic Cases³. The burden is serious as majority of head injury victims belong to young and productive age group.

Unintentional head injury varies with extremes of outcome from good recovery to death. The lethality of injury depends on amount of strike force, skull properties at the point of the contact, thickness of scalp, amount of hair and thickness and elasticity of individual skull, etc⁴. It is observed that the victims are more vulnerable in

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frontal collision, side collision and if hit by heavy motor vehicle⁵.

Although many head injury related studies are conducted from different parts of India, only few studies have been reported from Rajasthan specifically Mewar region, thus the present study was planned to know the pattern of head injury in Mewar region of Rajasthan.

MATERIAL AND METHOD

Present study is a retrospective study comprising of 265 head injury cases from road traffic accident victims. These were reported to Trauma & Emergency and

Neurosurgery Department, Geetanjali Medical College and Hospital, Udaipur, Rajasthan during January 2015 to December 2015. The study was undertaken to find out the pattern of head injuries, their age, sex and site wise distribution. A proforma was developed to collect the information from Medical Records Department of the hospital. Study was conducted after obtaining the necessary ethical permission from institutional ethical committee. Brought dead road traffic accident cases were excluded from the study. Data entry and analysis was done MS excel. Frequencies and percentages were used to present the data.

RESULTS

Table 1: Distribution of head injury cases according to age and gender (n 265)

Age Group(years)	Male	Female	Number (%)
0-10	7(3.45)	2(3.23)	9 (3.39)
11-20	25(12.32)	7(11.3)	32 (12.07)
21-30	64(31.53)	19(30.6)	83 (31.32)
31-40	46(22.66)	15(24.2)	61 (23.02)
41-50	30(14.78)	11(17.7)	41 (15.47)
51-60	19(9.36)	6(9.68)	25 (9.43)
>60	12(5.91)	2(3.23)	14 (5.28)
Total	203 (76.60)	62 (23.39)	265

Most common age group involved in head injury was 21-30 years comprising of 31.32% of the cases followed by 23.02% cases in age group 31-40 years. Individuals in the age group 0-10 years were the least affected (3.39%). Out of total 265 cases, majority (76.60%) were male. (Table 1)

Table 2: Distribution of head injury cases according to the time of event (n=265).

Time of Incident	Number (%)
12 AM - 6 AM	41 (15.47)
6 AM - 12 NOON	13 (4.9)
12 NOON - 6 PM	79 (29.81)
6 PM - 12 AM	132 (49.8)

In the present study, nearly half (49.8%) of the incidents occurred between 6 PM to 12 AM. (Table 2)

Table 3: Distribution of head injury cases according to site of skull fracture (n 190)

Region of skull involved in fracture	Number (%)
Frontal	67(35.26)
Temporal	33(17.36)
Parietal	40(21.05)
Occipital	13 (6.84)
Base	15 (7.89)
Multiple	22 (11.58)

Out of total 265, skull fracture was seen in 190 cases (73.58%). Out of these 190 cases, most common site of skull fracture was frontal bone (35.26%), followed by parietal bone (21.05%). Total 11.58% cases were having

involvement of more than one bone. (Table 3)

Table 4: Distribution of head injury cases according to type of skull fracture (n 190)

Type of skull fracture	Number (%)
Fissure /Linear	65 (34.21)
Comminuted	52 (27.36)
Depresses	17 (8.94)
Hinge	7 (3.68)
Multiple (>1 Type)	49 (25.79)

Among 190 skull fractures commonest type of fracture was Fissure/Linear (34.21), followed by Comminuted (27.36). (Table 4)

Table 5: Distribution of head injury cases according to type of intra cranial haemorrhage (ICH) (n 248)

Types of Hemorrhage	Number (%)
Extradural	53 (21.37)
Subdural	101 (40.72)
Subarachnoid	62 (25)
Combined (>1 Type)	32 (12.9)

Among 265 head injury cases, 248 (93.58%) had intracranial haemorrhage. Out of these 248 cases, subdural haemorrhage was most common (40.72%). (Table 5)

Table 6: Distribution of head injury cases according to offending vehicle and type of road users killed (n265)

Offending Vehicle	Types of Road user				
	Pedestrian	Bicyclist	Motorcyclist	Car/ Truck/ Tractor	Total
Two Wheeler	45(44.55)	9(52.94)	27(26.5)	2(4.44)	83(31.32)
Three Wheeler	7(6.93)	1(5.88)	6(5.88)	1(2.22)	15(5.66)
Four Wheeler	36(35.64)	4(23.52)	55(53.9)	39(86.67)	134(50.56)
Undetermined	13(12.87)	3(17.65)	149(13.7)	3(6.67)	33(12.45)
Total	101(38.11)	17(6.42)	102(38.49)	45(16.98)	265

Motorcyclists (38.49%) and pedestrians (38.11%) were almost equally involved in the incident. Most common offending vehicle was four wheeler (50.56%). (Table 6)

Table 7: Distribution of head injury cases according to Seasonal variations (n=265).

Season	Number (%)
Summer (Mar to Jun)	85 (32.07)
Monsoon (Jul to Oct)	78 (29.43)
Winter (Nov to Feb)	102 (38.49)

Winter season (Nov to Feb) recorded maximum number of cases (38.49%). (Table 7)

DISCUSSION

In present study, total 265 subjects were studied. In this study, most of the accident victims were male

as males are often out of their homes for the work and females are in homes. Similar finding was reported by some other studies.^{6,7}

Highest numbers of victims were found in the 21 - 30 years age group, accidents were least in children and old age people. This pattern of age group can be explained by the fact that at the young age people are more mobile, go out for work and may have risky behavior during driving such as rash driving, alcohol intake; while elderly people and children usually stay at home and safe, hence the young are more at risk to unnatural events like, road traffic accidents. Similar findings were seen in some other studies.^{8,9,10,11}

In present study, maximum accidents were seen during 6 PM - 12 AM. It may be due to heavy traffic as well as low visibility during evening and night. National crimes record Bureau also recorded high number of deaths during evening hours.¹²

In our study, most common type of skull fracture due to head injury was linear fracture and most common site of skull fracture was frontal bone fracture. This type of fracture is more common in cases where the head strikes by forcible contact with a hard resisting surface in RTA. Similar results were reported by some studies.^{7,8,13}

In our study, most common type of intracranial haemorrhage due to head injury was Subdural type of haemorrhage, followed by subarachnoid haemorrhage. This finding is similar to Tandle RM et al.⁹

The motor-cyclists were the commonest group of victims, followed by pedestrians. Similar pattern of vehicle use was seen by Pathak et al.⁷ Four wheeler was the commonest offending vehicle being involved in, followed by two wheeler. Similar type of involvement was seen by others also.¹⁴⁻¹⁸

In our study, we found that winter season recorded maximum number of incidents, followed by summer season. The Rainy season recorded the least number of cases. This can be explained by the fact that during winter season, there is longer duration of night and thus visibility is poor for more number of hours compared to other seasons. Another fact is that early hours of the day are foggy and there is slow reaction time due to extreme cold affecting both drivers and road users. Similar findings were reported by Kaul A et al.¹⁹ and Dhatarwal SK et al.¹⁴

CONCLUSION

Our study shows that head injuries are very common in road traffic accidents, males are most commonly affected and mainly four wheelers are the offending vehicles responsible for deaths of motorcyclists and pedestrians. Head injury is the main reason for mortality and it is alarming and highlights the need for taking urgent steps such as use of helmet by all motorcyclists and establishing good pre-hospital care and provision of trauma services at site.

Source of Funding – Self

Conflict of Interest – Nil

REFERENCES

1. Vij K. Textbook of forensic medicine and toxicology. 5th ed. Elsevier India, New Delhi; 2011:270-86.
2. Reddy KSN. The Essentials of Forensic Medicine and Toxicology. 29th ed. Hyderabad: K Suguna Devi 2009:319.
3. Biswas G, Verma SK, Sharma J, et al. Pattern of Road traffic accidents in North East Delhi. *Journal of Forensic Medicine and Toxicology* 2003(20): 27-32.
4. Dhillon S, Kapila P, Sekhon HS. Pattern of injuries present in road traffic accident in Shimla hills. *Journal of Punjab Academy of Forensic Medicine and Toxicology* 2007(7): 7-10.
5. Yavuz MS, Asirdizer M, Cetin G et al. The correlation between skull fractures and intracranial lesions due to traffic accidents. *American Journal of Forensic Medicine and Pathology* 2003;24(4): 339-45.
6. Honnangar RS, Aramani SC, Vijay Kumar, et al. An Epidemiological Survey of Fatal Road Traffic Accidents and their Relationship with Head Injuries, *Journal of Indian Academy of Forensic Medicine* 2011;32(2):239-42.
7. Pathak A, Desania NL, Verma R. Profile of road traffic accidents & head injury in Jaipur (Rajasthan). *Journal of Indian academy of forensic medicine* 2008;30(1): 6-9.
8. Rastogi AK, Agarwal A, Srivastava AK et al. Demographic Profile of Head Injury Cases in Agra Region. *Journal of Indian Academy of Forensic Medicine* 2012;34(2):117-9.
9. Tandle RM, Keolya AN. Patterns of head injuries in fatal road traffic accidents in a Rural district of Maharashtra- Autopsy based study. *Journal of Indian Academy of Forensic Medicine* 2011;33(3):228-31.
10. Patil AM, Waz WF. Pattern of fatal blunt head injury: A two year retrospective / prospective medico legal autopsy study. *Journal of Indian Academy of Forensic Medicine* 2010;32(2):144-9.
11. Jha S, Yadav BN, Agrawal A et al. The Pattern of Fatal Head Injury in a Teaching Hospital in Eastern

- Nepal. Journal of Clinical and Diagnostic Research 2011;5(3):592-6.
12. National Crimes Records Bureau. Accidental Deaths and Suicides in India 2012. New Delhi: Ministry of Home Affairs, Government of India.
13. Agarwal SS, Sheikh I, Kumar L. Cranio-Cerebral Trauma Deaths a post-mortem study on 1-15 yrs age group. Journal of Indian Academy of Forensic Medicine 2005;27(3):103-7.
14. Dhatarwal SK, Singh H. Pattern and distribution of injuries in fatal road traffic accidents in Rohtak (Haryana). Journal of Indian Academy of Forensic Medicine 2004;26(1):20-23.
15. Sharma BR, Sharma AK, Sharma S et al. Fatal road traffic injuries in Northern India: Can they be prevented?. Trends in medical Research 2007;2(3):142-8.
16. Biswas G, Verma SK, Agrawal NK et al. Pattern of road traffic accidents in north east Delhi. Journal of Forensic Medicine and Toxicology 2003;20(1):27-32.
17. Accidental Deaths in India. National Crime Record Bureau, 2007. New Delhi: Ministry of Home Affairs, Government of India.
18. Yadav A, Kohli A, Aggarwal NK. Study of pattern of skull fractures in fatal accidents in north east Delhi. Medico-Legal Update 2008;8(2):7-12.
19. Kaul A, Sinha US, Kapoor AK et al. An epidemiological study of fatal road traffic accidents in Allahabad region. Indian Internet Journal of Forensic Medicine & Toxicology. 2005; 3(1).

Pattern of Maternal Deaths: A Three Year Autopsy based Retrospective Study

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ABSTRACT

Background: Complete autopsies were important for the establishment of accurate cause of maternal deaths and an audit of postmortem memorandum was useful to establish pattern if any among such deaths. **Aims:** This retrospective study was carried out to know the different aspects of maternal deaths. **Material and method:** This three year retrospective study was carried out in department of Forensic Medicine & Toxicology, Dr. V. M. Government Medical College Solapur, Maharashtra from January 2014 to December 2016. This study is based on the medico-legal autopsy record of Maternal deaths. **Results:** Overall MMR of the Institution was 369 and the incidence of maternal deaths as compared to overall medico-legal autopsies was 1.70. A 43.68% of deaths occurred within 1-5 days of delivery. 87.37% maternal deaths occurred during the third trimester of pregnancies. A 55.33% of deaths were contributed as a direct pregnancy related deaths and 44.66 % were pregnancy associated deaths. **Conclusion** Comprehensive autopsy on all forms of maternal deaths is necessary. Social awareness, early diagnosis of complications, early institutionalization, and timely tertiary care should be a high priority.

Keywords: Maternal deaths, autopsy, maternal mortality.

INTRODUCTION

Maternal death is an important indicator of the reach of effective clinical health services to the poor, and is regarded as one of the composite measure to assess the country's progress. Reliable estimation of levels and trends of maternal mortality is thus extremely essential¹.

A maternal death is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes². Direct obstetric deaths are those

resulting from obstetric complications of the pregnancy state (pregnancy, labour and the puerperium), from interventions, omissions, incorrect treatment, or from a chain of events resulting from any of the above. Indirect obstetric deaths are those resulting from previous existing disease or disease that developed during pregnancy and which was not due to direct obstetric causes, but which was aggravated by physiologic effects of pregnancy.³

Maternal mortality is a major health problem concentrated in resource-poor regions. Accurate data on its causes using rigorous methods is lacking, but is essential to guide policy-makers and health professionals to reduce this intolerable burden.⁴ Maternal mortality is considered a basic health indicator that reflects the adequacy of health care^{5,6}. Making efforts to decrease maternal mortality rate is a moral, economic and human rights related issue. This issue could not be handled without investigation of maternal mortality related factors⁵. Despite numerous improvements in health care, poor outcome in the parturient remains a major public

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health concern that follows us into the 21st century⁷. The large regional differences in maternal deaths demonstrate that many of these deaths are preventable⁸. A valid and reliable autopsy based cause of death data of a mother during pregnancy would be very useful to understand the magnitude and root cause of the problem and thereby to develop the health policies and programs to save the mother's at risk in future.

Information provided by medical autopsies has played an important role in increasing the accuracy of cause-of-death reports and improving clinical practice in the developed world.⁹ Autopsies may also provide important data on the causes of maternal death, an essential component to reducing maternal mortality and to directing public health efforts⁴.

In order to determine the causes of maternal death and other relevant associated factors, we conducted a retrospective study.

MATERIAL AND METHOD

This 3 year retrospective study was carried out in the Department of Forensic Medicine and Toxicology, Dr Vaishampayan Memorial Government Medical College Solapur, a Western Maharashtra region from January 2014 to December 2016.

This study is based on the record of maternal deaths that had been brought for medico-legal autopsy in the department. All the autopsies have been conducted by the panel of experts comprising of Forensic Medicine, Pathology, Gynecology and Microbiology department. The detailed pertaining to period lapsed after delivery, period of gestation, mode of delivery, outcome of delivery and cause of death have been taken from post mortem memorandum and investigating agencies documents submitted for requesting autopsy such as panchanama and treatment record. The data was entered on predesigned data sheet to maintained uniformity, tabulated and then statistically analyzed.

Inclusion criterion: All the maternal deaths brought to the department during the study period either directly or indirectly related to the complications of pregnancy.

Exclusion criterion: All the un-natural maternal deaths.

Ethical committee clearance: As the data was retrospectively collected and as no revelations of

identity ethical committee clearance not required.

Conflict of Interest and Sources of Funding:
None

RESULTS

A total 6057 medico-legal autopsies have been done during the three year of study period out of which a total 103 autopsies have been contributed to maternal deaths. A total 27852 females have been admitted in the Institution for delivery hence the Maternal Mortality Ratio was to be 369.

Since most of the cases succumb to death within the 24 hours of delivery a total 24 cases (23.30%) inclusive of cases died immediately after delivery and brought dead at arrival of hospital. But maximum deaths occurred within 1 to 5 days of hospitalization a total 45 cases (43.68%). 34 cases (33.00%) have died after 5 days of hospitalization but within 42 days after delivery. (Table 1)

Maximum number 90 (87.37%) of deaths occurred in the third trimester of pregnancy, followed by second trimester 7.76% and least in the first trimester 4.85%.

In maximum cases 45 (43.68%) CS has been performed (out of which 41 cases are of CS only and in 4 cases CS has been followed with hysterectomy). In 37 cases (35.92%) the mode of delivery was vaginal delivery (out of which in 2 cases vaginal hysterectomy has been done). In 14 cases (13.59%) no delivery has been taken place and the dead fetus has been recovered during the autopsy. (Table 2)

Out of 103 cases in 84 cases (81.55%) outcome of the pregnancy results into delivery, 7 cases were of abortion (6.79%) and 14 cases remains undelivered (13.59%) wherein maternal death occurs before delivery and the fetus was recovered during the autopsy. (Table 3)

Indirect causes account for 38.83% of the total deaths during pregnancy. Among the indirect causes of death during the pregnancy respiratory system disease causes outnumbered all other systems and account for a maximum of 20.38% of total deaths followed by gastrointestinal system as 7.76%, Central nervous system 5.82%, urinary system 4.85% and lastly by cardiovascular system accounts 3.88% of total deaths. (Table 4 -A)

A total 63 (61.16%) pregnant females died as a direct result of complications of pregnancy. Among the causes of death of obstetric origin post partum hemorrhage accounts for maximum number of fatalities i.e. 16.50% followed by puerperal sepsis (9.70%), post-operative hemorrhagic shock (8.73%), Ante-partum hemorrhage 6.79%, post eclamptic intracranial

hemorrhage and Disseminated intravascular coagulation 5.82% respectively, Eclampsia 2.91%, pre-eclamptic toxemia 1.39% and in 2.91% the cause of death remains undetermined in spite of meticulous autopsy and that was either due to decomposition or due to some metabolic causes rendering the autopsy as a negative autopsy. (Table 4- B)

Table 1: Distribution of maternal deaths according to delivery-death interval.

Period of survival after delivery.	Number of cases	Percentage
Died immediately after delivery/brought dead.	2	1.94
Less than 24 hours	22	21.35
1 to 5 days	45	43.68
6 to 10 days	19	18.44
11 to 20 days	11	10.67
More than 21 and less than 42	4	3.88
Total	103	100

Table 2: Mode of delivery.

Mode of delivery	Number of cases	Percentage
Vaginal Delivery (VD)	35	33.98
Caesarian Section (CS)	41	39.80
CS with hysterectomy	4	3.88
VD with hysterectomy	2	1.94
Abortion	7	6.79
No delivery	14	13.59
Total	103	100

Table 3: Outcome of pregnancy.

Pregnancy outcome	Number of cases	Percentage
Delivered	67	65.04
IUD (but delivered)	9	8.73
Abortion	7	6.79
Still born.	8	7.76
Un delivered	14	13.59
Total	103	100

Table 4: Causes of death in maternal mortality.

Indirect Causes

Cause of death	Number	Percentage
I. Respiratory		
Acute interstitial pneumonia	16	15.53 %
Acute Respiratory Distress Syndrome	1	0.97 %
Lung abscess	2	1.39 %
Pulmonary Tuberculosis	2	1/39 %
Total	21	20.38 %
II. Cerebral		
Meningitis	3	2.91 %
Brain infarct	1	0.97 %
Intraventricular hemorrhage	2	1.39 %
Total	6	5.82 %
III. GIS		
Hepatic failure	4	3.88 %
Peritonitis	4	3.88 %
Total	8	7.76 %
IV. Cardiac		
Coronary artery disease	1	0.97 %
Cardiac tamponade	2	1.39 %
Pericarditis	1	0.97 %
Total	4	3.88%
V. Urinary system		
Nephritis	5	4.85%
Total	5	4.85%
Total	40	

Direct

Cause of death	Number	Percentage
Post Partum Hemorrhage	17	16.50 %
Puerperal sepsis	10	9.70 %
Hemorrhagic shock post operative	9	8.73 %
Ante partum hemorrhage	7	6.79 %
Post eclamptic Intracranial hemorrhage	6	5.82 %
DIC	6	5.82 %
Eclampsia	3	2.91 %
Undetermined	3	2.91 %
Pre eclamptic toxemia	2	1.39 %
Total	63	61.16 %

DISCUSSION

Motherhood is the basic right of every child and to preserve it by decreasing maternal mortality is the prime duty of every cultured society. In India, the Maternal Mortality Ratio was 167 in the year 2013 and the Maternal Mortality Ratio of Maharashtra was 68¹¹ and in our study Maternal Mortality Ratio was 369. As this Institution is a tertiary care unit and complicated cases from peripheral areas and private hospitals of the city referred to this hospital hence high MMR.

Period of survival after delivery

In present study 23.30% of cases died within 24 hours after delivery while 43.68% succumb to death within 1 to 5 days of the period after delivery.

Ann L Montgomery et al³ from the data from India reported 51.6% mothers died within 1-5 days after delivery which nearly coincides with this study. While Jadhav et al¹² reported 46.83 cases died within the 24 hours after hospitalization while Panchabhai et al¹³ reported 31.40% and Ratan Das et al¹⁴ (West Bengal) 85.13% within 24 hours. Vidyadhar Bangal et al¹⁵ was 39.47%.

Deaths occurred within 12 hours of admission suggesting majority patients reach the tertiary care hospital quite late.

Hence our study was in consistent with most of the studies having similar topographical background. The only contrast arises in the methods of collection of data. Most of the studies have considered the period of hospitalization or hospital stay when the patient has been treated after delivery at outside centers and have been referred only when the patient was serious and in distress, while other considered the period lapsed after delivery and death while collecting the data.

Period of gestation

In present study maximum number 87.37% of deaths occurred in the third trimester of pregnancy which coincide with study of Ann L Montgomery et al³ from the data from India reported death in third trimester occurred in 82.8% & Panchabhai et al¹³ (Mumbai, Maharashtra) reported 77.62% in IIIrd trimester. Ratan Das et al¹⁴ reported 8.98%, 11.71% in 1st and 2nd trimester and collectively 72.28% in 3rd trimester and postpartum period. Vidyadhar Bangal et al¹⁵ reported 5.26 %, 23.68

% in 1st and 2nd trimester and collectively 71.04 % in 3rd trimester and postpartum period. Hence our study coincides with most of the studies in this arena.

High numbers of deaths in third trimester period indicate that most of the patients arrived in a distressed condition at hospital and much complications of pregnancy in the advanced stage giving rise to high morbidity in postpartum period too.

MODE OF DELIVERY

In present study maximum cases 45 (43.68%) CS has been performed (out of which 41 cases are of CS only and in 4 cases CS has been followed with hysterectomy). In 37 cases (35.92%) the mode of delivery was vaginal delivery (out of which in 2 cases vaginal hysterectomy has been done). In 14 cases (13.59%) no delivery has been taken place and the dead fetus has been recovered during the autopsy.

Ann L Montgomery et al³ from the data from India showed that vaginal delivery in 88.5% and CS in 11.5%. Panchabhai et al¹³ reported Vaginal delivery in 40.43%, Surgical in 19.13% and Abortion in 9.75%.

Hence in the present study rate of CS is at higher side compared with other studies suggesting the availability of surgical maternal care in the studied region.

Many studies have found that the risk for maternal death is significantly greater for women undergoing cesarean section along with specific risks of anesthesia than for those who have a vaginal delivery.

Outcome of delivery

In present study out of 103 cases 84 cases (81.55%) have been delivered before death, 7 cases were of abortion (6.79%) and 14 cases remains undelivered (13.59%) which coincides with study of Vidyadhar Bangal et al¹⁵ recorded outcome of pregnancy as delivered in 81.57% and undelivered in 15.78% and abortion in 2.63%. The study coincide with Vidyadhar Bangal et al¹⁵. The higher rate of spontaneous miscarriage pre-term suggestive of higher rates of artificial abortion in the population of his studied region.

Causes of death

A total 63 (61.16%) pregnant females died as a direct result of complications of pregnancy. Among the causes of death of obstetric origin post partum

hemorrhage accounts for maximum number of fatalities i.e. 16.50% followed by puerperal sepsis (9.70%), post-operative hemorrhagic shock (8.73%), Ante-partum hemorrhage 6.79%, post eclamptic intracranial hemorrhage and Disseminated intravascular coagulation 5.82% respectively, Eclampsia 2.91%, pre-eclamptic toxemia 1.39% and in 2.91% the cause of death remains undetermined

In our study 38.83% of the maternal deaths were due to indirect causes. Acute interstitial pneumonia, hepatic failure, peritonitis accounted for 15.53%, 3.88% and 3.88% of maternal deaths respectively.

Ann L Montgomery et al³ study from India reported direct causes as 81% and Indirect as 16% Among direct predominantly haemorrhage 38%, sepsis 11%, Jadhav et al¹² reported Haemorrhage in 27.84% from the study at Solapur, Vidyadhar Bangal et al¹⁵ direct 50% and indirect 50% predominantly among direct were hemorrhage 21.05%, Eclampsia 10.52% and sepsis 7.89% Ratan Das et al¹⁴ Eclampsia 43.75%, hemorrhage 21.87% and sepsis 13.28%. Clara Menezes et al⁴ reported eclampsia in 8.74%, hemorrhage in 16.6% and indirect causes accounts for 56.1% of deaths.

Hence our study is in consistent with majority of the studies in this aspect. Even today large number of maternal deaths is due to the classical triad of haemorrhage, sepsis, and eclampsia. All these are preventable causes of maternal mortality provided the treatment started in time.

CONCLUSIONS

Review of autopsy reports can prove to be one of the useful sources to identify pregnancy-related deaths and elucidating the emerging trends. But the autopsy based maternal mortality figures does not reflect the true picture in the community. Still such review of maternal deaths would be helpful in formulating clinical guidelines and health system policies by providing a thorough assessment of cause of death and other contributory factors.

Ethical Clearance: A retrospective study without disclosure of any identity.

REFERENCES

1. Sample Registration system, Maternal mortality in India: 1997 – 2003, Trends, causes and risk factors, Registrar General India, New Delhi,
2. World Health Organization (WHO): WHO Health Report 2005.
3. Ann L. Montgomery, Usha Ram, Rajesh Kumar, Prabhat Jha, Maternal Mortality in India: Causes and Healthcare Service Use Based on a Nationally Representative Survey Published online 2014 Jan 15. doi: 10.1371/journal.pone.0083331;PMCID: PMC3893075.
4. Menezes C, Romagosa C, Ismail MR, Carrilho C, Saute F, et al.(2008) An autopsy study of maternal mortality in Mozambique: The contribution of infectious diseases. PLoS Med 5(2): e44. doi:10.1371/journal.pmed.0050044.
5. Ahmed A. El Daba, Yasser M. Amr, Hesham M. Marouf, and Manal Mostafa, Retrospective study of maternal mortality in a tertiary hospital in Egypt, Anesth Essays Res. 2010 Jan-Jun; 4(1): 29–32.
6. Panting-Kemp A, Geller SE, Nguyen T, Simonson L, Nuwayhid B, Castro L. Maternal deaths in an urban perinatal network, 1992–1998. Am J Obstet Gynecol. 2000;183:1207–12.)
7. Hawkins JL, Birnback DJ. Maternal Mortality in the United States: Where Are We Going and How Will We Get There? Anesth Analg. 2001;93:1–3.
8. Chowdhury ME, Ronsmans C, Killewo J, Anwar I, Gausia K, Das-Gupta S, et al. Equity in use of home-based or facility-based skilled obstetric care in rural Bangladesh: An observational study. Lancet. 2006;367:327–32.
9. Sonderegger-Iseli K, Burger S, Muntwyler J, Salomon F (2000) Diagnostic errors in three medical eras: a necropsy study. Lancet 355: 2027–203
10. Bhaskar K Murthy, Mangala B Murthy, and Priya M Prabhu “Maternal Mortality in a Tertiary Care Hospital: A 10-year Review” Int J Prev Med. 2013 Jan; 4(1): 105–109. PMCID: PMC3570901
11. censusindia.gov.in/.../Sample_Registration_System.html: Sample registration system -2011 Census of India; Maternal Mortality Ratio Bulletin 2011-13.
12. Jadhav CA , Gavandi Prabhakar , Shinde MA , Tirankar VR” Maternal Mortality: Five Year Experience in Tertiary Care Centre”Indian Journal

of Basic & Applied Medical Research; June 2013: Issue-7, Vol.-2, P. 702-709.

13. Panchabhai TS, Patil PD, Shah DR, Joshi AS
“An autopsy study of maternal mortality: A tertiary healthcare perspective” J Postgrad Med 2009;55:8-11
14. Ratan Das, Soumya Biswas and Amitava Mukherjee, “Maternal Mortality at a Teaching Hospital of Rural India: A Retrospective Study” International Journal of Biomedical And Advance Research (IJBAR) (2014) 05 (02)pg 155-117.
15. Vidyadhar B. Bangal*a, Purushottam A. Giri b, Ruchika Garg Maternal Mortality at a Tertiary Care Teaching Hospital of Rural India: A Retrospective Study” Int J Biol Med Res. 2011; 2(4): 1043 – 1046.

Study of Pattern of Unnatural Deaths in Women of Reproductive Age Group

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ABSTRACT

Introduction: Reproductive age is an important crucial period and a marker for human development and any imbalance can affect the health of next generation, social and economic development and thereby the society. Indian women have high mortality rate particularly in childhood and reproductive age the causes of which are usually natural. But unnatural causes have increased in recent times with factors affecting being relationship between spouse and family, status in society, health, education and financial independence. The aim of present study is to study the pattern of unnatural deaths in women of reproductive age and to analyse the probable reasons and the socio etiological factors involved.

Materials and Method: The study period was 16 months from September 2010 to December 2011, among autopsy cases of women aged 15 to 44 years.

Results: Unnatural death cases in reproductive age group constituted 17 % of which maximum numbers of cases were seen in women between the ages 20-24 years. The manner of death being suicide and hanging, poisoning and road traffic accident were the most common causes of death. Married women constituted maximum number of which 33.65% cases were within 7 years of marriage. Women belonging to grade III socio economic status constituted 57% cases of which maximum were housewives.

Conclusions: Unnatural death in women of reproductive age constituted significant number of which age 20 to 24 years were vulnerable. Suicide constituted majority of the cases. Married women with marital disharmony followed by love affair, physical illness and dowry death were common reasons.

Keywords: Unnatural death, Reproductive age women, manner of death, cause of death.

INTRODUCTION

A quote by a great law-giver Manu “Yatra Naryastu Pujyante, Ramante Tatra Devata” meaning the Gods reside in places where women are worshipped. Women in India have distinguished themselves to play active roles

in various professions. They are also involved in politics and administration. But in spite of this amelioration in the status of women, the evils of illiteracy, dowry and other marital problems, ignorance, economic slavery and crimes like homicide and sexual assault still exist. Therefore, protecting a woman from these evils benefits not only a family but also our society.

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Reproductive age is an important crucial period and a marker for human development. Any imbalance in their health and status in society can affect the health, social and economic development of next generation. Natural causes of morbidity and mortality are common among reproductive age group women. However, unnatural

causes have increased in recent times. The factors which affect are economic circumstances, education, employment, living conditions and family environment, social and gender relationships and traditional and legal structures they live in.¹

Violence against women is an internationally recognized public health problem, occurring in various forms and levels of severity in society, homicide being the commonest form. Contrary to the popular belief, women are more than 11-12 times more likely to be killed by a man they know than a stranger.²

The unnatural death of women is not uncommon in Indian society.³ A rapid increase in unnatural deaths especially in first few years of married life is a dark spot of our society.⁴ The most obvious reason are unending demands of dowry by their husbands and/or in laws.⁵ The purpose of this practice was meant to help new couples start their life in comfort. In several communities of India, dowry is a major constituent in marriage negotiations.⁶

Death is unnatural when caused prematurely against the order of nature due to injury, accident, poison and other means of violence.⁷ WHO defines reproductive age in women to be between 15 and 44 years and reproductive health as "a state of physical, mental and social wellbeing in all matters relating to reproductive systems at all stages of life."⁸ In India 22% of total population is constituted by women of reproductive age group.⁹

The gender-based violence is a major public health concern and an intolerable violation of human rights. The WHO estimated that rape and domestic violence together account for 5% of the healthy years of life lost to women of reproductive age in developing countries. Most abuse and torture remains hidden, undisclosed to neighbours, relatives, clinicians and researchers due to the prevailing values and individual shame, guilt, fear of recrimination and social taboo associated with victimization. In nearly 50 populations based surveys around the world, from 10% to over 50% of women report being hit, physically ill treated or harmed by a male at some point of their lives.¹⁰

The socioeconomic differences in healthy lifestyle are associated with the differences in attitudes towards life and accordingly the incidences of physical violence, suicides, etc are encountered. Understanding the variations in society, between different forms of injuries may help to explain the mechanism.³

The factors affecting unnatural death in women are relationship between spouse and family members, status in society, health, education and financial independence which are important for wellbeing of a woman or any person. This study aims to assess the pattern, social and medicolegal aspects of unnatural deaths in reproductive age women and establishing methods to prevent them.

MATERIAL AND METHOD

The study was conducted at Department of Forensic Medicine, MS Ramaiah Medical College, Bangalore for 16 months (September 2010 to December 2011). Information was collected from police and relatives of the deceased women brought for medico legal autopsy aged 15 to 44 years and details were entered in a proforma. Standard autopsy protocol was followed to arrive at a conclusion. All cases of women aged 15 to 44 years were included in the study. Cases whose death was opined to be due to a natural cause and unidentified deceased were excluded.

Sample size was estimated using n master software. From the cited literature "Unnatural deaths in Northern India: A Profile", to estimate the proportion of deaths among women in reproductive age group considering the proportion of road traffic accident as 36%, level of confidence as 95% with alpha error at 5% and relative precision of 20%, the sample size (n) was calculated to be 171. In the present study 205 cases were studied. Descriptive analysis of baseline characteristics were analysed and summarized.

RESULTS

The total number of cases autopsied from September 2010 to February 2012 are 1207 of which 17% (n= 205) cases constituted women of reproductive age group. Maximum number of cases belonged to age group 20-24 years (31.70%). Age group 35-39 years (7.80%) were least affected. (Figure 1)

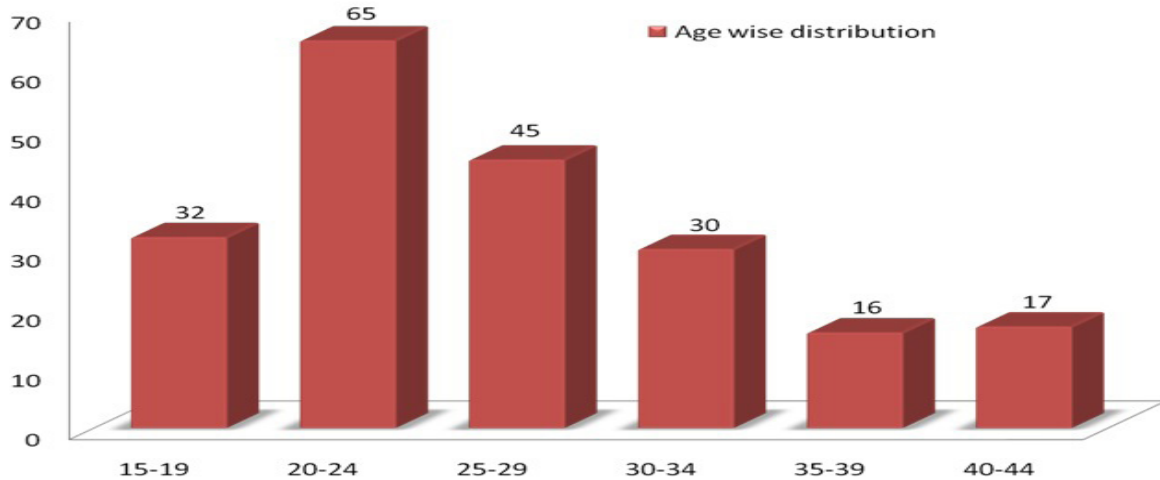


Figure 1: Age

Based on occupation (table 1), 46.8% were housewives followed by working women and students. Among these, suicide accounted for maximum cases in all occupational category.

Table 1: Occupation

Occupation	Suicide	Homicide	Accidental	Suspicious	Total (n=205)
Professional	07	-	01	02	10(04.88)
Student	32	-	03	01	36(17.56)
Shop/Business	31	-	06	01	38(18.53)
Agriculture	01	-	02	-	03(01.46)
Housewife	79	03	13	01	96(46.83)
Labourer/Maid	13	01	02	02	18(08.78)
Unemployed	04	-	-	-	04(01.95)

Based on manner and cause of death, 81% had committed suicide followed by 13% of accidental deaths. Suspicious and homicide cases accounted for 3.4% and 1.95% respectively. Suicide by hanging accounted for 63% of the case followed by 11% of poisoning cases. Suicide by railway injuries, drowning and burns accounted for 3.4% and 2% respectively. Road traffic accident accounted for 10%. Among the 4 homicide cases, 3 cases were due to manual/ligature strangulation and 1 case was due to stab injury. Among the 7 cases of suspicious death autopsied, 4 were opined as natural death, followed by 2 cases opined as suicide and 1 case was accidental.

As per marital status, 63.90% were married and 31.22% were unmarried and remaining were widow/separated. None of them were divorced. Among married, 33.65% were married for less than 7 years of which 11% of suicides were due to dowry harassment and 3 out of 4 cases of homicide were also married for less than 7 years.

Regarding education, maximum number of women were educated up to high school followed by intermediate degree and diploma. Least incidence was observed in women who had a professional degree. Illiterate women constituted 5.36%. (Table 2)

Table 2: Education

Education	No of cases	Percentage
Professional degree	02	00.97
Graduate	16	07.80
Intermediate/Diploma	44	21.46
High school	90	43.90
Middle school	39	19.02
Primary school	03	01.46
Illiterate	11	05.36
Total	205	100

Incidence of unnatural death was more in socio-economic status grade III followed by grade II and IV. There were no cases belonging to grade I and V. Among all grades, suicide by hanging accounted for maximum number of cases. (Table 3)

Table 3: Socio-economic status

	SE I	SE II	SE III	SE IV	SE V
Suicide	-	44	98	25	-
Homicide	-	01	03	-	-
Accidental	-	10	13	04	-
Suspicious	-	02	03	02	-
Total	-	57(27.80)	117(57.07)	31(15.12)	-

The motive of death in maximum cases was marital disharmony, followed by love affairs, physical illness and dowry deaths. (Table 4)

Table 4: Motive of death

MOTIVE FOR DEATH	No. Of cases (n=177)	Percentage
Marital disharmony	26	14.69
Dowry death	20	11.30
Extramarital affair	10	05.65
Family	10	05.65
Love affair	24	13.56
Education	11	06.21
Children related	07	03.41
Physical illness	22	12.43

Cont... Table 4: Motive of death

Psychiatric reasons	Depression	16	09.04
	Mood disorders	06	03.39
	Postpartum Depression	03	01.69
Financial problems		12	06.78
Unemployment		0	0
Not known		10	05.65

Maximum cases were seen in nuclear family followed by joint family. 2% cases were seen in women in living in relationship. (Figure 2)

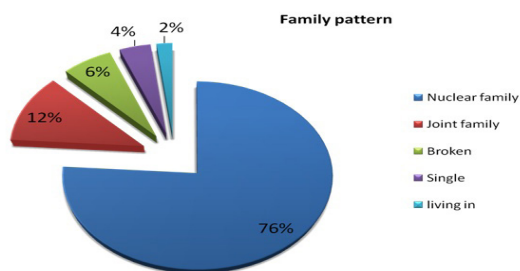


Figure 2: Distribution according to family pattern

DISCUSSION

The present study showed a higher incidence in 20-24 years age group, the factors which were responsible were marital disputes, dowry related issues. Similar findings were observed by Radhika¹¹ and Srivastava⁵ where in most victims belonged to 18-25 years. Kulshrestha¹² and Rajesh¹³ reported majority of deaths belonged to 26-30 years. According to Rosa M. Gonzalez-Guarda et al², victims for contemporary homicide risk belonged to age group of 20-44 years. Nadim Al-Adili¹⁴ reported that women aged 25 accounted for maximum number of cases. Hussain R Yusuf et al¹⁵, 20-29 years age group were involved in injury related deaths. Kailash⁴ and Akhilesh⁴ reported maximum incidence in 3rd decade in their respective studies.

According to manner and cause of death, the present study showed a higher incidence of suicides accounting for 81% of the total cases. Similar findings were noted by Srivastava⁵, Radhika¹¹ and studies by Hussain R Yusuf¹⁵, M Kapil Ahmad¹⁰. However, contrary to our study, Kailash³ reported 53.7% were accidental in manner, 40.4% suicides and 5% were homicides. Burns constituted 49.4%, poisoning 15.8%, RTA 12% and

drowning 10%. Suicide due to dowry was the most common manner. Similar findings were observed by Akhilesh Pathak⁴, Kulshrestha¹² and Rajesh C. Dere¹³

63.90% women were married and 31.22% were unmarried and remaining cases were widow or separated. Similar findings were observed by Kailash U Zine³, Kulshrestha¹², Rajesh C Dere¹³, A K Srivastava⁵, Radhika¹¹ and Akhilesh Pathak⁴.

Maximum number of women were educated till high school followed by intermediate degree and diploma. Least incidence was observed in women with professional degree. A K Srivastava⁵ reported 37% women educated till primary school followed by illiterate women. Kailash U. Zine³ reported 27% and 29% were educated till primary and middle school and 12.5% were illiterate. Hussain¹⁵ noted maximum cases in the illiterate group. Similar findings were seen in study by Kulshrestha.¹²

Most unnatural deaths belonged to grade III socio-economic status followed by grade II and IV. None belonged to grade I and grade V. Suicide by hanging was the common manner of death. Similar findings were noted by Kulshrestha¹². Kailash³ noted maximum cases in grade IV followed by grade V. Burns was common cause of death in all grades and accounted for 34.4% cases in grade IV. Srivastava⁵ reported 55% women belonged to grade IV followed by grade III. Yusuf R Hussain¹⁵ showed maximum incidence in grade IV followed by grade III.

Marital disharmony/love affair, physical illness and dowry death accounted for maximum number of cases, followed by depression, extramarital affair, financial problem, and familial disputes. The reason of physical illness in women who committed suicide as stated by police or relatives could not be observed at

autopsy. Diminishing capacity for adjustment between the spouse, infertility, dowry and in-laws related issues were common. Education related motives were due to scoring less marks of failing in any particular exam. Women with known history of depression or mood disorders with or without treatment attributed to 12% cases. Postpartum depression was observed in 3 cases who committed suicide within 6 months after delivery, which was elicited in the history. Kailash³ reported 44% cases were due to dowry followed by marital disharmony, abuse by husband. Similar results were seen by Kulshrestha¹² Srivastava⁵.

Maximum cases were seen in nuclear family followed by joint family. 2% cases were seen in women in living in relationship. Similar results were seen by Kulshrestha¹². However Bharath K. Guntheti¹⁶ reported maximum incidence of poisoning in joint families (63%) followed by nuclear family (36%).

CONCLUSION

Women of reproductive age constituted 17% of total cases autopsied in the study period. Maximum number of cases belonged to age group of 20 to 24 years constituting 31.70%. Age group 35-39 years was least affected with 7.80% of total cases. Suicide constituted 81% cases followed by 13% of accidental cases, 3.4% cases was suspicious and 1.95% cases were homicidal in manner. Cause of death was opined as hanging in 63% cases, poisoning in 11% and road traffic accident in 10% cases. Among homicidal deaths, 3 cases were opined as manual or ligature strangulation and 1 case was opined as stab injury. Among the 7 cases of suspicious death autopsied, 4 were opined as natural death, followed by 2 cases opined as suicide and 1 case opined to be accidental in manner. Married women constituted maximum number of cases with 63.9% cases being autopsied of which 33.65% cases were married for less than 7 years. 57% of women belonged to grade III socio-economic group followed by 27.8% from grade II. Marital disharmony and love affair, physical illness and dowry death accounted for maximum number of cases.

By addressing the issues related to women and by implementing the preventive measures like using dedicated suicide help lines for professional and essentially confidential care and support to the depressed & the suicidal, discouraging early marriage, pre-marital counselling and counselling to deal with love failure,

exam stress and inter-familial disputes which are reason for a handful number of cases, unnatural deaths in women of reproductive age can be reduced thereby helping in progression of the society, community, state and the nation.

The authors declare that there is **No Conflict of Interest** regarding the publication of this article.

This research received **No Funding** from any agency.

Ethical Clearance was taken from the Ethical Committee of the institution before starting the research.

REFERENCES

1. Women's health and education center [Internet]. Springfield: WHEC Update March 2007; 2(3) [cited 08.05.2017]. Available from: <http://www.womenshealthsection.com/content/update/march2007.php3>
2. Gonzalez-Guarda RM, Luke B. Contemporary homicide risks among women of reproductive age. *Women's Health Issues*.2009 Mar; 19:119-125
3. Zine KU, Mugadlimath A, Gadge SJ, Kalokhe VS, Bhusale RG. Study of some socio-etiological aspects of unnatural female deaths at government medical college, Aurangabad. *Journal of Indian Academy of Forensic Medicine*.2009; 31(3):210-217.
4. Pathak A, Sharma S. The study of Un-Natural Female Deaths in Vadodara City. *Journal of Indian Academy of Forensic Medicine*.2010; 32(3):220-223.
5. Srivastava AK, Arora P. Suspicious Deaths in Newly Married Females-A Medicolegal Analysis. *Journal of Indian Academy of Forensic Medicine*.2007;29(4):63-67.
6. Babu GR, Babu BV. Dowry deaths: a neglected public health issue in India. *International Health*.2011; 3(1):35-43.
7. Rahim M, Das TC. Mortuary Profile for Unnatural Deaths at Forensic Medicine Department of Dhaka Medical College. *Bangladesh Medical Journal*.2009; 38(2):44-47.
8. World Health Organization [Internet]. [Place unknown]: Women's Health; Nov 2009 [cited 15.05.2017]. Available from: <http://www.who.int/mediacentre/factsheets/fs334/en/>

9. Rathi C, Gajria K, Soni N. Review of referred obstetric cases-Maternal and Perinatal outcome. *Bombay Hospital Journal*. 2010; 52(1):52-56.
10. Ahmed KM, Ginneken JV, Razzaque A, Alam N. Violent deaths among women of reproductive age in rural Bangladesh. *Social Science & Medicine*. 2004; 59(2):311-319.
11. Radhika RH, Ananda K. An Autopsy study of Socio-Etiological Aspects in Dowry Death Cases. *Journal of Indian Academy of Forensic Medicine*. 2011; 33(3):224-227.
12. Kulshrestha P, Sharma RK, Dogra TD. The Study of Sociological and Demographical Variables of Unnatural Deaths among Young Women in South Delhi within Seven Years of Marriage. *Journal of Punjab Academy of Forensic Medicine & Toxicology*. 2002; 2:0975-0983.
13. Dere RC, Col. Rajoo KM. Study of Unnatural Deaths in Females. A Medicolegal Study at Rural Medical College, Loni. *Journal of Indian Academy of Forensic Medicine*. 2011; 33(3):211-213.
14. Al-Adili N, Shaheen M, Bergstrom S, Johansson A. Deaths among Young, Single Women in 2000-2001 in the West Bank, Palestinian Occupied Territories. *Reproductive Health Matters*. 2008; 16(31):112-121.
15. Hussain R Y, Halida HA, Rahman H M, Chowdhury MEK, Rochat RW. Injury related deaths among women aged 10-50 years in Bangladesh, 1996-97. *THE LANCET*. 2000; 355:220-224.
16. Guntheti BK, Singh U P. The pattern of poisoning in Khammam. *Journal of Indian Academy of Forensic Medicine*. 2011; 33(4):296-300.
17. Vanezis P. Deaths in women of reproductive age and relationship with menstrual cycle phase. An autopsy study of cases reported to the coroner. *Forensic Science International*. 1990; 47(1):39-57.
18. Leenaars AA, Dogra TD, Girdhar S, Dattagupta S, Leenaars L.. Menstruation and suicide: A histopathological study. *Crisis: The Journal of Crisis Intervention and Suicide Prevention*. 2009; 30(4): 202-207
19. Baca-Garcia E, et al. Suicide attempts among women during low estradiol/low progesterone states. *Journal of Psychiatric Research*. 2010; 44:209-214.

Study of Distribution, Nature and Type of Injury in Road Traffic Accidents

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ABSTRACT

During one year study period, medico-legal autopsies were conducted on 1800 cases of fatal road traffic accidents at the mortuary of Madurai Medical College, Tamil Nadu. Male : female ratio 3:1, 38.8 % were in the age group of 25 - 44 years. Motorized two wheelers were most vulnerable accounting for 35% of total fatalities followed by pedestrians 30%. Heavy vehicles were found to be mostly involved 50.44% of cases and multiple injuries were sustained in most number of cases. Primary impact injuries were recorded in 900 cases, secondary impact injuries in 950 cases and secondary injuries in 1200 cases. Mostly lower limbs 28.37% and pelvis 26.63% received primary impact, head and neck 58.62% the secondary impact while secondary injuries were mostly located in lower limbs 38.38%.

Keywords: Accidents, Primary and Secondary impact injuries, Head injury, Haemorrhage.

INTRODUCTION

Road traffic accidents tend to be the most serious problem claiming many human lives worldwide. Number of people killed in RTA worldwide is estimated at almost 1.25 million, while the number of injured could be as high as 50 million⁽¹⁾. Currently motor vehicle accidents are ranked 9th in order of disease burden. Nearly three quarter of deaths resulting from motor vehicle crashes occur in developing country⁽²⁾. Most important factors contributing are human errors, poor traffic sense, poor road condition, road encroachment etc.

The primary role of autopsy surgeon is to find out the cause of automobile deaths may it be accidents, rash / negligent driving, suicide and homicide. Recording of injuries postmortem may facilitate in awarding compensation by court and in apprehending defaulting drivers.

The present study has been carried out to study the distribution, nature and types of injuries in fatal road traffic accidents and to suggest possible preventive measures.

MATERIALS AND METHOD

The present study was conducted at Madurai

Medical College mortuary, Tamil Nadu. The study period was from January 2016 to December 2016. The material for present study included all dead bodies of fatal road traffic accidents brought to Madurai Medical College mortuary. Only those cases where proper records were available, were considered.

RTA victims dying within 21 days of accident were included in the study. In the present study, a road traffic accidents was defined as accidents which took place on the road between two or more objects, one of which must be any kind of a moving vehicle⁽⁸⁾. A pretested proforma was used to extract information by interrogating police personally, as well as friends, neighbours, etc. Other data was collected from the inquest reports and FIR were also studied.

All 1800 cases were examined in depth at postmortem for the presence of external injuries including bone and joints and finally characteristics of injuries were analysed regarding their nature, type, area of body injured and distribution of injuries. Additionally, place of death of RTA victims, period of survival and alcoholic influence were also recorded. Safety measures if followed or not were also noted.

RESULT**Table 1 : Age group and gender involved in fatal RTA**

S.NO	AGE GROUP	MALE	FEMALE
1.	<10	70	15
2.	10-24	380	70
3.	25-44	450	250
4.	45-64	350	65
5.	65 & ABOVE	100	50
	TOTAL	1350	450

Table 2 : Types of road - users involved in fatal RTA

S.NO	TYPE OF ROAD USERS	NO	PERCENTAGE (%)
1.	PEDESTRIAN	540	30%
2.	MOTORIZED TWO WHEELER VEHICLE	630	35%
3.	VEHICLE OCCUPANTS	360	20%
4.	CYCLISTS	126	7%
5.	OTHERS	126	7%
6.	UNKNOWN	18	1%

Table 3 : Distribution of external injuries amongst different types of road users

NATURE OF EXTERNAL INJURY	PEDESTRIANS		PEDAL CYCLIST		MOTOR CYCLIST		UNKNOWN		TOTAL	
	NO	%	NO	%	NO	%	NO	%	NO	%
PRIMARY IMPACT INJURY	326	36.26%	189	21%	169	18.74%	216	24%	900	100%
SECONDARY IMPACT INJURY	362	38.15%	156	16.36%	224	23.64%	208	21.85%	950	100%
SECONDARY INJURY	192	16%	370	30.85%	386	32.15%	252	21%	1200	100%

Table 4: Distribution of injuries on different parts of the body

PART OF BODY INJURED	PRIMARY IMPACT INJURY		SECONDARY IMPACT INJURY		SECONDARY INJURY	
	NO	%	NO	%	NO	%
HEAD AND NECK	45	5%	557	58.62%	230	19.18%
UPPER EXTREMITIES	162	18%	146	15.38%	220	28.33%
THORAX	126	14%	27	3%	120	9.97%
ABDOMEN	72	8%	30	3.10%	60	5%
PELVIS	240	26.63%	65	6.78%	110	9.14%
LOWER EXTREMITIES	255	28.37%	125	13.12%	460	38.38%
TOTAL	900	100%	950	100%	1200	100%

Table 5 : Distribution of avulsion, crushing injuries and contre loup injuries amongst different types of road users

S.NO	TYPES OF ROAD USER	AVULSION INJURY		CRUSHING INJURY		CONTRE LOUP INJURY	
		NO	%	NO	%	NO	%
1.	PEDESTRIAN	136	34.01%	401	42.20%	108	71.77%
2.	PEDAL CYCLIST	5	1.36%	33	3.4%	9	5.88%
3.	MOTOR CYCLIST	166	41.50%	282	29.75%	3	2.35%
4.	VEHICLE OCCUPANT	90	22.45%	191	20.11%	27	17.65%
5.	OTHER	-	-	30	3.12%	4	2.35%
6.	UNKNOWN	3	0.69%	13	1.42%	-	-
	TOTAL	400	100%	950	100%	150	100%

Table 6 : Distribution of visceral injuries

VISCERAL INJURIES	NO	PERCENTAGE (%)
BRAIN	481	22.92%
HEART & VESSELS	200	9.56%
LUNGS	326	15.50%
LIVER	416	19.82%
SPLEEN	238	11.34%
KIDNEY	178	8.47%
STOMACH	74	3.50%
INTESTINE	187	8.89%
TOTAL	2100	100%

DISCUSSION

Road traffic accidents are increasing with rapid pace and presently these are one of the leading cause of death in developing countries. Vander sluis et al ⁽⁵⁾ 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 1800 cases of fatal road traffic accidents have been studied in respect to distribution, nature and types of injuries. A majority of fatal RTA have sustained multiple injuries. Eken et al ⁽³⁾ have also reported occurrences of multiple injuries in 93.5% of victims.

In the present study, a preponderance of males over females M/F ratio 3:1 have been observed. This is in contrast to ratio of 9:1 as it has been observed by Singh and Dhatarwal ⁽²⁾. Highest incidence of fatalities have occurred in the age group 25 - 44 years (33.3%). this is in accordance with Kochar et al ⁽⁴⁾ and Singh & Dhatarwal ⁽²⁾.

Motorized two wheeler drivers have been mostly involved followed by pedestrians. This can be explained by the fact that lack of traffic rules, nil or little knowledge about traffic sign boards, rash / negligent driving, narrow roads, driving under the influence and many other factors are contributing to the fatalities in the region.

In the present study, heavy vehicles are more commonly involved in fatal RTA followed by light vehicles. This can be attributed to high speed, greater momentum, presence of single space roads, overtaking, volume of traffic, etc. The findings are in conformity with Singh & Dhatarwal ⁽²⁾.

Our findings are in variance with Eken et al ⁽³⁾ who have observed that car and buses are commonly involved in the casualties followed by motorcycle, lorries, etc. Contributing factors like alcohol in fatal RTA in our study accounted for 5.5 % of cases. This is in variance with Kochar et al ⁽⁴⁾ who have reported about 28.3% and Soderstrom et al ⁽⁷⁾. But this can be attributed to the fact that postmortem detection of alcohol depends on various factors like gastric lavage, time lapsed between admission and death, improper viscera handling, etc.

Multiple external injuries noted in majority of cases. This is in accordance to Singh & Dhatarwal⁽²⁾ primary impact injuries are noted in 900 cases, secondary impact injuries are noted in 950 cases, whereas secondary injuries are noted in 1200 cases. Pedestrians are mainly involved in primary and secondary impacts whereas motorcyclists are mainly involved in secondary injuries.

Lower extremities and pelvis are mostly involved in primary impact injuries and head and neck are mostly involved in secondary impact injuries. Secondary injuries are seen mostly in lower extremities (460 cases). Crushing injuries are responsible for more incidences of secondary injuries. In majority of cases, front of vehicle is found responsible for initial impact and road users are at fault in majority of cases. This is in contrast to Singh and Dhatarwal⁽²⁾ who noted that drivers are at fault in majority of cases (55.6%).

Crushing injuries are noted in 950 cases and pedestrians and motor cyclists are primarily involved. Lower extremities, head and neck, pelvis and abdomen in descending order bears the brunt. Degloving and avulsion injuries are more common in motorcyclists.

Brain has been chiefly injured in majority of cases followed by liver, legs and spleen^(2,3,5). In this study all 1800 cases have sustained injuries, this is in contrast to Eken et al⁽³⁾ who observed that as many as 100 RTA victims had no evidence of violence on physical examination.

In this present study, it is observed that 492 cases (27.32%) died on spot. This is in variance with Singh and Dhatarwal⁽²⁾ who have reported an incidence of 15.4% on spot. Our study records that a total of 62% of RTA victims have been admitted in hospital whereas 10.68% have died on way to hospital. This can be explained by the fact that more trauma care centres are available in the region.

Regarding period of survival of fatal RTA victims, we have noted that a great majority of cases have died within 24 hours. Hence first 24 hours are quite crucial for RTA victims. 800 cases survived beyond 24 hours, but they too later succumbed to injuries with a period of 21 days. This is in accordance with Singh & Dhatarwal⁽²⁾.

CONCLUSION

It may be concluded that there is urgent need to address the epidemic of carnage on the roads. In many

cases fatal RTA's are caused by human errors and are therefore preventable. A stricter licensing policy, especially for four wheelers, a greater awareness about traffic rules, cultivation of road traffic sense, curbing drug abuse, and a proper road network conforming to the volume of traffic will go a long way in curbing the incidence of fatal RTA's. Moreover, the recommendations from the world report on road traffic injury prevention should be considered and promptly implemented.

Conflict of Interest : None

Source of Funding : Self

Ethical Clearance: It is retrospective involving statistics, ethical clearance is not needed for this study.

REFERENCES

1. WHO: World Report on road traffic injury prevention. Geneva : WHO; 2004. p 3-29.
2. Singh Harnam and Dhatarwal SK. Pattern and distribution of injuries in fatal RTA's in Rohtak 2004; 26:20-23.
3. Eke N, Etebu En and Nwosu SO. Road traffic accident mortalities in port Harcourt. Nigeria. Journal of Forensic Medicine and Toxicology 2000; 1: 1-5.
4. Kochar A, Sharma GK, Atul Murari and Rehan HS. Road traffic accidents and alcohol : A perspective study. International Journal of Medical Toxicology and Legal Medicine. 2002, 5 : 22-24.
5. Van der Sluis. CK, Geertzen JHB, Werkman HA and Duis HJT: Epidemiological data from severely injured patients : A retrospective study over the period 1985 - 1989.
6. Srivastava AK and Gupta RK. A study of fatal road accidents in Kanpur. Journal of Indian Academy of Forensic Medicine. 1989; 11 : 24-28.
7. Soderstrom CA, Dischinger PC, Ho SM and Soderstrom MT. Alcohol use, driving records and crash culpability among injured motorcycle drivers. Accident analysis and prevention. 1993; 25 : 711-16.
8. Jha N, Srinivasa DK, Gautam Roy and Jagdish S. Epidemiological study of RTA cases : A study from South India. Indian Journal of Community Medicine. 2004; 29 : 1-8.

A Study – Trends of Unnatural Deaths in Full Moon (Purnima) and No Moon (Amavasya) Conditions as Compared to other Days

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ABSTRACT

Ancient belief in India says that the moon is the controller of the water, and circulating through the universe, sustaining all living creatures. It is believed that the moon, like the other planets, exerts a considerable degree of influence on human beings. It has been observed that people suffering from mental ailments invariably have their passions and emotional feelings affected during full moon days. Some people, suffering from various forms of illness invariably find their sickness aggravated during such periods. Low-tides and high-tides are a direct result of the overpowering influence of the moon. Our human body consists of about seventy percent liquid. It is accepted by physicians that our bodily fluids flow more freely at the time of full moon. People suffering from asthma, bronchitis and even certain skin diseases, find their ailments aggravated under the influence of the moon. During a full moon, a person may tend to become restless, irritable and ill-tempered. Same way, human behavior is also influenced, such as traffic accidents, crimes and suicide. So in this study we took record of unnatural death recorded at SSG Hospital, Vadodara of the year 2013. During the year, 13 no moon days and 12 full moon days recorded. Total number of incidence of unnatural deaths recorded is 2134.

Keywords: Full moon, No Moon, Accidental death

INTRODUCTION

The word 'lunatic' derived from the word 'lunar' (or moon) is most significant and indicates very clearly the influence of the moon on human life. The organisms' behavior throughout a 24-hour period results from the interaction between the endogenous programming and the modifications caused by external stimuli, both environmental and social. Human and animal physiology is subject to seasonal, lunar, and circadian rhythms. Circadian¹ and seasonal rhythms² are well described, but the effects of the lunar cycle on humans have been much less explored. Roman et al.³ have examined the prevalence of gastro intestinal (GI) bleeding in relation to the full moon. The aim of this

article was to review available data regarding effects of the lunar cycle on human, with particular attention paid to unnatural deaths on full moon days and on no moon days. Benadis et al.⁴ examined the influence of the full moon on the number of seizures (epileptic and nonepileptic) recorded in their epilepsy monitoring unit. They report no significant difference in the rates of epileptic seizures according to the phase of the moon, although an increase in non epileptic seizures was noted during the full moon.

MATERIALS AND METHOD

In this retrospective study, we recorded cases of unnatural incidences which ultimately resulted in death of that person. Incidences are recorded from inquest panchnama of all cases of the year 2013 from SSG Hospital, Vadodara. From 1st January 2013 to 31st December 2013, total 2134 cases are recorded. Days of full moon and no moon are decided by standard BAPS swaminarayan panchang. Total 13 no moon days and

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12 full moon days are recorded. Unnatural incidences recorded of all days of calendar year. Comparison done of unnatural incidences on full moon days with other days and unnatural incidences on no moon days with other days by using standard statistical T test. In the test, we compared unnatural incidences recorded on 12 full moon days with unnatural incidences recorded on other 340 days. We excluded 13 days of no moon for this comparison. Similarly, we compared unnatural incidences recorded on 13 no moon days with unnatural incidences recorded on other 340 days. During this we excluded 12 days of full moon for this comparison. In this study we consider death incidence as unnatural which are not natural, meaning that incidences of accidents, falls, suicides and homicides.

OBSERVATIONS AND DISCUSSION

In this study we have recorded cases of unnatural incidences on full moon and no moon days, which ultimately resulted in death of the person. Total 12 full moon days and 13 no moon days are recorded. Total number of unnatural incidences recorded during the year 2013 is 2134, on 12 full moon days 89 and on 13 no moon days 76. Total unnatural incidences recorded on other 340 days, when we excluded 12 full moon days and 13 no moon days from a year is 1969. We found that there is statistically significant relation, p value 0.016 found during comparison of unnatural incidences recorded on full moon days with unnatural incidences recorded of other days. This comparison shows that during the year 2013, unnatural incidences which ultimately resulted in death are significantly more on full moon days. Barr reports that the mental health of patients living with the condition of schizophrenia will deteriorate during the time of the full moon.⁵ The incidence of crimes reported to three police stations in different towns in the period of 1978–1982 was also studied.⁶ The incidence of crimes committed on full-moon days was much higher than on all other days. A complex study evaluated by computer was conducted in Dade County, Florida.⁷ Homicides and aggravated assaults demonstrated statistically significant clustering around the full moon. Like above mentioned studies, significant correlation found of unnatural incidences between full moon days and other days in present study. And no correlation found between no moon days and other days. As during comparison, no statistically significant result found, p value 0.46.

CONCLUSION

During this study we could find number of unnatural incidences, which ultimately resulted in death, is significantly high on full moon days as compared to other days in which no moon days were not included.

Table – 1 : The comparison of the mean of incidents of full moon days with mean of incidents of other days

	Variable 1	Variable 2
Mean	7.416666667	5.791176471
Variance	5.174242424	7.180452889
Observations	12	340
Hypothesized Mean Difference	0	
df	12	
t Stat	2.416953267	
P(T<=t) one-tail	0.016248857	p-value
t Critical one-tail	1.782287556	
P(T<=t) two-tail	0.032497714	
t Critical two-tail	2.17881283	

Table – 1 : The comparison of the mean of incidents of no moon days with mean of incidents of other days

	Variable 1	Variable 2
Mean	5.846153846	5.791176471
Variance	5.807692308	7.180452889
Observations	13	340
Hypothesized Mean Difference	0	
df	13	
t Stat	0.080375546	
P(T<=t) one-tail	0.468581381	p-value
t Critical one-tail	1.770933396	
P(T<=t) two-tail	0.937162761	
t Critical two-tail	2.160368656	

Ethical Clearance- Taken from Institutional Human Ethics Committee GMERS Medical College

Gotri, Vadodara (Gujarat) 390021(Registration No. ECR/28/Inst./GJ/2013)

Source of Funding - Self

Conflict of Interest - Nil

REFERENCES

1. Haus E, Smolensky M.H. Biologic rhythms in the immune system. *Chronobiology International*. 1999 Sep; 16(5):581-622
2. Nelson RJ, Demas GE. Seasonal changes in immune function. *The Quarterly Review of Biology*. 1996 Dec; 71(4):511-548
3. Roman EM, Soriano G, Fuentes M, Luz-Galvez M, Fernandez C. The influence of the full moon on the number of admissions related to gastrointestinal bleeding. *International Journal of Nursing Practice*. 2004 Dec; 10(6):292-296.
4. Benadis SR, Chang S, Hunter J, Wang W. The influence of the full moon on seizure frequency: myth or reality? *Epilepsy & Behavior*. 2004 Aug; 5(4):596-597.
5. Barr W. Lunacy revisited: the influence of the moon on mental health and quality of life. *Journal of Psychosocial Nursing and Mental Health Service*. 2000 May; 38(5):28-35.
6. Thakur CP, Sharma D. Full moon and crime. *British Medical Journal (Clinical Research Ed.)*. 1984 Dec; 289(6460): 1789-1791
7. Lieber AL. Human aggression and the lunar synodic cycle. *Journal of Clinical Psychiatry*. 1978 May; 39(5):385-392.

A Demographic Profile of Violent Asphyxial Deaths at a Tertiary Care Centre- A Five Year Retrospective Study

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ABSTRACT

Five year retrospective study was conducted by evaluating a total of 1250 deaths due to mechanical asphyxia from 01-01-2010 to 01-01-2015, autopsied at Vijayanagar institute of medical sciences at Ballari, Karnataka. Analysis of the recorded data related to autopsy examination along with age, sex of the deceased, season and manner of death was done. Asphyxial deaths were 26.59% of total autopsies and number of males (60.00%) was more than females (40.00%). In our study commonest method of asphyxial death was drowning (56.00%), followed by hanging (40.00%), ligature strangulation (2.4%) and throttling (1.6%). 16-30 years age group were more prone to violent asphyxial deaths (45.28%) and more cases were noticed in winter season (48.0%) constituting majority of accidental cases (48.96%).

Keywords: Asphyxia, Hanging, Drowning, Strangulation, Throttling

INTRODUCTION OR BACK GROUND

Asphyxia is a state in which there is prevention of exchange of air between the atmosphere and the pulmonary alveoli. Adelson defined asphyxia as the physiologic and chemical state in a living organism in which acute lack of oxygen available for cell metabolism is associated with inability to eliminate excess of carbon dioxide¹. Asphyxial deaths are caused by the failure of cells to receive or utilize oxygen. The deprivation of oxygen can be partial (hypoxia) or total (anoxia). The classical signs of asphyxia are visceral congestion, petechiae, cyanosis and fluidity of blood². Asphyxial deaths may be caused by different methods, such as hanging, strangulation (manual and ligature), suffocations (environmental, smothering, choking, mechanical and suffocating gases), chemical asphyxia (carbon monoxide, hydrogen cyanide and hydrogen

sulphide) and drowning³. Violent asphyxial deaths have contributed considerably to unnatural homicidal, suicidal and accidental deaths⁴. So 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 death⁵. The purpose of this study was to investigate some features related to asphyxial deaths in the Bellary region of Karnataka and to compare them with other studies.

MATERIAL AND METHOD

The study comprised of all the cases of deaths due to mechanical asphyxia that were autopsied at VIMS, Ballari from 01-01-2010 to 01-01-2015. Hanging, drowning, ligature strangulation and throttling were included. Relationship of asphyxial deaths with the age and sex of the deceased, season and manner was analyzed. Based on postmortem reports and on perusal of the information collected from police and the relatives of the deceased, manner of death was determined.

FINDINGS: RESULT

A total of 4700 cases being autopsied in mortuary,

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out of which 1250 cases were of mechanical asphyxia (26.59%). Drowning (700 cases; 56.00%) was the commonest type of asphyxial death followed by Hanging (500 cases; 40.00%), Ligature Strangulation (30 cases; 2.4%) and Throttling (20 cases; 1.6%) were noticed. Sex wise distribution and profile of different asphyxial deaths are shown in Table 01.

Table No. 01: Profile of Asphyxial Deaths

Type of Asphyxia	Male		Female		Total	
	No	%	No	%	No	%
Drowning	400	32.00	300	24.00	700	56.00
Hanging	320	25.60	180	14.40	500	40.00
Ligature strangulation	20	01.60	10	0.80	30	02.40
Throttling	10	0.80	10	0.80	20	01.60
Total	750	60.00	500	40.00	1250	100

We found that 16-30 years age group were more prone to violent asphyxial death (45.28%), 31-45 years were second largest group (32.08%) as shown in Table 02.

Table No. 02: Age and Sex Wise Distribution of Asphyxial Deaths

Age (In years)	Male		Female		Total	
	No.	%	No.	%	No.	%
Less than 1	2.0	0.16	2.0	0.16	4.0	0.32
15	108.0	8.64	30.0	02.40	138.0	11.04
16 - 30	300.0	24.00	264.0	21.12	564.0	45.12
31 – 45	310.0	24.8	200.0	16.00	510	40.80
More than 46	30.0	02.40	04.0	0.32	34.0	02.72
Total	750.0	60.00	500.0	40.00	1250	100

More cases recorded in winter season (613 cases;49.04%) followed by summer season (344 cases;27.52%) and rainy season (293 cases;23.44%) as shown in Table 03.

Table No. 03: Season Wise Distribution of Asphyxial Deaths

Season	Male		Female		Total	
	No.	%	No.	%	No.	%
Rainy	200	16.00	93	07.44	293	23.44
summer	150	12.00	194	15.52	344	27.52
winter	400	32.00	213	17.04	613	49.04
Total	750	60.00	500	40.00	1250	100

The commonest manner of asphyxial deaths was accidental (612 cases; 48.96%) in nature followed by suicidal (580 cases; 46.40%) and homicidal (48 cases; 3.84%) shown in Table 4.

Table No. 04: Manner Wise Distribution of asphyxial deaths

Manner	Accidental	Homicidal	Suicidal	Total
Hanging	10	00	490	500
Ligature strangulation	02	28	00	30
Drowning	600	10	90	700
Throttling	00	20	00	20
Total	612	48	580	1250

DISCUSSION

The incidence of mechanical asphyxia was 26.59% which is significantly more than the result of the other studies^{6,7,8,9} and in few studies^{1,10} the incidence was lower. This difference in the incidence may be due to geographical variations in the population.

In our study, drowning was the commonest type of asphyxial death followed by hanging, which is consistent with the study 7 and was observed that the incidence of drowning being the commonest (56.00%) which could be due to the presence of water reserves in the region of the study. But varied of the studies by various authors^{1,6,7,9,10,11}. According to WHO report 20007, Both China and India have particularly high drowning mortality rates and together contribute 43% of all drowning deaths worldwide. Most of the deaths caused due to drowning (nearly 97%) occur in developing countries like India. Drowning is a common method of committing suicide especially amongst women, and more particularly in localities nearby the sea, river, dam or canal. The asphyxial deaths was more in age group of 16-30yrs (45.28 %) which can be compared to other studies^{3,5,7,10}, followed by the age group 31-40yrs (32.08%) which goes in favour of another study⁷. Males predominance was noticed in our study. This high incidence may be because males are more exposed to stress, strain and occupational hazards compared to females which is similar to the observations reported in different studies^{1, 3, 5-11}. Majority of cases occurred in winter season which is similar to the study by Dhoble et al¹² but differed from that of study by mujamdar¹³. All hanging cases were suicidal, which is similar to the other studies^{14, 15} and is the most commonest method used to commit suicide. All strangulation cases were homicidal in our study which is similar to the study done by Azmak D^{14, 15}

CONCLUSION

Asphyxial deaths accounted for 26.59% of the total autopsied Cases in the period between 01-01-2010 to 01-01-2015.

The most frequent method of asphyxial death is drowning ((700 cases; 56.00 %)) followed by hanging (500 cases; 40.00%).

Males were twice more commonly involved than females and Male to female ratio was 3:2.

Manner of death was found to be suicidal in all hanging cases except 10 cases which were due to accidental. And all throttling cases were homicidal deaths.

Seasonal asymmetry is observed with maximum mortalities occurring during winter months followed by summer months.

Conflict of Interest – None

Source of Funding- none

Ethical Clearance –Ethical approval was declared from the University ethics committee

REFERENCES

1. Gurudatt KS, Kumar SA, Gouda HS. Analysis of fatal cases of mechanical asphyxia at Belgaum, Karnataka 2011; 28(2): 51-53.
2. Dimaio VJ, Dimaio D. Forensic Pathology, 2nd ed. Washington, DC: CRC Press; 2001:
3. Sharma BR, Harish D, Sharma A, Sharma S, Singh H. Injuries to neck structures in deaths due to constriction of neck, with a special reference to hanging. J Forensic Leg Med. 2008 Jul; 15 (5): 298-305.

4. Reddy KSN. The essentials of Forensic Medicine & Toxicology, 19th ed. Hyderabad: Suguna Devi K Medical Book Company; 2000: 283-295.
5. Patel AP, Bhoot RR, Patel DJ. Study of Violent Asphyxial Death. *Int J Med Toxicol Forensic Med* 2013; 3 (2): 48-57.
6. Tirmizi SZ, Mirza FH, Paryar HA. Medicolegal investigation of violent asphyxial deaths – an autopsy based study. *JDowUni Health Sci* 2012; 6(3):86-90.
7. Chaurasia N, Pandey SK and Mishra A. An Epidemiological Study of Violent Asphyxial Death in Varanasi Region(India) a Killing Tool. *J Forensic Res* 2012; 3 (10): 174.
8. Singh A, Gorea RK, Dalal JS, Thind AS, Walia DA. Study of demographic variables of violent asphyxial death. *Journal of Punjab academy of Forensic Medicine & Toxicology* 2003; 3: 22-5.
9. Gargi J, Gorea RK, Chanana A, Mann G. Violent asphyxial deaths- A six years study. *Journal of Indian Academy of Forensic Medicine* 1992; 171-6.
10. Reddy PS, Kumar RR, Rudramurthy. Asphyxial Deaths at District Hospital, Tumkur A Retrospective Study. *JIAFM* 2012; 34(2):146-147.
11. Momonchand A, Devi TM, Fimate L. Violent asphyxial deaths in Imphal. *Journal of Forensic Medicine & Toxicology* 1998; 15 (1): 60-4.
12. Socio-Demographic profile of Asphyxial deaths in Female : 2 yr study. Dr. Shashikant V., Dr. Shital S. Dhoble, Dr. H. G. Kukde. volume 5. issue 2. february 2016. ISSN No 2277-8179 Volume : 5 | Issue : 2 | February 2016 • ISSN No
13. Majumdar BC. Study of violent asphyxia deaths. *JIAFM* 2002; 24 (2): 8-10.
14. Azmak D. Asphyxial deaths –A retrospective study and review of the literature. *Am J Forensic Med Pathol.* 2006; 27(2):134-44.
15. Shaikh MMM, Chotaliya HJ, Modi AD, Parmar AP, Kalele SD. A Study of Gross Postmortem Findings in Cases of Hanging and Ligature Strangulation. *JIAFM* 2013; 35 (1): 63-65.

Epidemiological Study of Cases of Custodial Deaths in North Bengal Region During Last Five Years

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ABSTRACT

Custodial death refers to the death of a person in the police custody, lockup or in the judicial custody. Such deaths draws undue attention of public and media as well as allegations of torture by the relatives of deceased on police personnel. It has been observed that in the past decade the toll of deaths in police lock-ups is on the rise. The aim of the study was to study of epidemiological data in cases of custodial deaths with special emphasis to find out the cause and manner of death and recommending some preventive measure to reduce incidences of such deaths. In this study, we have analyzed the 42 cases of custodial deaths that had been autopsied in the mortuary of Department of Forensic Medicine, NBMCH, Darjeeling, West Bengal in the last 5 years (January 2011 – November 2016). All data were analyzed with the help of SPSS software. Using appropriate statistical tool we have found that males (95.2%) predominated over females, custodial deaths mostly found among the middle aged (45.23%) Hindu population (85.7%). 64.3% deaths were attributed to natural causes, while 9.5% cases were due to homicide, 11.9% cases were due to suicide and in 14.3% cases opinion were kept pending till receipt of chemical examiner's and histopathological reports.

Keywords – Custodial deaths, Natural deaths, Unnatural deaths, Suicide, Homicide.

INTRODUCTION

Custody as defined by oxford dictionary is “protective care or guardianship of someone or something”, whereas as per the legal dialect/sense, “Custody is defined as any point in time when a person's freedom of movement has been denied by law enforcement agencies, such as during transport prior to booking, or during arrest, prosecution, sentencing, and correctional confinement.”¹ Thus, custodial death includes the death of a person in the police custody, lockup or in the judicial custody.

Any death in police custody is a serious matter causing public concern even raising major human right issue.² It has been observed that in the past decade the

toll of deaths in police lockups is on the rise. As per NCRB data, 115 cases of custodial deaths occurred in 2013 followed by 93 cases in 2014 and 97 cases in 2015.³

Such deaths draws undue attention of public and media as well as allegations of torture by the relatives of deceased on the police personnel. A person does not have any constitutional rights including access to health care whence brought under custody and the custodial authorities are responsible for providing such care. As per the NHRC guidelines, any death occurring during the custody is considered as unnatural and such deaths are to be reported within 24 hrs. and a panel of doctors will conduct the post-mortem examination under videography.⁴

It also been found that, unawareness and carelessness of custodial authorities in healthcare provision is the major reasons behind custodial deaths. Unhealthy inhabitable condition of the cells worsening the situation as well.⁵

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The Article 21, which is one of the luminary provisions in the Constitution of India, also lays emphasis on the fact that no person shall be deprived of his life and personal liberty except according to the procedure established by law.

OBJECTIVES

Retrospective study of epidemiological data in cases of custodial deaths with special emphasis to find out the cause and manner of death and recommending some preventive measure to reduce the incidences of such deaths.

MATERIALS AND METHOD

In this study we have analysed the cases of custodial deaths (n= 42) that had been autopsied in the mortuary of Department Of Forensic Medicine, NBMCH, Darjeeling, West Bengal in the last 5 years (January 2011 – December 2016).

All data were analysed with the help of SPSS software.

Table 1: Gender

Sex	Frequency	Percent
Male	40	95.2
Female	2	4.8
Total	42	100

Table 2: Religion

Religion	Frequency	Percent
Hindu	36	85.7
Christian	1	2.4
Muslim	5	11.9
Total	42	100.0

Table 3: Age

Age	Frequency	Percent
Less than 20	0	0
21-40	15	35.7
41-60	19	45.2
More than 60	8	19.1
	42	100

Table 4: Manner of death

	Frequency	Percent
Natural (Illness)	27	64.3
Homicidal	4	9.5
Kept pending	6	14.3
Suicide	5	11.9
Total	42	100

FINDINGS

Most of the victim of custodial deaths (n = 42) were male (95.2%).

Incidences of custodial deaths (45.23%) were mostly belong to the middle age group (i.e. 41 – 60 years).

Majority of cases (64.3%) were attributed to natural causes (illness) while 11.9% cases were due to suicide, 9.5% cases were due to homicide and in 14.3% cases opinion regarding the cause of death were kept pending for chemical examiner's and histopathological reports.

CONCLUSION

Most of the deaths happened inside the police or judicial custody were due to natural diseases (Illness) followed by suicide and middle aged males outnumbered females.

RECOMMENDATIONS

The most important remedial measures is provision of proper healthcare facilities, equivalent to that available in the community.

The adequate treatment facility should make available for each prisoner for gruesome diseases like HIV, TB and other communicable diseases.

Drug and alcohol deaddiction center.

Periodic health checkup and psychological counselling should be done inside the correctional homes especially in middle & old aged persons to reduce the morbidity and mortality.

All investigations and autopsies have to be conducted as per the NHRC guidelines.

Proper security arrangements inside the correctional

homes to prevent any type of violence. CCTV camera supervision of police station and correctional home should be done.

Conflict of Interest – No COI.

Source of Funding – Self

Ethical Clearance – Ethical clearance was obtained from Ethical committee, North Bengal Medical College, Darjeeling.

REFERENCES

1. Gill J, Koelmeyer TD. Death in Custody and Undiagnosed Central Neurocytoma. *Am J Forensic Med Pathol* 2009;30: 289–291
2. Agnihotri AK, Gangadin SK. Torture volume 15, Number 1, 2005
3. www.ncrb.gov.in/
4. www.nhrc.nic.in/
5. Jhamad AR, Sikary AK, Millo T. Analysis of custodial deaths in New Delhi: A 13 years study. *J Indian Acad. Forensic Med* 2014; 36:19-22.

A Study of Suicide in Nagpur with Respect to Demographic Profile and Method Adopted for Suicide

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ABSTRACT

‘Suicide is characterized as the final common pathway of diverse circumstances, of an interdependent network rather than an isolated cause, a web of circumstances tightening around a single time and space¹. The maximum number of suicide in young adult (20-40years) may be attributed to various factor. Victim who belongs to upper lower class which constitutes 50.33% of cases followed by lower class (17.67%), Most of the suicides were seen in unemployed (26%), of which 16% (i.e.46.15% out of total of total female) were housewives followed by students (18.33%). In present study most of the victims, i.e. 41.33% cases were educated up to 8-12 standard followed by 24.67% cases up to 7th standard, 21.34% the method used by young adult (20-40) years for committing suicides was commonly hanging (20.66%) closely followed by Poisoning 60(20%),

Keywords: *Suicide, Unemployed, young adult, hanging and poisoning.*

INTRODUCTION

‘Suicide is characterized as the final common pathway of diverse circumstances, of an interdependent network rather than an isolated cause, a web of circumstances tightening around a single time and space¹ As per National crime record bureau data in the year 2013, the total unnatural death was 5,68,517 out of which 33,201cases are of homicide, 4,00,517 cases of accident and 1,34,799 cases was of suicide respectively. It indicates that homicide account for 5.84%, accident 70.45% and suicide 23.72% respectively. This indicates that suicide is second most common cause of unnatural death. Out of all the suicide in India Maharashtra accounts for 12.33%, of which 523 suicides occur in study region accounting for 3.1 % of total suicide in Maharashtra and 0.38% of suicide in India. This indicates that Maharashtra has maximum suicidal load all over the India.

The means adopted for committing suicides varies from easily available and less painful such as hanging, poisoning and drowning to more painful means such as self inflicted injuries, burning and shooting etc. In the year 2013 out of total suicide hanging accounted for 39.8%, poisoning 27.9%, Self-Immolation 7.4%

and drowning 5.7% were the prominent means of committing suicides.²

The present study was performed to evaluate the various aspects of suicidal deaths in this region which may help the society to reduce the rate of suicide.

MATERIAL METHOD

The study was carried out in the Department of Forensic Medicine Government Medical College and Hospital, Nagpur. A prospective study was conducted from Jan 2013 to nov2014. Various information was collected from inquest papers, autopsy report, information from relative, police, chemical analysis reports and treatment record. The data were analysed by using analysed and tabulated in Microsoft Excel software packages.

Inclusion criteria

All the dead bodies brought to department of forensic medicine for medico- legal autopsy with history of suicidal death.

Exclusion criteria

Unknown, unclaimed dead bodies.

Dead bodies known but no relatives available.

Cases where the manner of death is doubtful.

Cases where the proper history about all the assessing parameters taken in study could not be elicited from investigating officers and relatives.

RESULT

TABLE ON 1- SHOWS SUICIDE WITH RESPECT TO AGE

Sex	Number of cases	% of cases
Male	196	65.34
Female	104	34.66
Total	300	100%

Table No. 1- shows that out of total 300 cases, 196 were male and 104 were female. Male two times of outnumber the female .

TABLE NO: 02 SHOWS THE SUICIDAL DEATHS WITH RESPECT TO AGE.

Age	Sex				Total	%
	Male	%	Female	%		
Child (0-12)	0	0	0	0	0	0
Adolescent (13-19)	11	3.67	22	7.33	33	11
Young adult (20-40)	106	35.33	67	22.33	173	57.67
Adult (41-64)	46	15.33	13	4.33	59	19.67
Older 65 or above	33	11	2	0.66	35	11.66
Total	196	65.33	104	34.67	300	100

TABLE NO: 3 DISTRIBUTION OF SUICIDAL DEATHS AS PER SOCIOECONOMIC STATUS

Social class	Male		Female		Total	
	Cases	%	Cases	%	Cases	%
Lower class	33	11	20	6.67	53	17.67
Upper lower class	104	34.67	47	15.66	151	50.33
Middle class	25	8.33	15	5	40	13.33
Upper middle class	22	7.33	14	4.67	36	12
Upper class	12	4	8	2.67	20	6.67
Total	196	65.33	104	34.67	300	100

Upper lower class constitutes 151(50.33%) cases, of which 104(34.67%) cases were males while 47(15.66%) cases were females

TABLE NO 4: DISTRIBUTION OF SUICIDAL DEATHS AS PER OCCUPATION

Occupation	Male		Female		Total	
	Cases	%	Cases	%	Cases	%
Unemployed	27	9	51	17	78	26
Student	27	9	28	9	55	18.33
Labourer	49	16.33	5	1.67	54	18
Farmer	23	7.67	2	0.67	25	8.33
Private Service	15	5	7	2.33	22	7.33
Govt. service	13	4.33	6	2	19	6.33
Private business	42	14	5	1.67	47	15.67
Total	196	65.34	104	34.67	300	100

Maximum suicides were seen in unemployed (26%), followed by students (18.33%), and least cases of suicide found in government service (6.33%). Out of total 78 unemployed maximum cases found in were housewives which accounts for 46.16% of total females.

TABLE NO: 5 DISTRIBUTION OF SUICIDAL DEATHS AS PER LOCALITY

	Male		Female		Total	
	Cases	%	Cases	%	Cases	%
Urban	161	53.67	80	26.66	241	80.33
Rural	35	11.67	24	8	59	19.67
Total	196	65.34	104	34.67	300	100

Maximum cases of suicidal deaths urban area constitutes 241 (80.33%) cases, of which 161(53.67%) cases were males while 80(26.66%) cases were females. Rural areas constitute 59(19.67%) cases, of which 35(11.67%) cases were males while 24(8%) cases were females.

TABLE NO: 6 DISTRIBUTION OF SUICIDAL DEATHS WITH RESPECT TO EDUCATION

Education	Male		Female		Total	
	Cases	%	Cases	%	Cases	%
Illiterate	13	4.34	11	3.66	24	8
Up to 7 th std.	60	20	14	4.67	74	24.67
8 – 12 std.	70	23.33	54	18	124	41.33
Graduate	45	15	19	6.33	64	21.34
Post graduate	8	2.66	6	2	14	4.66
Total	196	65.34	104	34.67	300	100

Maximum cases of suicidal death in victims who were educated up to 8-12 standard constitutes 124(41.33%) cases, of which 70(23.33%) were males while 54 (18%) cases were females. While minimum cases found in postgraduate constitute 14 (4.66%) cases, of which 8(2.66%) cases were males while 6(2%) cases were females.

TABLE NO: 7 DISTRIBUTION OF SUICIDAL DEATHS WITH RESPECT TO METHOD OF COMMITTING SUICIDE

Method	Sex				Total	%
	Male	%	Female	%		
Hanging	85	28.34	30	10	115	38.34
Poisoning	71	23.67	30	10	101	33.67
Burns	15	5	33	11	48	16
Drowning	22	7.33	11	3.67	33	11
Railway cutting	2	0.66	0	0	2	0.66
Firearm	1	0.33	0	0	1	0.33
Total	196	65.33	104	34.67	300	100

Maximum cases committed suicide by Hanging constitutes 115(38.34%) cases, of which 85(28.34%) cases were males whereas 30(10%) were females. While minimum cases of committing suicide by firearm which constitute 1 (0.33%) cases .

DISCUSSION

In spite of its wider perspectives, the aetiology of suicide is ill understood. In the modern civilized society, suicide in general terms has always been designated as a cowardly and shameful act, even though it is viewed with sympathy in minor proportion of circumstances. A proper understanding of these etiological aspects with respect to the practising area is a prerequisite for suicide investigation. The present study consisted of 300 cases who committed suicide and were subjected to autopsy at our institution. The results of the present study were compared with the studies by different workers from other parts of the country and abroad as well.

Age

In the current study out of total 300 cases, maximum number of cases were of young adults (20-40 years). Not a single case of suicide was seen in children (0-12years).

Our study is in accordance with studies of Rane A et al³, Tanna JA et al⁴, Kadu SS et al⁶, Sahoo Bardale et al⁵, Singh P et al⁷, Gururaj G⁸, Elfawal MA⁹, PC et al¹⁰, R. Aauer Med¹¹, Ponnudurai et al¹².

The maximum number of suicide in young adult (20-40years) may be attributed to various factor such as: - Prevalence of psychiatric risk factors in youth especially conduct disorder, substance abuse or depression, a

higher proportion of youth in society resulting increase competition for educational access or job opportunities and if not fulfilled may result in sense of hopelessness or depression in them and change in family structure.

They are at the threshold of building their career and have the most zeal and urge to be ahead of others. It was noticed that stress did not spare even the professional students like medical and engineering students who committed suicide after exams and results. Unsuccessful academics and romance were attributed to suicide in adolescents.

Socioeconomic status –

Victim who belongs to upper lower class which constitutes 50.33% of cases followed by lower class (17.67%), middle class (13.33%), upper middle class (12%) and upper class (6.67%) cases respectively. Present study is in accordance with Tanna JA et al⁴, Kadu SS et al⁶, and Aauer Med¹¹.

The high rate of suicide among lower class could be due to financial and health problems. Because of low income, an individual cannot fulfil the daily needs of family. Lower socioeconomic status is linked to domestic crowding, a condition which has negative consequences for adults and children, including higher psychological stress and poor health outcomes. They are associated with many addiction (cigarette smoking) and engaging in episodic heavy drinking.

Occupation

Most of the suicides were seen in unemployed (26%), of which 16% (i.e.46.15% out of total of total female) were housewives followed by students

(18.33%). Current study is in accordance with NCRB², Rane A et.al³, and Gururaj G et.al⁸. B. L. Meel¹³.

In our study unemployed and housewife accounts for maximum number of suicide. Unemployed males frequently face debts, family pressure for earning and consequent mental stress etc. Males are supposed to earn for the family and if he remains unemployed there is tremendous mental pressure on him to earn, so males are more prone for suicide.

Housewives are the person with no income. Such dependent females are frequently tortured physically and mentally, and they use suicide as a mean for escaping the torture. The most common cause of suicidal death is torture by the in-laws. It is known fact that for the female after marriage she has to adjust with her in laws and other relatives. She has to compromise with her dreams and wishes at every stage after marriage. To get rid of all these thorn –pricks, she prefers committing suicide.

Locality

Maximum suicide (80.33%) were in the people living in urban areas while people living in rural areas constituted (19.67%) cases.

Our study is in accordance with Rane A et al³ who found that most of the suicide persons were from an urban background (70%), rural areas (10%) and suburban areas (20%).

It has been proposed that the risk of suicide in general population increases progressively with increasing degree of urbanicity of the living place.

Education

In present study most of the victims, i.e. 41.33% cases were educated up to 8-12 standard followed by 24.67% cases up to 7th standard, 21.34%

Current study is in accordance with Tanna JA et al⁴, Kadu S Set al⁶, Gururaj G et al⁸ and Chandrashekar TN¹⁴.

Suicide is more prevalent in persons with low education level attributed to many factors such as low income and unstable job to these persons. Hence, such persons whether male or female with low education level are always vulnerable for committing suicide. More

elusive is an explanation of why more educated persons might experience more protection via support from the home than less educated persons. Therefore those with high education achieved solid familial integration.

Method use and age

In present study the method used by young adult (20-40) years for committing suicides was commonly hanging (20.66%) closely followed by Poisoning 60(20%), Burning (10.33%), Drowning (6%), Railway cutting (0.33%) and Firearm (0.33%) respectively. These all form of suicide were most common in Young adult (20-40) years of which hanging and poisoning contributed almost equally.

Current study was in accordance with NCRB², Rane A et al³, Bardale et.al⁵, R. Elfawal MA⁹, Sahoo PC et al¹⁰, Ponnudurai et al¹², B L. Meel¹³, and Keith Mant¹⁵.

The main reasons for people choosing hanging as the most common method of committing suicide are easy availability of ligature material, simple procedure, immediate, painless and surety of death. Poisoning was second common method of committing suicide after hanging due to the fact that it is easily available and no strict legislation for acquiring poison. Suicide by firearm is least commonly encountered method which may attribute to factors like less accessibility, high cost and strict law enforcement in both regard to possession and usage of firearms.

Summary and Conclusions

Deaths are always painful for families and friends but some are more tragic than others. Suicide represents a major public health problem and a drain on our economy with loss of human resources. The current study was carried out with the aim to analyse and aware about the various aspect of suicide. and suggest the legal and preventive measures. Keeping in mind the significance and importance of knowing the scenario of suicides, the present study entitled as 'Study of suicidal death in central Indian population' was undertaken. Maximum number of cases was in young adult (20-40 years. Males nearly two times outnumbered the females. Majority were belonging to upper lower class which constituting 50.33% cases followed by lower class 17.67% cases Maximum suicides were unemployed (26%) cases, of which 16% (i.e. 46.15% out of total of total female) were

housewives followed by student (18.33%) cases. Urban victims constituting 80.33% cases outnumbered rural 19.67% cases. Majority of victims were educated up to 8-12 standard i.e. 41.33% cases followed by up to 7th. Overall most common method for committing suicide was hanging (38.34%) cases followed by poisoning (33.67%) cases.

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REFERENCES

1. Mental Health: An Indian Perspective 1946–2003. Rao V, A. Suicidology: The Indian Context. In: Agarwal S P, Goel D S, Ichhpujani RL, Salhan R N, Shrivastava S, editors. Directorate General of Health Services Ministry of Health and Family Welfare New Delhi, 2005. p. 277 – 283.
2. Suicide in India .National Crime Record Bureau. Ministry of Home Affair. (internet)2013. Retrieved from: <http://ncrb.gov.in/suicides2013.pdf>;p.169-189.
3. Rane A, Nadkarni A. Suicide in India: a systematic review. Shanghai Archives of Psychiatry. 2014; 26(2): 69-80
4. J A Tanna, P N Patel, S D Kalele. Psychological autopsy of suicide cases in Bhavnagar gujrath ,india .medico-legal update jan-jun 2013,vol.13,no 1.
5. Bardale R, Tumram N, Dake M, Shrigiriwar M, Dixit P. Trends of suicide in urban area:a 5 year study. Int J med Toxicol Legal Med. 2011; 13(3): 28-37.
6. Kadu S S, Asawa R. Medicolegal evaluation of suicidal deaths in rural area. journal of forensic medicine and law. Jan-Jun 2011; 20(1): 8-11.
7. Singh P, Marak F K, Longkumer K, Momonchand A. Suicides in imphal. JIAFM. 2005 ; 27 (2): 85-86
8. Gururaj G, Isaac MK. Epidemiology of suicides in Bangalore. National Institute of Mental Health and Neuro Sciences, publication no. 43; 2001.
9. Elfawal, MA. Cultural influence on the incidence and choice of method of suicide in Saudi Arabia. American journal of forensic medicine and pathology. 1999; 201: 163 – 68.
10. Sahoo PC, Das BK, Mohanty MK, Acharya S. “Trends in Suicide – A study in MKCG Medical College, P.M. Centre”. Journal of Forensic Medicine and Toxicology. 1999; 16(1): 34-35.
11. Aauer Med. “Suicide by drowning in Uusimaa Province in Southern Finland”. Medicine, Science and Law. 1990; 30(2): 175-179.
12. R Ponnudurai, J Jeyakar. Suicide in madras. Indian journal of Psychiatry. 1980; 22: 203-5.
13. Meel B L. A study on the incidence of suicide by hanging in the sub-region of Transkei, South Africa. Journal of clinical forensic medicine. 2003; 10(3): 153-157.
14. Chandrashekar TN. “A study of incidence of suicide during different phases of Menstrual Cycle”. International Journal of Medical Toxicology and Legal Medicine. 2001; 3(2): 30-32.
15. Keith Mant A. Mechanical asphyxia, in: Taylors Principles and Practice of Medical Jurisprudence. 13th Edn, BI Churchill Livingstone, New Delhi; 1994: 313-315.

Lip Prints and its Relationship with Angle's Classification of Molar Relation- An Observational Study

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ABSTRACT

Introduction: In Orthodontics, competency of lip is one of the most important assessment to be done for treatment planning. There are studies on correlation of lip prints and skeletal malocclusions, and not much studies focused on relationship between the lip print and molar relation. Occlusion has been broadly classified as Class I, Class II and Class III. This study aims in studying the prevalence of 5 types of lip prints in three different groups of molar relation. The results of this prevalence study, may aid in evidence in personal identification in the field of Forensic Odontology.

Aim: To find if there is any significant relation between the type of lip print and the Angle's molar relation.

Materials and Method: 60 subjects were included and were divided to three groups corresponding to the Angles classification of malocclusion as Class-I, Class-II and Class-III. 20 subjects were included in each group. The lip print pattern of all the 60 subjects was traced using lipstick on a cellophane tape and was pasted on a chart paper for future analysis. The relation between type of lip print and the type of molar relation was assessed.

Results: The correlation coefficient was established to assess relationship with Angle's Molar relation and lip prints which proved to be statistically insignificant ($p > 0.05$).

Conclusion: Type I is the most prevalent lip print in all the 3 molar relations. There is no significant relationship between the type of lip print and the molar relation. Unique 12 digit lip print typing established in this study can be further explored to prove the significance of lip print in biometrics.

Keywords: Dental Malocclusion, lip print, forensic odontology, Angle's Molar relation

INTRODUCTION

Every individual is unique so are their features, like finger print and lip print that do not change significantly with age⁽¹⁾. These features have largely been used in forensic odontology.

Forensic odontology is that branch of forensic medicine which in the interest of justice deals with the proper handling and examination of dental evidence and with the proper evaluation and presentation of the dental findings.⁽²⁾

The main purpose of forensic odontology is to identify individuals with their unique features after a mass disaster like earthquake, landslide, flood, tsunami etc, by comparing the ante mortem and post mortem record⁽³⁾. For this to be carried out a proper treatment record has to be maintained by the dentist. Lips are soft tissues that can be destroyed with time, hence lip prints are not much used in post mortal identification. Lip print patterns are used in individual identification in criminology⁽⁴⁾. The tooth in the jaw are the best

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identification tool even at a latter period after the disaster, as they are not destroyed by heat or other physical changes. So the molar relation can also be used as tool in forensic odontology. The molar relation between the upper and the lower jaw can also be an important ante mortem record.

The wrinkles and grooves on the labial mucosa extending from the region that changes from the labial mucosa to the outer skin is called sulcus labiorum⁽⁵⁾. This forms the characteristic pattern which is called the lip print. Lip is a vital tissue that is analyzed during every orthodontic treatment. However lip print has not been recorded as an ante mortem record.

There are studies that correlates the skeletal jaw relation with lip prints. This is the study that correlates the sagittal occlusion of first permanent molar, classified as Angles Class I, Class II and Class III with 5 types of lip prints. Development of lip occurs during the sixth week of intrauterine life⁽⁵⁾, while the eruption of 1st permanent molar occurs from 6 to 7 years of age. The objective of the study is to know if there is any relation between the molar relation and the lip print type of the individual, there by using them together as an identification tool in mass disaster.

MATERIALS AND METHOD

In the current study a sample size of 60 with 20 in each group of Class-I(Group A), Class-II(Group B) and Class III(Group C) molar relations⁽⁶⁾ were taken. Individuals in the age group of 15-60 were taken with all their teeth with or without 3rd molar were included the study.

CLASS I-

The mesiobuccal cusp of the permanent maxillary first molar occludes at the mesiobuccal groove of the permanent mandibular first molar.(Figure1)

CLASS II-

The mesiobuccal cusp of the permanent maxillary first molar occludes mesial to the buccal groove of the permanent mandibular first molar.(Figure 2)

CLASS III-

The mesiobuccal cusp of the permanent maxillary first molar occludes mesial to the buccal groove of the permanent mandibular first molar.(Figure 3)



Figure 1:CLASS I MOLAR RELATION



Figure 2:CLASS II MOLAR RELATION

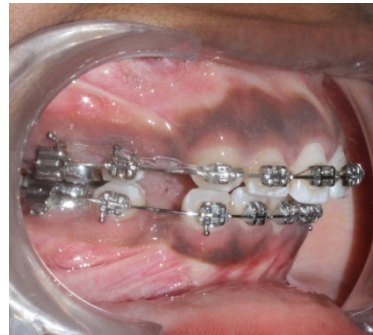


Figure 3: CLASS III MOLAR RELATION

The individuals with any missing tooth or any lesions of lip or developmental disturbances of the lip or any surgery hindering the morphology of the lip were excluded from the study. Informed consent was obtained from all the participants. After this procedure the maxillary and mandibular molar relation was assessed. Then the lip was wiped clean and lipstick was applied with cotton bud all over the lip, every chance of cross contamination was eliminated. 5cm long cello tape was placed over the lip and gentle pressure was applied. Then the cello tape was peeled off from one corner of the lip to the other and pasted on a chart paper. The whole lip was divided into 12 compartments with each of upper and lower lip into 6 compartments and each quadrant of right upper, left upper, right lower and left lower into 3 compartments⁽⁷⁾. A magnifying glass was used to examine the lip pattern in each quadrant and was typed according to Suzuki and Tsuchihashi

classification (1974)

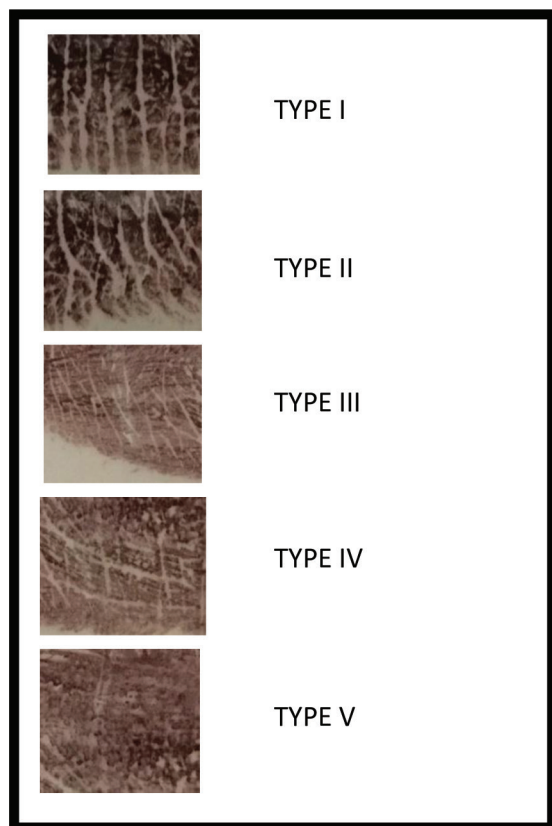


FIGURE 4: Types of lip print

RESULTS

In this study 41 females and 29 males were included. Group A(Class I) included 7 male and 13 female, Group B(Class II) included 6 male and 14 female, Group C(Class III) included 6 male and 14 female. The mean age of patients in Group A(Class I) had a mean age of 27.75 ± 8.552 years, in Group B(Class II) had a mean age of 26 ± 8.55 , and those in Group C(Class III) had a mean age of 27.85 ± 11.96 years.

After analyzing 60 lip prints in 12 compartments a 12 digit coding was generated for each of the 60 samples. From the above analysis of 12 quadrants of the lip it was found that the each lip print was unique. There by making the three digit typing in each quadrant of lip and its combination with the molar relation unique.

There was no significant correlation between the lip typing and the age and sex of the patient. The study also proved there was no correlation between the molar relation and the type of lip print (Table 1). However the predominate type of lip print in the different quadrants of different group remains to be Type 1 (Table 2).

TABLE 1: Correlation between the molar relation and the lip print type

Quadrant	R Value	P Value
Right upper	0.093	0.480
Left upper	0.066	0.619
Left lower	0.240	0.065
Right lower	-0.118	0.369

TABLE 2: The predominant type of lip print in each quadrant for each group

GROUP	QUADRANT	TYPE OF LIP PRINT
Group A	Right upper quadrant	Type I
	Left upper quadrant	Type I
	Left lower quadrant	Type I
	Right lower quadrant	Type II
Group B	Right upper quadrant	Type I
	Left upper quadrant	Type I and Type V
	Left lower quadrant	Type I, Type II and Type III
	Right lower quadrant	Type I
Group C	Right upper quadrant	Type I
	Left upper quadrant	Type I
	Left lower quadrant	Type III
	Right lower quadrant	Type II

DISCUSSION

The molar relations like the lip print are found to be hereditary. Cheiloscopy and its relation to the skeletal malocclusion has been previously discussed In two studies (8,9), but there were no study correlating the Angle's molar relation with lip print . The study by Uma Maheswari et al(7) in the year 2010 in 750 samples, analyzed the type of lip print in 12 compartments for the first time. This study has followed a similar way of analysis and in addition 12 digit code for each lip print was generated to prove the uniqueness of the lip print.

In agreement with the study by Vahanwala and Parekh(10) done in Indian population, current study found vertical prints to be the most common pattern. On the contrary, study by Sivapatha Sundaram(11) found intersecting lip pattern was predominate and Verghese et al (12) found reticular pattern is highly predominate. In comparison of observations reported by previous studies by Tsuchihashi(5) and Pradeep Ragav et al(9), current study proves there is no significant variation between the lip print of male and female there by states there exists no sexual dimorphism between them.

Previous study by Pradeep Ragav et al(9) done in 114 subjects from the age group of 18-30 found reticular pattern to be significantly high in class I, Class II did not show any predominance of lip print typing and vertical pattern to be high in skeletal Class III. While the study by Narayan Kulkarni et al(8) done in 90 subjects, stated Type-I, Type-III and Type-II, Type-III Types of lip print to be predominant in class I, Type, Type-II combination to be predominant in Class II and Type I, Type IV and Type III, Type IV to be predominant in Class III. Both the studies(8)(9)($p > 0.05$), state no significant correlation between the lip print type and the skeletal jaw relation. Unlike the previous study done to correlate the skeletal jaw relation and the lip print by Pradeep Ragav et al(9) and Narayan Kulkarni et al(8), current study has found the dominant lip print in each quadrant separately. The current study says vertical pattern and branched groove to be dominant in Class I. The vertical grooves, forked grooves and reticular grooves except, intersected grooves to be dominant in Class II. The vertical grooves, fork shaped grooves and intersecting grooves to be dominant in class III. However the study did not show a significant($p > 0.05$) difference in the lip print between the groups.

Correlation studies done in lip print pattern include study done with blood group(13)($p > 0.05$) finger print(14)(p -not mentioned), caries (15)($p = 0.725$) and skeletal jaw relations(8)(9)($p > 0.05$). This study has probed for the prevalence of the lip print pattern in different molar relations. This study proves the need to use lip print as ante mortem record and also shows there is less possibility of using lip print as a predictor of Angle's molar relation.

The current study concludes lip prints cannot be employed for recognition of molar relation in the experimental population. However the study also

concluded Type I lip print to be predominant in the population with no sexual dimorphism or variations with age. The future recommendations of this study, hence is not in support of correlation study of lip print with any disorders. The unique 12 digit coding system generated for lip print samples can be further explored using technologic innovation to prove the significance and application of lip print in biometrics.

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REFERENCE

1. Randhawa K, Narang RS, Arora PC. Study of the effect of age changes on lip print pattern and its reliability in sex determination. *J Forensic Odontostomatol*. 2011 Dec 1;29(2):45–51.
2. O'Shaughnessy PE. Introduction to forensic science. *Dent Clin North Am*. 2001 Apr;45(2):217–227, vii.
3. Pramod JB, Marya A, Sharma V. Role of forensic odontologist in post mortem person identification. *Dent Res J*. 2012;9(5):522–30.
4. Utsuno H, Kanoh T, Tadokoro O, Inoue K. Preliminary study of post mortem identification using lip prints. *Forensic Sci Int*. 2005 May 10;149(2–3):129–32.
5. Suzuki K., Tsuchihashi Y. A new attempt of personal identification by means of lip prints. *Can Soc Forensic Sci J*. 1971;(4):154–158.
6. Angle's classification of malocclusion [Internet]. TheFreeDictionary.com. [cited 2017 May 21]. Available from: <http://medical-dictionary.thefreedictionary.com/Angle%27s+classification+of+malocclusion>
7. Paper5: Role of Lipprints in Personal Identification and criminalization by T.N. Uma Maheswari & N. Gnanasundaram: Anil Aggrawal's Internet Journal of Forensic Medicine: Vol. 12, No. 1 (January - June 2011) [Internet]. [cited 2017 May 21]. Available from: http://www.anilaggrawal.com/ij/vol_012_no_001/papers/paper005.html
8. Kulkarni N, Vasudevan S, Shah R, Rao P,

- Balappanavar AY. Cheiloscopy: A new role as a marker of sagittal jaw relation. *J Forensic Dent Sci.* 2012;4(1):6–12.
9. Raghav P, Kumar N, Shingh S, Ahuja NK, Ghalaut P. Lip prints: The barcode of skeletal malocclusion. *J Forensic Dent Sci.* 2013;5(2): 110–7.
10. Vahanwala SP, Parekh BK. Study of lip prints as an aid to forensic methodology. *J Forensic Med Toxicol.* 2000;17:12–8.
11. sivapatha sundaram, ajay prakash, siva kumar gopalakrishnan. Lip Prints (Cheiloscopy). *IJDR.* 2001 Dec;12(4):234–7.
12. A. J. Vergese, Soma sekaran, Umesh Babu. A Study on lip print types among the people of Kerala. *J Indian Acad Forensic Med.* 2010 Jan;32(1):6–7.
13. Rahul patel et al, Assessment of correlation of lip print with gender and blood group among dental students of Visnagar, Gujrat, India. *IJPPS.* May-Jun 2015,1(1);14-18
14. Murugan1 M, Karikalan2 T. study of telative correlation between the pattern of finger print and lip print. *JEMDS.* 2014 oct;56(3):12768-12772
15. 785_IJAR-6356.pdf [Internet]. [cited 2017 Jul 15]. Available from: http://www.journalijar.com/uploads/785_IJAR-6356.pdf.

Awareness & Practice of Patient Rights – A Cross Sectional Study in a Teaching Hospital in Telangana

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ABSTRACT

Introduction: A healthy doctor - patient relationship is cardinal in effective treatment of the patient. This relationship strengthens when the physician respects the patient rights. Improvement in quality of health services is possible with the patients' contribution in treatment process. This can be accomplished only when patients are aware of their rights. Given this, current study was taken up to evaluate patients' awareness & practice of their rights.

Method: This was a cross-sectional, questionnaire based study, in which the subjects, were recruited from out patient departments and in patient wards of the hospital. In & out patients of psychiatry and pediatric departments were excluded.

Results: Of the 300 subjects, 97% had awareness that they can consent or refuse any specific or all measures and 85% knew that the doctors should keep all information about their illness confidential. Though awareness to express their grievances was high, the physicians practice to address these issues was low. Statistically significant association was observed between literacy status and awareness of patient's rights for 14 of the 15 items tested and for practice of giving information about illness, treatment options and giving opportunity in making decision.

Conclusion: The awareness among patients regarding rights needs to be increased, and the awareness among physicians regarding communication of all the issues to the patients needs to be increased which will increase practice of patient rights.

Keywords: Patient rights, awareness, practice

INTRODUCTION

A healthy doctor - patient relationship is cardinal in effective treatment of the patient. One of the facets of healthy doctor-patient relationship is the physician

respecting the patient rights. A doctor who respects the rights of patient gains the confidence of the patient, which is crucial in strengthening the doctor-patient relationship. Patient rights are a fundamental human right that protects patients against abuse, favoritism and advocates ethical practices.

The rights of patient cannot be the same all over the world due to different cultural and social customs. In North America and Europe, there exist four models, which depict the doctor-patient relationship: the paternalistic, the informative, the interpretive, and the deliberative. In paternalistic model the doctors decision

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is given more importance than the patients right to information & participation in decision making as in informative model. (WHO).¹ However, patient-centered medicine has not always been common practice. For example, in the 1950s to 1970s, most doctors considered it inhumane and detrimental to patients to disclose bad news because of the bleak treatment prospect for cancers. The medical model has more recently evolved from paternalism to individualism.²

The medical council of India (MCI) under Indian Medical Council (Professional conduct, Etiquette and Ethics) Regulations, 2002 defines certain duties and responsibilities as well as some rights of physician's. More or less the duties of the physician's mentioned in the code of ethics regulations 2002 become the rights of the patient.

One of the most important aspects, which lead to improvement in quality of health services, is the patients' contribution in treatment process. This can be accomplished only when patients are reasonably aware of their rights. However, with ever increasing complexity in the health systems and fast growing medical technologies, together with a big rural, uneducated patient population in India, the awareness of patients about their rights has been challenged. Given this, current study is taken up to evaluate patients' awareness & practice of their rights.

MATERIALS & METHOD

This was a prospective, questionnaire-based cross sectional study done at department of Forensic Medicine & Toxicology, Medciti Institute of Medical Sciences, Telangana. The study was approved by the Institutional Ethics Committee and was done in accordance to Declaration of Helsinki and principles of ICH-GCP.

The subjects, (patients & their attendants) were recruited from out patient departments and in patient wards of the hospital. Adults of either gender willing to give written informed consent were included in the study. In & out patients of psychiatry and pediatric departments were excluded.

After taking written informed consent, eligible subjects were recruited into the study. Each subject was asked the questions from the questionnaire by the investigator and the response to each of the questions asked, was recorded in the case record form.

Statistical analysis: The data thus obtained was analyzed and presented as mean $\pm$ SD for continuous variables and percentages for categorical variable. Association between literacy and awareness of patient rights and that between literacy status and practice of patient rights were tested using Chi Square with Yates correction considering $p < 0.05$ as significant.

RESULTS

In this study, 300 eligible subjects were enrolled in a period of 4 months. Of them, 55% (166/300) were male and rest were female with a mean age of 36.6 yrs. Among the subjects enrolled, 35% (104/300) were literate; majority were patient attendants and were from rural background.

Before taking the responses for questionnaire-based items, each subject was asked, "whether they know that patients have some rights". The response was 'no' in 249 (83%) subjects.

Regarding awareness of patient rights (Table No.1), 97% of subjects had awareness that they can consent or refuse any specific or all measures, 93% were aware regarding giving complaints and rectification of grievances followed by 92% with awareness that they should be informed regarding day to day progress, line of action, diagnosis and prognosis and 90% were aware that they should be treated without any discrimination.

87% of subjects were aware that they should be treated in privacy and 85% knew that the all information about their illness and any other details are confidential.

However, only 23% were aware that they can have access to their medical records, 24% that they can obtain compensation for medical negligence, only 28% knew that they should be treated with comfort during illness and follow-up, 30% that they can take second opinion and lastly only 35% that they can choose hospital freely and 40% knew that they can choose doctor freely.

In this study, statistically significant association between literacy status and awareness of patient's rights was observed for 14 of the 15 items tested. (Figure No. 1) However, association was found to be non-significant, between literacy status and awareness regarding receiving continuous care for illness.

Among the responses, given regarding practice of patient's rights (Table No. 2), 100% of subjects said that

they were being treated without discrimination, 98% agreed that their records were kept confidential and 94% responded positively on informed consent.

However, it was observed that only 4% of subjects responded that the grievance redressal was done, only 12% said that the claims and provisions were addressed, 18% felt that they were given opportunity of decision making in treatment and only 26%, 32% and 34% felt that they were informed about diagnostic procedures, illness and treatment options respectively.

The association between literacy status and practice of patient's rights (Figure No 2) was found to be statistically significant for practice of giving information about illness ($p < 0.01$), treatment options (< 0.05) and giving opportunity in making decision ($p < 0.05$). However, it was found to be non-significant between literacy status and practice of treatment with respect and dignity, giving information regarding diagnostic procedures, confidentiality, informed consent, grievance redressal and claims and provisions.

DISCUSSION

This study reveals that only 17% of subjects are aware that as patients they do have some rights. In studies done by Fernandes et al.³, Yousuf et al.,⁴ Ducineskiene et al.⁵ and Kagoya et al.,⁶ although 76% of patients knew the meaning of patient rights, only 43% knew that it was acceptable in India, irrespective of absence of legal bill; 90% of patients had awareness of rights; only 56% of patients were aware of the Law on Patient's Rights and most patients (81.5%) had never heard of the Uganda Patients' Charter respectively.

In this study, there was good awareness that they should be treated with care without any discrimination; they should be informed about day-to-day progress, line of action, diagnosis and prognosis. Similar rates of awareness was reported in a study done by Fernandes et al.³ In this study, 35% and 40% of subjects were aware that they can choose hospital and doctor freely respectively; similar rates (41.5% & 40.1%) were reported in a study done at Lithuania.⁵

Among the 97% of subjects, who were aware that they could consent or refuse any specific or all measures, all think that it should be taken from the attendant. Majority feel that consent is taken only to inform risk in the procedure and some feel it as binding towards

paying the fees. Likewise in a study by Fernandes et al.,³ 63% of patients knew that a consent was required for common procedures. In a study on perception of informed consent, it was reported that most patients (86%) thought that their consent confirmed that they understood that there are risks involved (82%).⁷

In this study, 85% knew that all information about their illness and any other details should be confidential and 98% felt that confidentiality was maintained. In a study done at Lithuania, 40.9% of the respondents reported that patient's permission was obtained for providing the information to relatives.⁵

Though, 92% of subjects were aware that they should be informed regarding day to day progress, line of action, diagnosis and prognosis, only about 30% agreed that they were informed about these issues. In Fernandes et al., study, 85% of patients responded that they were informed regarding illness and modality of treatment and only 45% were informed regarding alternative procedures.³ In Yousuf RM et al., study, treatment options were discussed with 45% of cases only, and 65% of patients were informed of their duration of treatment.⁴ In another study done at Lithuania, the authors felt that health care professionals who knew about the law of patient rights were more likely to share information than unknowledgeable professionals.⁵

Of the subjects, 32% were unaware regarding safety of diagnostic and therapeutic procedures, of them, 25% felt that it was not necessary to know about safety of these procedures, as they felt that doctor does any procedure in the best interest of the patient.

65% of subjects were unaware about choosing hospital freely; they felt someone should refer them. 70% were unaware regarding taking second opinion. Whether aware or not, they take second opinion without informing the primary doctor.

In this study, though the awareness to express grievances was high, the physicians practice to address these issues was low. In a study, though 67% of patients were aware of grievance redressal, it was addressed in practice in only 21% of cases.³

In this study, 35% of the participants were literate, in contrast to a study done in Malaysia⁴ in which 86% were literate and a study done in Saudi Arabia, 76.8% had high school education⁸, similarly in one study,

55.5% indicated that they did not know about their rights despite 72% having secondary education.⁶

The significant association found between the literacy status and awareness of most of the patient rights, indicates that in illiterates the awareness of patient rights is less. In the studies done at Iran⁹ and Uganda⁶, significant relationship was reported between patient awareness and educational level ($P < 0.001$), with increasing education, awareness improved. Similar results were reported in a study done by Farida et al., where, higher education level was associated with increase of total awareness score ($p = 0.000$).⁸

In this study, 18% felt that they were given opportunity of decision making in treatment. In contrary, in a study done at Karnataka, India,³ 64% of patients felt that their choice regarding treatment was respected and this can be attributed to 86% literate patients in that study while only 35% were literate in this study and a significant association between practice of this right and literacy supports the same.

Regarding grievance redressal system, the results of this study are in line with those of a study done at Karnataka, India,³ where only 21% respondents agreed that there was grievance redressal system existing.

The non significant association between literacy status and practice of patient rights with regard to

treating with respect, informing about diagnostic procedures, maintaining confidentiality, taking consent, indicates that the physicians executed practice of these rights irrespective of literacy status.

The non-significant association between literacy status and practice of grievance redressal and claim and provisions, indicates that physicians had low level of compliance in execution of these rights irrespective of patient awareness.

Practice of giving information about illness, treatment options and giving opportunity of decision making in treatment were significantly associated with literacy status, showing that physicians executed these practices more towards literate population.

CONCLUSION

The awareness among patients regarding rights needs to be increased, and the awareness among physicians regarding communication of all the issues to the patients needs to be increased which will increase practice of patient rights. As the awareness of patient rights is associated with literacy status, government should take good measures to increase the literacy rate in population. Compliance with MCI regulations can increase the practice of patient rights by physicians.

Table No. 1: Showing number and percentage of subjects who were aware and unaware of patient rights (n=300).

S.No	Right To	Aware of Patient Rights (n=300)	
		Aware n (%)	Unaware n (%)
1	Choose the hospital freely	105 (35%)	195 (65%)
2	Choose the doctor freely	125 (40%)	175 (60%)
3	Be treated with care, compassion, respect and dignity without any discrimination	272 (90%)	28 (10%)
4	Be treated in privacy during consultation and therapy	261 (87%)	39 (13%)
5	Keep all information about his/her illness and any other be kept confidential	255 (85%)	45 (15%)
6	Receive full information about his/her diagnosis, investigation, treatment and alternative plans	111 (37%)	189 (63%)

Cont... Table No. 1 showing number and percentage of subjects who were aware and unaware of patient rights (n=300).

7	Information regarding safety of diagnostic and therapeutic procedures	204 (68%)	96 (32%)
8	Know the day to day progress, line of action diagnosis and prognosis	276 (92%)	24 (8%)
9	Consent or refuse any specific or all measures	291 (97%)	9 (3%)
10	Second opinion	90 (30%)	210 (70%)
11	Access records and demand summary or other details pertaining to it	69 (23%)	231 (77%)
12	Receive continuous care for illness from the physician or institute	114 (38%)	186 (62%)
13	Be treated with comfort during illness and follow up	85 (28%)	215 (72%)
14	Complain and rectification of grievances	279 (93%)	21 (7%)
15	Obtain compensation for medical negligence	72 (24%)	228 (76%)

Table No. 2 showing number and percentage of subjects who responses were positive and negative towards practice of patient rights (n=300).

S.No	Practice of	Practice of patient rights (n=300)	
		Yes n (%)	No n (%)
1	Treatment with respect & dignity	294 (98%)	6 (2%)
2	Treatment without discrimination (Gender, religion, financial status)	300 (100%)	0
3	Giving information about diagnostic procedures	78 (26%)	222 (74%)
4	Giving information about illness	96 (32%)	204 (68%)
5	Giving information about treatment options	102 (34%)	198 (66%)
6	Confidentiality	293 (98%)	7 (2%)
7	Informed consent	280 (94%)	20 (6%)
8	Respect/ opportunity of decision making in treatment	52 (18%)	248 (82%)
9	Grievance redressal system	14 (4%)	286 (96%)
10	Claims & provisions	35 (12%)	265 (88%)

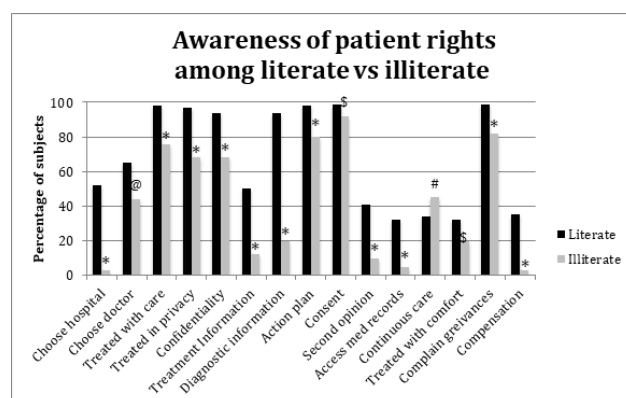


Figure No 1: Showing percentage of subjects with awareness of patient rights among literate and illiterate.

* indicates $p < 0.0001$; @ indicates $p < 0.01$; \$ indicates $p < 0.05$ and # indicates $p > 0.05$ for association between awareness of patient rights and literacy status

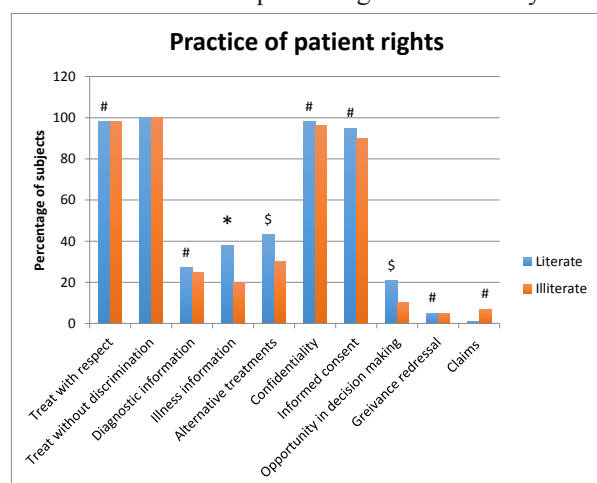


Figure No 2: Showing percentage of subjects with positive response towards practice of patient rights among literate and illiterate.

* indicates $p < 0.01$, \$ indicates $p < 0.05$ and # indicates $p > 0.05$ for association between practice of patient rights and literacy status

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REFERENCES

1. Genomic research centre. Patients' rights. World Health Organisation. <http://www.who.int/genomics/public/patientrights/en/> accessed on 03/08/2016
2. Ha, Jennifer Fong, and Nancy Longnecker. "Doctor-Patient Communication: A Review." *The Ochsner Journal* 10.1 (2010): 38–43.
3. Fernandes. Awareness of patients rights. *Int J Res Foundation Hosp Healthc Adm*, 2014.
4. Yousuf R M, Fauzi A R M, How S H, Akter S F U, Shah A. Hospitalised patients' awareness of their rights: a cross-sectional survey from a tertiary care hospital on the east coast of Peninsular Malaysia. *SingaporeMedJ*2009;50(5):494
5. Ducinskiene D, Vladickiene J, Kalediene R and Haapala I. Awareness and practice of patient's rights law in Lithuania. *BMC International Health and Human Rights* 2006, 6:10 doi:10.1186/1472-698X-6-10.
6. Kagoya HR, Kibuule D, Mitonga-Kabwebwe H, Ekirapa-Kiracho E, Ssemphwa JC. Awareness of, responsiveness to and practice of patients' rights at Uganda's national referral hospital. *Afr J Prm Health Care Fam Med*. 2013;5(1), Art#491, 7 pages. <http://dx.doi.org/10.4102/phcfm.v5j1.491>
7. Andrea Akkad, Clare Jackson, Sara Kenyon, Mary Dixon-Woods, Nick Taub, Marwan Habiba. Patients' perceptions of written consent: questionnaire study. *BMJ*, doi:10.1136/bmj.38922.516204.55 (published 31 July 2006)
8. Farida M, Habib and Hind Sulaiman Al-Siber. Assessment of awareness and source of information of patients' rights: a cross-sectional survey in Riyadh Saudi Arabia. *American Journal of Research Communication*, 2013, 1(2): 1-9
9. Mastaneh Z, Mouseli L. Patients awareness of their rights: insight from a developing country. *International Journal of Health Policy and Management* 2013; 1: x-x.

Sociological Explanation of the Effects of Social and Cultural Factors Affecting Attitude toward Divorce in 2016 (Case Study: Couples Referring to Guilan Welfare Centers)

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ABSTRACT

The family as a major social institution has historically played important roles such as socialization, preservation of social cohesion, the transfer of cultural heritage to future generations, social control and monitoring, the reduction of external pressure and the formation of cultural – social personality and identity. However, recently, chronic disease of divorce has become prevalent and families have been changed into the crisis centers in the contemporary world. Attitude toward divorce is like a mirror that reflects the evolving trends and perspectives of the family's future and it can be used as an indicator for measuring family health and stability. This study aims to investigate the attitude toward divorce in couples referring to welfare centers as well as the social and cultural factors affecting its formation using survey and Kineard's Attitude Measurement Questionnaire and Life Style Questionnaire based on random sampling method on 282 couples applicant for divorce. The results of the research show that there is a significant relationship between the socio-economic status of couples, the level of parental education and the father's job, lifestyle and attitude toward divorce. Multiple regression analysis shows that the lifestyle and educational level of couples in total explain 34% of the variance in the attitude to divorce.

Keyword: Attitude to Divorce; Lifestyle; Economic and Social Status; Parental Education; Father's Job.

INTRODUCTION

Among the social institutions affecting the formation of the personality and socio-cultural identity of humans, including education, government, religion, mass media, economics, and the peer group, one can safely assert that the role of the family is unique and irreplaceable¹. The family is the place where talents and creativity grow. It is the place for cultivation and perfection of human beings and the source of love and affection. History shows that nations with stable families have been stronger and the decadence of every nation has begun since the foundation of its family has been weakened². As a mirror, the family reflects the

socio-cultural, economic, and political conditions of the society, in other words, it can be interpreted as a ruler and a criterion for measuring policies and practices at the macro level of the society³. On the other hand, the family is considered as a protective and shocking shield in society. Therefore, it cannot be regarded as merely an institution based on intense emotions because its social functions are also important and meaningful, and that is why any change in family greatly affects the whole social structure⁴. According to Tofler, the family is where an injured person returns to it after a battle with the outside world, a safe and lively environment; with the expansion of the over-industry revolution, the family as a shocking shield is also considerably affected⁵. Despite the importance of family in all cultures and societies, divorce is another aspect of the fact that no individual, group or community is immune from its consequences. As a society in transition and in the turbulence of the dual themes of traditionalism and modernity, the Iranian society is experiencing special economic, social and

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cultural conditions that have exposed it to new harmful social problems or deepened its traditional traumatic aspects, including increasing trend of divorce. Every kind of change in Iranian society is rooted in the family. The main changes in the social system of Iran were realized either by the family or oriented towards the family. One of the signs of a change in the Iranian family is the increasing rate of divorce in the cities and the villages; divorce for the new generation has been regarded as a way of transition from intra-familial problems (especially between men and women), while in the last generation, especially among the first generation, there was not such an attitude toward divorce⁶.

Therefore, given the increasing trend of divorce, it can be claimed that divorce has become a “social problem” in Iranian society and involves all social strata and groups and nobody is immune from its consequences. Consequences such as instability and imbalance in family mental health⁷, adversely affect parents and children, increase crime among the girls and boys, disrupt children’s development, especially boys, increase antisocial behaviors in children⁸, leads to occurrence of physical and psychological disorders such as alcoholism, suicide, mental weakness and less satisfaction with life in divorced people⁹, more social isolation, problems in parental duties, low level of mental health of the divorced couples, lower opportunities of children for academic achievements, psychological adjustment, social competitions and physical health¹⁰, less involvement in social activities, increase in social isolation, losing contacts and social interactions with friends and neighbors, and ultimately losing emotional support¹¹.

In addition to the consequences of divorce, the reason for increased divorce rate has also been examined from different perspectives, because divorce is a multidimensional phenomenon with several causes, rooted in different micro, macro, and middle levels of social life⁸. Some describe it as a postmodern world and open-minded modernity, and talk about the end of romantic love and the replacement of mutual satisfaction in marriage, questioning the definitive affairs in the field of beliefs and knowledge, including marriage¹². Elkin calls the postmodern family “permeable,” meaning the family can be influenced in a way that its significance is reformed or changed¹³.

Others believe that the family is affected by the

process of globalization, a process that has shifted the traditional order of space-time and put traditional social institutions, including the family, into an uninhabited state, cut back its stability and integrity and created a kind of the permeable and ubiquitous social environment based on the characteristics of “difference”, “fluidity”, “paradox” and “networking”¹⁴. As mentioned above, the relationship between divorce and values and related developments is well known. According to Nizbet, social problems, even the worst one, are rooted in values that are strongly endorsed by the community¹⁵. In other words, social problems have a functional relationship with the institutions and values that we live with. Accordingly, divorce derives mainly from society and its varying values than from the collapse and destruction of the family as a social institution³. Divorce rate is considered as indicator for family health and well-being in a community. Many sociologists regard the rise and fall of marriage rate as a general indicator of the quality of marriage, social order and stability. The family is the point of intersection of various trends that affect the entire community¹⁶. Hence, any policy making and decision making to reduce and control divorce requires awareness of the rate of divorce in society.

METHODOLOGY

Method, statistical population, sample size: This is a survey that is carried out using a causal-comparative method. The statistical population of this study consists of all couples referring to intervention centers in the family in order to reduce the divorce in Guilan for two months, with a total of 1000 people. The sample size was determined using Morgan Table, taking into account 5% sampling error¹⁷ and Cochran’s formula as 278 people selected by systematic random sampling. The inclusion criteria for the study included the request for the divorce of couples referring from family courts to well-being centers and consent to enter the study. After confirming the content validity of the questionnaire, the reliability of the tool (including attitude toward divorce, lifestyle, and objective cultural capital) was calculated using Cronbach’s alpha coefficient which was 83.3, 90.7 and 80.8, respectively. Data were collected using the interview technique and physical presence.

FINDINGS

Based on the results of the research at the descriptive level, 46.1% of the respondents are men and 53.9% are

women at the level of demographic variables. 2.5% of the respondents are illiterate and 76.6% of them have diploma degree or are lower than the diploma level and 20.8% have associate's degree or above. 3.9% of respondents are under 20 years old, 53.2% are 21-30 years old, 30.5% are 31-40 years old, 11% are 41 to 50 years old, and 1.4% are 51-60 years old and older. 68.3% of the respondents are rural and 31.7% are urban. In terms of economic status, 44.3% of the respondents are inactive, 31.9% are worker, 9.6% are employed, and 14.2% are self-employed.

The first hypothesis: There is a significant relationship between demographic variables (sex, age, and location) and attitude toward divorce of the couples applicant for divorce.

Table 1: Independent t-test results for the first hypothesis

Independent variable	Levene's test for equality of variance		T test of equality of variances					Confidence 95%	
	F	Sig	t	df	Two way sig	difference in average	Difference in SE	low	high
Sex	0.430	0.526	0.479	280	0.633	0.5211	1.0887	-2.664	1.6220
			0.477	269.389	0.634	0.5211	1.0887	-2.671	1.6294
Location	0.011	0.918	1.370	280	0.172	1.59993	1.16793	-0.69910	3.8989
			1.385	172.827	0.168	1.59993	1.15489	-0.67954	3.8794

Table 2: Results of One-Way Variance Analysis of the first hypothesis

	Source of changes	Sum of squares	fd	Average of squares	F	Sig
Age groups	intergroup	178.282	4	44.571	.534	.710
	intragroup	23098.597	277	83.388		
	total	23276.879	281			

Table 3: Relationship between couples' level of education and Income with attitude toward divorce for the second hypothesis

Pearson correlation		Attitude toward divorce
Couples' level of education	Pearson value	0.428**
	Sig	0.020
Income	Pearson value	0.225**
	Sig	0.020

Testing the fourth hypothesis: There is a significant relationship between income and attitude toward divorce of the couples referring to divorce reduction centers.

DISCUSSION AND CONCLUSION

As a developing society, Iran's society gradually moves away from its past structure and conventions, and moves towards new structures and conventions but not yet established, therefore, it has a kind of ambiguity and duality in terms of beliefs, thoughts, behaviors, and practices. It is natural that there are dual and sometimes contradictory themes affecting lifestyle of the people that lead to fundamental changes.

The results of this study indicate that 3.5% of couples applicant for divorce had negative attitude toward divorce, 33.4% showed neither agreement nor disagreement (Interstitial state) toward divorce, and 63.1% had a positive attitude toward divorce. Obtained levels of attitude toward divorce reflect the image of a society that is experiencing a kind of familial crisis, a fact that can be justified by the state of divorce in Iran, a situation that if the dimensions and scope of emotional divorce or silent lives are added to it, it will become more painful. Soleimani¹⁸ showed the students' attitude toward divorce more than moderate, however, Fatehi et al.¹⁹ showed that 52.7% of respondents had moderate tendency to the divorce and nearly 7.6% had strong tendency toward it. It seems that one of the most important factors in increasing divorce in Iranian society is the change in lifestyle in the society affected by modernization and related changes particularly in the area of the family.

Investigation of the hypothesis on the relationship between lifestyle and attitude toward divorce suggests that lifestyle affects attitude toward divorce, so that with increasing the attitude of individuals towards modern lifestyle patterns, the attitude toward divorce is also more positive. The lifestyle is the objective aspect and the external manifestation of human behavior in areas such as body management, consumption of cultural products, patterns of coverage, patterns of nutrition, and so on based on the mental structure or habitus of activists during the process of socialization or the internalization of the structures of the social world based on their position within social spaces, through which activists are able to understand and evaluate the social world. Therefore, it can be assumed that lifestyles have different meanings, that is, they include certain values that each activist implicitly considers them and these reflect the particular values and norms of a society that people tend to adopt some of particular lifestyles based on the mental world

included in it. The results of the study also show that with increasing socioeconomic status in terms of factors such as job, education and income, couples will have a more flexible attitude toward divorce. For example, analysis shows that increasing educational level of the couples increases their tendency toward divorce and this is consistent with the results of Saroukhani's²⁰ study on the effect of education on increasing divorce, and this relationship is also observed in other factors, such as job status and income levels. It seems that one of the main reasons is that the high socio-economic status has a major role in providing the fields of financial and economic independence, providing social-psychological security in divorce and separation situations, especially for women, and increasing the expectations of life, adopting lifestyle based on pleasure, happiness, intolerance of hardships and difficulties of life are other related results.

Another important finding of the research is the existence of a relationship between the educational status and the job of the parents of the couples and couples' attitude toward the divorce. The most important reason seems to be the formation of the type of socialization and habitus of people and families with similar socio-economic status as well as subsequent tendencies and attitudes.

Results also show the lack of a relationship between the underlying variables (sex, age, and location) and attitude toward divorce; of course, due to the process of globalization and the formation of values and norms arising from the expansion of communications and mass media, the prevalence of the positive attitude toward divorce among individuals and group, such a phenomenon is expected. In the end, according to step by step multiple regression analysis, lifestyle and education have been able to explain a total of 305% of the variance of attitudes toward divorce.

Ethical Clearance: is adhered all ethical interests: (The ethics of recording data, the right of respondents to end involvement in the research, the disclosure by respondents of sensitive material, the ethics of ethnographic fieldwork, the ethics of the research interview, and ethics in the use of questionnaires).

Conflict of Interest: The authors report no conflict of interest.

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REFERENCES

1. Asghari, F., Saadat, S., Atefi Karajvandani, S., & Janalizadeh Kokane, S. (2014). The Relationship between Academic Self-Efficacy and Psychological Well-Being, Family Cohesion, and Spiritual Health among Students of Kharazmi University. *Iranian Journal of Medical Education*, 14(7), 581-593.
2. Walsh, F. (2015). *Strengthening family resilience*. Guilford Publications.
3. Saei Arasi, I. (2003). *An Introduction to Sociology and Pathology of the Unhappy Family*, Islamic Azad University of Abhar.
4. Demir, Sevim Atila. (2013). Attitudes toward concepts of marriage and divorce in Turkey. *American international journal of contemporary research*. Vol. 3 NO.12.
5. Taflor, A. (2014). *Third Wave*. Translated by Kharazmi, Sh. Tehran: Aseman Publishing.
6. Aazd Ormaki, T. (2015). *Changes, Challenges and Future of the Iranian Family*, Tehran: Tisa Publishing.
7. Boulhari, J. et al. (2012). Examination of some social causes leading to couples' applicant for divorce in Tehran courts. *Iranian Journal of Epidemiology*, Volume 8, Issue 1.
8. Sotoudeh, H. (2007). *Family Pathology*. Tehran: Neda-ye Arian Publishing.
9. Bernards, J. (2005). *An Introduction to Family Studies*. Translated by Ghazian, H. Tehran: Ney Publishing.
10. Shokr Beigi, A. (2011). *Modernism and Family Social Capital*. Tehran: Sociologists' publication.
11. Waite, L. & Gallagher, M. (2012). What are the possible consequences of divorce for adults, www.divorce.usu.edu/files/uploads/lesson.pdf.
12. Giddens, A. (2014). *Modernity and self - Identity: Self and society in the late modern age*. Translated by Movafaghian, N. Tehran: Ney Publishing.
13. Kandal, D. (2014). *Contemporary Sociology*. Translated by Hemmati, F. Tehran: Sociologists' Publishing.
14. Ahmadi, O. A. (2015). *Social Analysis of the Social Status and Change of Marriage and Divorce*. Social Status Report of Women in Iran (2001-2011). Tehran: Ney Publishing.
15. Moayedfar (2006). *Sociology of Social Issues in Iran*. Tehran: Nour-e Elm Publication.
16. Giddens, A. (1998). *Global Perspective*. Translated by Jalaipour, M. R. Tehran: Nashr-e No Publishing.
17. Azkia, M. & Darban Astaneh, M. (2003). *Applied Research Methods*, Tehran: Keihan Publications.
18. Soleimani, I. (2015). A changing attitude toward divorce among students (Ardabil Universities). *Journal of Social Sciences, Islamic Azad University of Shoushtar Branch*, Vol. 9, No. 4, pp. 239-252.
19. Fatehi, A. et al. (2010). Sociological analysis of factors affecting couples' tendency to divorce in Isfahan province, *Quarterly Journal of Social Security Studies*.
20. Sarukhani, B. (1993). *Divorce, research on its recognition and factors*. Tehran, Tehran University Press.

Profile and Pattern of Homicidal Injuries in Central Indian Population

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ABSTRACT

The present study was conducted in department of Forensic Medicine and Toxicology at a tertiary care centre in Nagpur for a period of 2 years from July 2015-2017 with an aim to evaluate the pattern of homicidal injuries with special reference to injuries sustained during these incidences. Total 99 cases were studied from the details mentioned in inquest, police reports, post mortem reports and statements of the relatives. Injuries over particular parts of the body were noted in detail while keeping into consideration the type of weapon used, internal organs involved and cause of death. Most cases occurred in summer season (37.37%) and evening (32.32%) being preferred time for assault with isolated and remote places (28.28%) being most preferred site. Males in the age group of 21-30 years (32.32%) dominated the scenario with hard and blunt weapon (36.36%) being used most commonly followed by sharp and pointed (35.35%) weapons. Head injury (40.4%) and hemorrhagic shock (40.4%) were equally responsible for deaths along with head, neck and face region (80.8%) being the most targeted region. Brain (42.42%) was most commonly damaged organ followed by neck structures.

Keywords -Pattern of Injuries, Homicide, Weapon, Cause of death, Inquest.

INTRODUCTION

Violence is a significant health problem and homicide is the severest form of violence, depriving human being of his fundamental right to live. Homicide is prevalent widely almost all over the world.¹ Homicide is defined as killing of one human being by another human being and is one among the leading causes of unnatural deaths.² Not all homicide is murder, as some killings are manslaughter, and some are lawful, such as when justified by an affirmative defence, like insanity or self defence.³

Homicide is the most serious crime as old as civilization and reported as early as in the Bible.⁴ 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.⁵

Population explosion, changing lifestyle, stresses of life due to monitory, emotional, health issues, negative impact of movies and media, addiction and easy availability of the weapons has led to increase in the incidence of homicide and also the change of pattern in homicide has been observed. Considering the magnitude and frequency of the deaths and its impact on the society, the present study is undertaken so as to find out the most vulnerable age group, sex incidence, seasonal variation, pattern of injuries and weapons used.

MATERIAL AND METHOD

A retrospective study of 2 years was conducted from July 2015 to June 2017 and data of 99 cases was collected from post-mortem reports, police inquest and other relevant documents in a predetermined format. In few cases multiple methods of homicide, multiple weapons were used in a single case and also multiple

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type of injuries sustained therefore all were recorded and only one homicide was counted. The selection criteria for the cases are as follows:

All cases referred as homicide and confirmed on post-mortem were included in the study.

All cases which were investigated as accidental deaths but later turned out to be homicidal deaths were included.

Victims from all age groups were included.

Proforma is prepared citing numerous variables such as age, sex, season of incidence, time of incidence, place of incidence, type of injury, type of weapon used, region of body targeted, internal organ involved and cause of death.

Post mortem examinations of the cases were carried out as per standards.

OBSERVATION AND RESULTS

Present study demonstrated dominance of male victims 68 (68.68%) as compared to female victims 31 (31.31%). Age group between 21-30 years was most vulnerable with 32 cases (32.32%). In both cases of infanticide female children were victimized. Regarding seasonal variation most cases were distributed equally with summer 37 (37.37%) being most common and winter being least common 30 (30.3%). Most victims were assaulted in the evening 32 (32.32%) while evening time and late night combined together 52 (52.52%) was the preferred time of assault in more than half of cases.

Most victims were done to death at isolated places (28.28%) followed closely by victims residence (26.26%) and public places (24.24%). Domestic homicides were noted in (15.15%) cases where accused as well as victims shared common residence. Husband (33.33%) was the main perpetrator followed by brother (26.33%). Blunt trauma injuries like abrasions 61 (61.61%), contusions 59 (59.59%) and lacerations 32 (32.32%) were most commonly encountered followed by stab injuries 28 (28.28%) and incised wounds 20 (20.20%). Firearm injuries 2 (2.02%) were least commonly observed. Head, neck and face region 80 (80.8%) was most targeted region followed by thorax 39 (39.39%) and genitals 5 (5.05%) were among the least targeted areas.

Hard and blunt 36 (36.36%) along with sharp and pointed instruments/objects 35 (35.35%) were weapons of choice for assault. Head injury 40 (40.4%) and shock due to haemorrhage 40 (40.4%) were equal contributors among cause of deaths followed by asphyxia 17 (17.17%). Among internal structures brain 42 (42.42%) was most commonly damaged followed by neck structures 29 (29.29%) and lungs 12 (12.12%).

Male 6 (6.06%) and female 6 (6.06%) were equally victimized using ligature strangulation as a means of homicide. 2 (2.02%) cases of smothering were observed, female being common victim and out of which one case also had ligature strangulation associated with it.

Shock and haemorrhage 32 (32.32%) followed by head injury 30 (30.3%) were most common causes of death in males while mechanical asphyxia 9 (9.09%) was most common cause of death in female. Homicidal burn injuries 4 (4.04%) were more prominent in female population.

DISCUSSION

The ratio of male victims 68 (68.68%) to female victims 31 (31.31%) in the present study is 2.19:1 which is consistent with observations made by Buchade, Mohite⁶; Ghangale, Dhawane and Mukherjee⁷; Mohanty, Mohanty and Acharya⁸ and Scott K W M⁹ and can be attributed to more aggressive nature of males than females. Most vulnerable victim age group was between 21-30 years 32 (32.32%) followed by 31-40 years 25 (25.25%) which is consistent with studies of Agrawal and Bansal¹⁰; Ghangale, Dhawane and Mukherjee⁷; Scott K W M⁹; Sinha U S, Kapoor A K and Surendra Kumar Pandey¹¹. However present study findings are in contrast with the observations made by Wahlsten P¹² and Kominato Y¹³ where most victims belonged to 31-40 years and 36-45 years respectively.

Incidence of homicides were highest in summer season and these findings are consistent with observations made by R. Y. Padmaraj (2010)¹⁴ and Pradeep K Mishra (2012)¹⁵ while these findings are in contrast with observations made by Sinha.U.S¹¹ where incidence was least in summer. Maximum incidences i.e. more than 50% took place in evening and late night which may be due to lack of light where chances of assailant being exposed are less or may be due to indulgence in heated arguments, it being domestic or financial during the recreational activities after the days hard work.

Similar findings were observed by Wahlsten P.¹² and Gupta Avnesh⁴ whereas study by Vougiouklakis T.¹⁶, maximum cases (26.9%) occurred during noon.

Isolated or remote places were more preferred site by assailants in the present study which are consistent with findings by Vougiouklakis T.¹⁶ where deserted area or place close to agricultural site was commonly found and with the observations of Mohanty M.K.⁸ where majority of cases took place outdoors. Victim's residence (26.26%) was second most common site of incidence which implies that these homicides were done in cold blood and perpetrators were aware of whereabouts of the victim. Public places (24.24%) like streets and common gathering places, third leading place of incidence in the present study are the places where old rivalries, arguments and revenge murders took their toll.

Hard and blunt weapons 36 (36.36%) were most commonly used followed shortly by sharp and pointed 35 (35.35%). Thus findings in the present study are consistent with Buchade, Mohite⁶ while contradicts findings of Ghangale, Dhawane and Mukherjee⁷; Aggarwal and Bansal¹⁰ and Rouse D A¹⁷ where sharp edged weapons were most commonly used followed by hard and blunt weapons. Firearms 2 (2.02%) was least used weapon in the present study which is consistent with findings of Jhaveri S, Raloti S, Patel R, Brahbhatt J, Kaushik V³; Buchade, Mohite⁶ however contradicts the observations made by Sinha U S, Kapoor A K, Surendra Kumar Pandey¹¹ and Bamidele Adeagbo, Colin Clark and Kim Collins¹⁸ where firearms were mostly used. Strict rules for carrying a firearm license, harsh penalties and strict vigilance of illegal black market sale of firearm weapons has led to less popularity of these weapons while hard and blunt weapons being easily available are more popular.

Multiple parallel, uniformly deep, stab injuries concentrated in a particular region with or without mutilation which are emotionally motivated occurring in jealousy, intense hatred and sexual overtones is known as overkill. Such 7 cases were observed in the present study.

Head, neck and face region 80 (80.8%) of the body was the most targeted areas of the body followed by thorax

39 (39.39%). Similar findings regarding involvement of head, neck and face region were observed by Buchade, Mohite⁶; Mohanty, Mohanty and Panigrahi et al¹⁹; Sinha U S, Kapoor A K, Surendra Kumar Pandey.¹¹ Brain was most common organ involved in the present study which is consistent with observations made by Sinha U S, Kapoor A K, Surendra Kumar Pandey¹¹ and contradicts the finding made by Buchade, Mohite.⁶

Head injury and shock with haemorrhage were equally responsible for the deaths of victims in the present study while studies by Aggarwal and Bansal¹⁰ showed shock and haemorrhage being more prominent cause of death and Sinha U S, Kapoor A K, Surendra Kumar Pandey¹¹ reported head injury being more common. Homicidal burns were more common in female and similar findings were observed by Ghangale, Dhawane and Mukherjee.⁷

LIMITATION

Study was confined to a particular jurisdiction, rather sensitive zone of a greater part of city.

The data was based mainly on the information provided by law enforcing agencies, reports, statements, victim relatives and friends in a few cases.

CONCLUSION

Government should survey and address the problems of the youth like unemployment, poverty and illegal activities by targeting sensitive areas in the community as majority of the victims belonged to age group between 21-30 years which is crucial for an every individual to be independent.

Strict laws should be implemented for possession of potentially dangerous weapons.

Loopholes are created when multiple law enforcing agencies act independently. So a common unit as in some western countries which is entirely dedicated to homicidal investigation may yield fruitful and rapid results in mere future in Indian scenario.

Table I: Age distribution of Cases

AGE	Cases (n)	Percent
<1	2	2.02%
1-10 YEARS	5	5.05%
11-20 YEARS	7	7.07%
21-30 YEARS	32	32.32%
31-40 YEARS	25	25.25%
41-50 YEARS	17	17.17%
51-60 YEARS	7	7.07%
61-70 YEARS	2	2.02%
71-80 YEARS	2	2.02%
81-90 YEARS	0	0%
TOTAL	99	100%

Table II: Sex distribution of cases.

	2015	2016	2017	TO-TAL	Percent
MALE	16	38	14	68	68.68%
FE-MALE	7	16	8	31	31.31%
TOTAL	23	54	22	99	100%

Table III- Time of Incidence

MORNING	5	5.05%
AFTERNOON	26	26.26%
EVENING	32	32.32%
LATE NIGHT	20	20.20%
NOT AVAILABLE	16	16.16%
TOTAL	99	100%

Table IV: Place of Incidence

PLACE OF INCIDENCE	Cases (n)	Percent
VICTIM	26	26.26%
ACCUSED	3	3.03%
VICTIM ACCUSED	15	15.15%
PUBLIC PLACE	24	24.24%
WORK PLACE	1	1.01%
ISOLATED/REMOTE	28	28.28%
OTHER	2	2.02%
TOTAL	99	100%

Table V- Seasonal Variation

	2015	2016	2017	TOTAL	Percent
SUMMER	0	24	13	37	37.37%
RAINY	16	15	1	32	32.32%
WINTER	7	15	8	30	30.30%
TOTAL	23	54	22	99	100%

Table VI: Injury constellation with respect to kind of injuries, type of weapon, region of body targeted, internal organs involved and cause of death.

Kind of Injuries inflicted*		
Abrasion	61	61.61%
Contusion	59	59.59%
Laceration	32	32.32%
Incised	20	20.20%
Stab	28	28.28%
Chop	12	12.12%
Firearm	2	2.02%
Ligature strangulation	12	12.12%
Throttling	4	4.04%
Smothering	2	2.02%
Burns	6	6.06%
Type of Weapon used*		
Hard and blunt	36	36.36%
Sharp and Pointed	35	35.35%
sharp and heavy	13	13.13%
Ligature	12	12.12%
Firearm	2	2.02%
Manual	5	5.05%
Region of the body targeted*		
Head, Neck, face	80	80.80%
Thorax	39	39.39%
Abdomen	30	30.30%
limbs	30	30.30%
Genitals	5	5.05%
Internal organs involved*		
Brain	42	42.42%
Heart	8	8.08%
Lungs	12	12.12%
Liver	4	4.04%
Spleen	2	2.02%

Cont... Table VI: Injury constellation with respect to kind of injuries, type of weapon, region of body targeted, internal organs involved and cause of death.

Kidneys	1	1.01%
Neck Structures	29	29.29%
Cause of Death*		
Head Injury	40	40.40%
Shock and haemorrhage	40	40.40%
Asphyxia	17	17.17%
Burns	5	5.05%
Complications	5	5.05%

*Kind of injury, type of weapon, region of the body targeted, internal organs involved and cause of death outnumbered the actual cases as all parameters were taken into consideration in each case.

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REFERENCES

- Gupta S. and Prajapati P. Homicide Trends at Surat Region of Gujarat, India. *Journal of Forensic Medicine & Toxicology*. 2009;26 (1): 45-48.
- Narayana Reddy K.S., 2007. —The Essentials of Forensic Medicine and Toxicology Medical Book Company, Hyderabad, 26th edition: 251 – 252 PP.
- Jhaveri S, Raloti S, Patel R, Brahbhatt J, Kaushik V. Profile of Homicidal deaths: a three year study at Surat Municipal institute of Medical Education and Research, surat during 2011-2013. *Natl J Community Med* 2014; 5(4); 406-9.
- Gupta Avnesh et al. 2004. —A study of Homicidal Deaths in Delhi, *Medicine, Science and Law*, 44 (2): 127-132.
- Parikh C.K., 1990. —Parikh's Text Book of Medical jurisprudence, Forensic Medicine and Toxicology for Classrooms and Courtrooms, CBC Publishers and Distributors, New Delhi, 6th Edition: 2.1pp, 3.51pp, 4.23pp.
- Buchade D, Mohite S: Pattern of injuries in Homicidal Cases in Greater Mumbai: a Three year study; *J Indian Acad Forensic Medicine*. Jan-Mar 2011. Vol.33, no 1. 46-49.
- Ghangale A.L, Dhawane S.G, Mukherjee A.A. Study of Homicidal Deaths at Indira Gandhi Medical College, Nagpur. *J For Med and Tox*; 2003, 20(1): 47-50.
- Mohanty M K, Mohanty S and Acharya S: Circumstances of Crime in Homicidal Deaths. *Med Sci Law*; 2004, 44(2): 160-64.
- Scott K W M. Homicide pattern in West Midlands. *Med Sci Law*; 1990, 30(3), 234-38.
- Aggarwal NK, Bansal AK.; Trends of homicides in capital city of India. *Medico-legal Update*; April-June 2004, 4(2): 41-45.
- Sinha U S, Kapoor A K and Surendra Kumar Pandey. Pattern of Homicidal deaths in SRN hospitals mortuary at Allahabad. *Journal of For Med & Toxico*; July-Dec 2003, 20(2); 33-36.
- Wahlsten P et al., 2007. "Survey of Medico legal investigation of Homicides in the city of Turku, Finland", *Journal of Clinical Forensic Medicine*, 14: 243-252.
- Kominato Y et al., 1997. "Homicide Patterns in the Toyoma Prefecture, Japan", *Medicine Science and Law*, 37(4): 316-320.
- Padmaraj R.Y., Tandon R.N. "Pattern of homicide at mortuary of civil hospital, ahmedabad" *JIAFM* 2010; 27(2): 51-55.
- Mishra Pradeep K., Yadav J., Singh S et al. "Pattern of injuries in Homicidal deaths in Bhopal region", *IAFM* 2012, Vol 34, No 3, Page 195-198.
- Vougiouklakis T., Tsiligianni C., 2006. "Forensic and Criminologic aspects of Murder in North-West (Epirus) Greece", *Journal of Clinical Forensic Medicine*, 13: 316-320.
- Rouse D A. Pattern of stab wounds: a six year study. *Med Sci Law*; 1994, 34(1) 67-71.
- Bamidele A, Colin C., Kim C.; Homicides committed by Youth Assailants: A Retrospective Study. *American J For Med and Path*; 2008, 29(3): 219-23.
- Mohanty S., Mohanty M K., Panigrahi M K et al. Fatal head injury in Homicidal Victims. *Med Sci Law*; 2005, 45(2): 244-248.

Study of Elbow Joint for Estimation of Age in Maharashtra Population

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ABSTRACT

40 boys and 40 girls of normal height weight aged between 11 to 18 years were selected and studied radiologically, elbow joint (AP and Lat view). Appearance of trochlea in 11 year in female. Fusion of trochlea was 12 to 14 year in females and 14 to 15 year in males. Appearance of Lat. Epicondyle in males was 11 to 12 years and females 11 years. Fusion of Lat. Epicondyle was 13 to 16 year in males and 13 to 14 year in females. Fusion of med. Epicondyle in males was 14 to 16 years and females 11 to 15 years. Fusion of head of radius in male was 14 to 16 years. And in females 11 to 13 years. Appearance of olecranon process in males was 11 to 13 year and female 11 year. Fusion of olecranon process in males 17 to 18 and in females 15 to 16 years. This radiological study has medico legal and archeological importance. More over it has orthopedic and radiological importance also because inexperienced radiologist or orthopedician may think these epiphyseal lines and non-fusion secondary centers as fractures. As they belong to Maharashtra population this study has ethnic importance also. This study of estimation of age can contribute to the factors of determination of age, but cannot be the paramount conclusive⁽¹⁾

Keywords – Medical Epicondyle, Lateral Epicondyle, age, Maharashtra.

INTRODUCTION

There are many criteria for identifications of age like eruption of teeth, height, pubertal changes, but fusion of ossification varies regionally owing to multiple factors. Ossification of is the growth of the bone to meet the required height and girth of the individual body. The center appears at IUL or fetal lives are primary centers. The centers of ossification appears after birth are called secondary centers, but in the present study most of secondary centers are not considered because these appear at early age i.e capitulum at 1 year, radial head at 3 years, medial Epicondyle at 5 years trochlea at 4 year, olecranon at 9 years because radiation of x-ray

may cause Hazard to the growing children's. Hence these age groups of children were excluded.

Estimation of age is quite important job for medico-legal expert in living and dead in his day today medico-legal practice but ossification centres seen earlier in tropical countries and females more over variation in appearance or fusion is attributed to multiple factors like climate, hereditary, race, dietary habits, nutrition, socio-economic status of population, gender etc. Because bone is the most plastic tissue which adapts with the environmental factors. Hence attempt is made to study the boys and girls of Maharashtra from 11 year to 18 years so that It will not only help the medico-legal expert but nutritional expert also to rule out the variation in appearance and union of centres of ossification and to the orthopedician who repair the elbow joint.

MATERIALS AND METHOD

40 Boys and 40 girl of different age group 11 to 18 are selected to study the ossification of elbow joint radiologically, Boys and girls regularly visiting to IIMS& R Warudi Hospital along with patients as

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attendant are selected for study. the AP and Lat. View of elbow joint studied. The subjects with obvious gross skeletal deformities, fractures of elbow joints, malnourished and chronic illness involving bone growth are excluded. AP view is taken by placing the upper limb in full extension and supine position to visualize medial, lateral epicondyle and radio capitular joint. Lateral view is taken by flexing the elbow at 90 degree and forearm in semi pronated position to visualize olecranon process and humero ulnar joint⁽²⁾. The duration of this study was about two years.

OBSERVATION AND RESULTS

I) Appearance of Trochlea

- Not observed in males at 11 year but
- Observed in female

II) Fusion of Trochlea

- In Males 12 to 13 year , 14 to 15 year show process of fusion
- But in female 12 to 13 , 14 to 15 year show majority of fusion

III) Appearance lateral Epicondyle

- In male 11 to 12 year of age lateral epicondyle is not seen
- But in female at 11 to 12 year there is appearance lateral epicondyle

IV) Fusion of lateral epicondyle

- In males of 13 to 15 year and 16 year of the shows nearer to fusion
- But in females in majority shows complete fusion.

Fusion of medial epicondyle:

- In Males 14 to 16 year of age nearer to fusion and 17 to 18 shows complete fusion

- In females 11 to 15 year of age shows nearer to fusion and 16th an word show complete fusion

Fusion of Head of Radius:

- In males 14 to 16 year show near fusion 17 to 18 show complete fusion
- In the females 11 to 13 show near the fusion and 14 to 15 onwards show complete fusion

Appearance of olecranon

- In males 11 slightly, in 13 year complete appearance
- In females 11 year complete appearance is observed

Fusion of olecranon

- Males 14 to 16 show near fusion 17 to 18 onwords complete fusion,
- In females 15 to 16 onwards complete fusion occurs.

Table –No-1: Study of different age in both sexes

(Boys -40-50% & Girls -40-50%)

Age in Year	Boys -40		Girls		Total	
	No	%	No	%	%	%
11 year	5	12.5	5	12.5	10	12.5
12 year	7	17.5	7	17.5	14	17.5
13 year	8	20	8	20	16	20
14 year	6	15	6	15	12	15
15 year	3	7.5	3	7.5	6	7.5
16 year	4	10	4	10	8	10
17 year	3	7.5	3	7.5	6	7.5
18 year	4	10	4	10	8	10

Table No-2: Study of fusion of elbow joint in both sexes (Boys -40-50% & Girls -40-50%)

Appearance of trochlea		Fusion of trochlea		Appearance Lat. epicondyle		Fusion of Lat. epicondyle		Fusion of med. epicondyle		Fusion of Hd. of radius		Appearance of Olecranon		Fusion of Olecranon	
M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
-	11 yr	14 to 15	12 to 14	11 to 12	11	13 to 16	13 to 14	14 to 16	11 to 15	14 to 16	11 to 13	11 to 13	11	17 to 18	15 to 16

DISCUSSION

In the present study of estimation of age by elbow joint (11 to 18 years) the highest percents are (20%) are 13 year (17.5%), (15%) in 14 year, in 12 year (12.5%) in 11 years (10%) In both 16 year and 18 year is noted in both sexes. (Table-1)

a) Appearance of trochlea in 11 years of female but absent in males, fusion of trochlea in males 14 to 15 but in females 11 to 12 years.

b) Appearance of lat epicondyle in males 11 to 12 years but in female 11 years and fusion at males is 13 to 16 year but in female 13 to 14 years of age.

c) Fusion of medial epicondyle in males at 14 to 16 year of age but in female 11 to 15 years.

d) Fusion of head of radius in males is 14 to 16 year and in female 11 to 13 year of age.

e) Appearance of secondary centres of olecranon in males 17 to 18 year in female 15 to 16 years. These present values are more or less in agreement with previous studies of India (3) (4) (5) but varies with standard test book anatomy as they are copied from western studies (6)(7) but in both studies of India and abroad females bones have earlier fusion than male bones because centres of fusion act according to the state of endocrine secretion, health, and nutrition of individual. Undoubtedly there are racial, geographical and hereditary differences all those this have not yet been adequately determined (8) A youngster who is larger than the average or who is obese is often is subjected to unwarranted epiphyseal stresses. His bulk may give a false impression of degree of bony maturity. Earlier fusion of epiphysis in female was observed in all previous studies of India and abroad (9) but fusion of bones in our study 2-3 year earlier than western studies. No literature available in English to justify these differences in ossification or fusion. The probable reasons could be

a) The dates of fusion are usually delayed in normal individuals of short stature as long bones grow by accretion accompanied by absorption mechanism of remodeling (10)

b) Rate of bone growth fusion (maturation) is influenced not only by age and sex but by economic status, the individual total body weight and possibly by

function. Racial difference is also required to be taken into account.

c) The interval structure of bone is adapted in a very remarkable way to resist the stresses to which it is subjected during the life. Hence tubercles and tuberosities are formed in direct response to pull of tendons and ligaments (11)

d) The process of ossification associated with appearance of local enzyme called phosphates the degree ossification process is largely influenced by this enzyme (12)

e) More over deposition of calcium salt in a biochemical phenomenon not directly determined by any local cellular elements but controlled by extrinsic chemical factors related to general metabolism of the body and local variation in the blood supply (13)

SUMMARY AND CONCLUSION

The present radiological study of estimation of age by elbow joint in both sexes of Maharashtra population very much helpful to the medico-legal and archeological expert to determine the age and for orthopedic surgeon, radiologist more over as the study belongs to Maharashtra these present significant values have ethnic importance but this present study demand further embryological, Histological, bio-Mechanical, genetic studies because the origin of osteoblastic cells remain in doubt because they can be differentiated from mesenchymal cells and fibroblast. The greater activities of osteoclast cells also still remain uncertain. Above all the factors which determine the time of ossification are obscure.

This research paper is approved by ethical Committee of IIMS & R warudi, Badnapur (Tq) Jalna (Dist) Maharashtra.

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REFERENCES

1. Choudhary Amit Anand-Bone Test not enough to fix age supreme court- AIIMS report & accused's claim of being minors at the time of crime rejects- Times of India – Daily English new paper (Hubli edition).3-12-2016. Page -9.
2. David E Grayson-The elbow radiographic imaging

- 4th editor 1990 pearls and pitfalls publication
3. Nemade K S Kamadi : N Y Meshram MM- The age order of epiphysis union elbow joint. A radiological study in vidarbha. International journal of recent trends in sciences and technology ISSN 2277-2812E ISSN 2249-8109 WI10(2)2014 251-255
 4. Bhise ss, Nanandkar SD- Age determination from radiological study of epiphyseal appearance and fusion around elbow joint, journal of forensic medicine, Science and law Vol-20(1), 2011 official publication of medico-legal Association of Maharashtra.
 5. Dixit SP : Bansal RK- study of ossification centres fusion of elbow joint in 15 to 17 year Gharawali females of Dehradun region J.Indian Acad. Forensic.Med.2014 Oct- Dec vol.36(4) 396-398
 6. Dutta A K Essential of human Anatomy Sup & Inf Extremities Ist Editition 1992 current books I international publication Culcuta, Bombay, Madras 12 to 15
 7. Mitras – Anatomy Osteology IInd edition 1982 Academic publication Calcutta, New Dehli. 8-101, 8-908, 8-1011
 8. Rasch P J- Kinesiology and Applied Anatomy 7th edition /1977 Lea & Febiger 200 chesterfed, park way Malveron Pennsylvania 19355 USA Publication 21-23.
 9. Krogman W M, Iscan M Y-The human skeleton in forensic medicine second addition. Charles. C Thomas. Publisher spring field, Illions, USA, 92-94
 10. Payton C G- The growth of epiphysis of long bones in Madderfed. J of Anat vol-67 1933. 25-26
 11. Arey D Thespan w- growth and form 1942 Cambridge university publication 92-95
 12. Huggins CB- Influence of urinary tract mucous on experimental formation of bone proc. SOC. Exp. Bio med 1930,27
 13. Clark L.G- the tissues of the body 6th edition 1971 chapter oxford At the clarendon press 77-79.

A Cross Sectional Evaluation of Suicides in Females

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ABSTRACT

The deaths occurring due to causes which are not any disease process or ageing are called unnatural deaths. The unnatural deaths can be divided as per the manner as suicidal, accidental, homicidal or undetermined. The term 'suicide' refers to the deliberate act of taking one's own life. Common methods of suicide by female in India include hanging, poisoning, immolation, drowning and fall from height. The total number of 107 cases constituted unnatural female deaths autopsied from June 2013 to August 2014 out of which 44 cases were confirmed to be suicides constituting 41%. Maximum suicidal female deaths occurred between the age group of 21 – 30 years i.e. 13 cases (30%). The number of cases of female suicide were highest amongst married group with 29 cases (66%), the illiterate and high school population had the maximum number of deaths with 13 (31%). It was observed that the middle class socio economic group had the highest deaths (43%) among different groups segregated on modified Kuppuswamy classification. Hanging was the method adopted by 24 number of victims to commit suicide (54%) followed by poisoning 11 victims (23%). Marital disharmony was the major cause constituted to 24 cases (54%).

Keywords: Female, Suicide, Hanging, Marital disharmony

INTRODUCTION

According to the 2011 census, ^[1] India recorded a sex ratio of 940 females per 1000 males, which is lowest among the 10 most populous countries of the world. The fascinating state of Tamil Nadu is the emerging hub of technology and modern lifestyle in India. Tamil Nadu is one of the most developed states of India with 44% of its population living in urban areas and seventh most populous state in India. The state witnessed a growth of 15.6% in its population between years 2001 to 2011. The state also maintains a good sex ratio of 995 females for every 1000 males. ^[1] Tamil Nadu is one of the top states of India as far as education is concerned. Out of total population, 80.3% of people in Tamil Nadu are literates. Female literacy rate is 73.9% as compared to males 86.8%. Hinduism is most dominant religion in

Tamil Nadu with over 88% of the total population is Hindus. Two Sociologists predict the skewed female to male ratio will produce greater levels of tension that will result in increased occurrences of violence against women. Such acts against women have been a growing social phenomenon in the last decade. In 2010, out of the total IPC crimes, 9.6% were crimes against women, which included torture, sexual harassment, molestation, kidnapping/abduction, rape and cruelest of all – dowry deaths. ^[2] The deaths occurring due to causes which are not any disease process or ageing are called unnatural deaths. Unnatural deaths are found to be higher in rural than in urban areas. The unnatural deaths can be divided as per the manner as suicidal, accidental, homicidal or undetermined. ^[3]

Unnatural deaths are of major concern for public health care and politics. Among married females, unnatural deaths are more common in middle and lower middle socio-economic groups. Several other factors such as age, occupation, lack of emotional and financial support, inability to bear a child, sexual jealousy and marital infidelity, failure in love and scolding by parents of unmarried girls are the reasons which may also influence the unnatural death.

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The term 'suicide' refers to the deliberate act of taking one's own life, the common reasons being endogenous depression, harassment of a married woman by husband for dowry, harassment for other reasons, familial and social disharmony, failures in exams, love failures etc. As compared to the male counterparts the females are forced to bear the social burdens more which renders them vulnerable to any kind of social maladjustment. Common methods of suicide by female in India include hanging, poisoning, immolation, drowning and fall from height. [4]

AIMS AND OBJECTIVES

To study the various patterns of suicidal female deaths

To analyze and indentify the preventable risk factors in such deaths.

MATERIALS AND METHOD

All cases of unnatural female deaths brought to the mortuary of Sri Ramachandra Medical College and Research Institute, Chennai for postmortem examination during the period of May 2013 to August 2014, were studied in detail. This cross-sectional observational study was undertaken in which all suicidal deaths occurring in cases admitted in Sri Ramachandra Medical College and Hospital or admitted in any other hospital and referred to Sri Ramachandra Medical College and Hospital and suicidal death cases received as brought dead to the mortuary of Sri Ramachandra Medical College and Hospital were included in the study and all other female deaths due to any manner other than suicide or not confirmed cases of suicide were excluded.

A standard proforma specially designed was used to collect information regarding the demographic pattern. The history and data were obtained after detailed interviews with investigating officers, deceased's kith and kin in addition to hospital records of the deceased. All the cases were analyzed according to their age, marital status and educational status. The socioeconomic classification of all the cases in the study was done into five groups based on modified Kuppusamy classification attained through standard scale of educational, occupational and per capital income of the individuals. In cases of female suicides, the antecedent factors included in the study were familial disharmony, educational issues, financial dispute,

infertility, early marriage, depression / maladjustment and victims who were unable find a life partner. Any hindrance in victim's regular behavior which is well established in their routine is noted as abstinence from her normal behavior. Detailed examination findings of all external and internal injuries were also recorded. Data were analyzed using computer software, Statistical Package for Social Sciences (SPSS) version 11.5. Data were expressed in its frequency and percentage.

RESULTS

The total number of 107 cases constituted unnatural female deaths autopsied from June 2013 to August 2014 out of which 44 cases were confirmed to be suicides constituting 41%, based on history collected from police, inquest report, history from relatives, hospital case sheets and also medical opinion formed after postmortem examination. Segregating the cases as per age groups it was noted that maximum suicidal female deaths occurred between the age group of 21 – 30 years i.e. 13 cases (30 %) followed by 11 to 20 years (23%) and least in older age groups. Mean age group was 39 yrs, with the maximum age of 92 yrs and minimum age being 2 yrs. (Fig: 1)

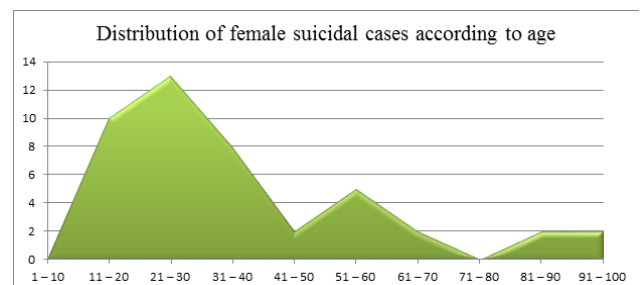


Fig: 1

The maximum number of cases belonged to married group with 29 cases (66%) followed by unmarried population with 10 (23%) and widow with 5 (11%). There were no cases belonging to separated and divorced group. The illiterate and high school population had the maximum number of deaths with 13 (31%) followed by post high school diplomas victims with 7 (15 %) each and least by primary school passed out with 2 cases (4 %).

The cases were divided as per their socio-economic status which was based on modified Kuppusamy Classification and it was observed that the middle class socio economic group had the maximum number of deaths with 19 cases (43 %) followed by the lower middle class, i.e., 13 cases (31%) and the least by upper

class with 2 case.

Hanging was the method adopted by 24 number of victims to commit suicide (54 %) followed by poisoning 11 victims (23 %) , burns 7 victims(15 %) , jumping from heights and suicide on road with 1 case each (4 %). (Fig: 2)

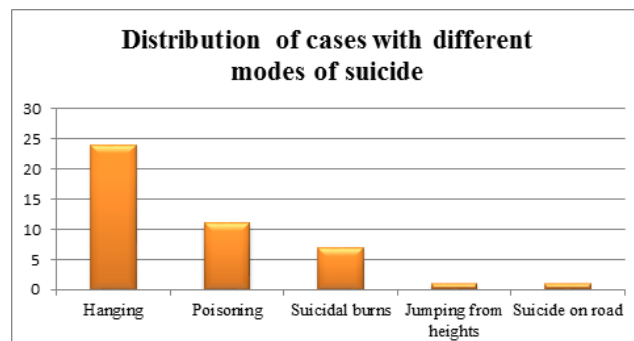


Fig: 2

The antecedent factors leading to committing the act of suicide was studied in each case and it was observed that marital disharmony was the major cause constituted to 24 cases (54 %) and sterility constituted to 8 (15 %) followed by issues in educational environment with 5 (11%), financial dispute with 3 cases (8 %), old age loneliness with 3 cases (8 %) and 1 victim had died due to inability to find life partner. (Table – 1)

Table – 1 : Antecedent factors for suicide

Antecedent Factor	No. of Cases (n=44)	Percentage (%)
Marital disharmony	24	54
Sterility	8	15
Educational environment	5	11
Financial dispute	3	8
Old age loneliness	3	8
Inability to find life partner	1	4

DISCUSSION

The maximum occurrence of female suicides in our study was between Maximum of 21 – 30 years i.e. 15 cases (30 %) with mean age being 39 yrs. Prajapati P et al^[5] found that maximum prevalence was 21– 30 years (36.23%). Dere RC et al,^[6] found that the commonest age group affected was 26-30 years (24.56%) followed

by 21-25 years (21.93%).

In this study, the maximum number of cases belonged to married group with 66% followed by unmarried population with 23 % and widow with 11 %. A similar trend was also observed by Pathak A et al,^[7] as 75.63% married and 20.2% unmarried and by Zine KU et al^[8] as 83.7% and 10.8% respectively. Prajapati P et al,^[5] found that more than half of victims were married (69.57%) while 25.36% were unmarried and 5.07% were widow. However the percentage of married victims was very high as per the study by Dere RC et al,^[6] in which the incidence in married female was 92.86%.

The illiterate and high school population had the maximum number of deaths with 31 % followed by post high school diploma victims with 15 % each and graduates with 11%. This finding is inconsistent with the following studies such as by Prajapati P et al study,^[5] which support the fact that the incidence of female suicide is high in population lower education status. These findings are in accordance with statistics of NCBI 2008,^[9] which reported that the maximum number of suicide victims were educated up to Primary level (25.3%) followed by Illiterate and Middle educated persons accounted for 20.7% suicide victims and 23.7% respectively. However in the study by Afzali S et al,^[10] they found that the highest frequency of suicide was in the under diploma group, whereas the lowest frequency was for illiterate women.

In the present study, on dividing the cases as per modified Kuppaswamy scale we observed that the middle socio economic status had the maximum number of deaths with 43 % followed by upper lower socio economic status with 31%. This finding is consistent with Shrivastava AK,^[11] studies also. According to Shrivastava AK maximum numbers of cases belong to socio economic class IV, 56%. But in contrast, Prajapati P et al,^[5] found that highest numbers of cases (40.58%) were in class II (upper – middle).

In this present study, Hanging was the method adopted by maximum number of victims to commit suicide (54%) followed by poisoning (23%) and burns (15 %). This result is consistent with Kumar S et al^[12] and Kumar A et al^[13] studies. But Prajapati P et al,^[5] found that Poisoning (35.51%) as the most common cause and K.D. Chavan et al,^[14] found that Burns (31.3%) was the most common cause of suicide.

In the present study, we observed that marital disharmony was the major cause constituted to 50% of the cases followed by sterility (15%) and issues in educational environment (12%) financial dispute with 2 cases (8 %), old age loneliness with 2 cases (8 %) and inability to adapt early marriage (4 %). 1 victim had died due to inability to find life partner. Similar finding is seen with studies by Geeta S et al (2008) ^[15] and Srivastava AK et al (2007) ^[11] studies. But Zine KU et al ^[8] found in their study that dowry deaths in 44.5% followed by torture by in laws & husband (16.7%) and rash & negligent husband (10.2%). According to Singh AK et al (2009),^[16] depression, insecurity and excess work load responsible for the high incidence of suicidal deaths. Prajapati P et al ^[5] and Kumar S et al ^[12] found that most common motive for suicidal deaths was mental stress due to unknown reasons followed by family quarrel. These varying findings could be attributed to various factors like social, economic, familial, cultural variations seen in different places in our country as well as other corners of world also.

SUMMARY AND CONCLUSION

Maximum numbers of unnatural female deaths are found in adolescent age group (21 – 30 yrs). Majority of the unnatural female deaths are found in low socioeconomic group with less educational status. Hanging is the most common method adopted by the females to commit suicide. Marital disharmony is the commonest cause behind female suicides however the antecedent factors behind suicide in females may vary in different places due to the different social, cultural, familial, economic and psychological variables.

Ethical Clearance: Obtained from Institutional Research Ethics Committee, Sri Ramachandra Medical College & Research Institute (Deemed to be University)

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REFERENCES

1. Government of India. Census of India 2011. State Lit [Internet]. 2011;3–4. Available from: http://www.censusindia.gov.in/2011-prov_results/data_files/india/Final_PPT_2011_chapter6.pdf.
2. Crime against women, 2010. [Internet] National Crime Record Bureau, Ministry of Home Affairs, India. Available from: <http://www.ncrb.gov.in>.
3. Ali EM, Elbakry AA, Ali MA. A study of Unnatural Deaths in Medicolegal Autopsies At Dakahlia Locality. Mansoura J Forensic Med Clin Toxicol. 2007; XV (1):33–43.
4. V.V. Pillay. Textbook of Forensic Medicine & Toxicology. 16th edn; Paras Publishers, Hyderabad: 251.
5. Prajapati P, Prajapati S, Pandey A, Joshi V, Prajapati N. Pattern Of Suicidal Deaths In Females Of South Gujarat Region. Natl J Med Res. 2012; 2(1):31–4.
6. Dere RC, Rajoo KM. Study of Unnatural Deaths in Females A Medicolegal Study at Rural Medical College, Loni. J Indian Acad Forensic Med. 2011; 33 (3):211–3.
7. Pathak A, Sharma S. The Study of Un-Natural Female Deaths in Vadodara City. J Indian Acad Forensic Med. 2008; 32 (3):220–3.
8. Zine KU, Mugadlimath A, Gadge SJ, Kalokhe, Bhusale RG. Study of some socio-etiological aspects of unnatural female deaths at government medical college, Aurangab J Indian Acad Forensic Med. 2008;31(3):210–17.
9. Accidental and Suicidal deaths in India 2008. National Crime Bureau of India. Available from: URL:<http://ncrb.nic.in/ADSI2008/accidental-deaths-08.pdf> and Suicidal deaths 08.pdf
10. Afzali S, Taheri SK, Jamilian M, Eslambolchi P. The Relationship between Menstrual Cycle Phases and Suicide Attempts in Suicidal Women Admitted to the Poisoning Ward of Farshchian Hospital, Hamedan, Iran. Iran J Toxicol. 2012; 5(15):531–4.
11. Srivastava AK, Arora P. Suspicious Deaths in Newly Married Females – A Medicolegal Analysis. J Indian Acad Forensic Med. 2007; 29 (4):63–7.
12. Kumar S, Verma AK, Ali W, Pandey A, Ahmad I, Singh US. A study of unnatural female death profile in Lucknow, India. Am J Forensic Med Pathol [Internet]. 2013 Dec [cited 2014 Oct 31];34(4):352–6. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/24141355>
13. Kumar A, Pandey SK. Prevalence of Unnatural Death among Reproductive Aged Females in Varanasi Area India. Int J Sci Res. 2014; 3(6):

2144-7.

14. Chavan KD and Kachare RV. Study of suicidal deaths. *Int J of Med Toxicol and Leg Med.* 1999 Jan-Jun; 1(2):29-31.
15. Geeta S, Sachidananda M, Sekhar TC, Manju P. Victimologic Study of Female Suicide, *Medico-Legal Update - An International Journal*, Volume 8, Issue 1, 2008.
16. Singh AK, Verma AK, Singh K, Singh M, Kumar S. Pattern of Un-natural Deaths in Lucknow, Capital of Uttar Pradesh. Paper presented in Scientific Session of Forensic Medicon 2010, XXX Annual conference of Indian Academy of Forensic Medicine (IAFM) on January 2010 at Nagpur.

Traditional Medicine in Treatment of Women with Premenstrual Syndrome, A Systematic Review

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ABSTRACT

Premenstrual syndrome is the common disorder among women that are in the childbearing age, this disorder may disturb marital relationship, cause social isolation, school and work absenteeism, poor performance, reduced attention, increased complaints about psychological diseases and even suicide and its legal problems. In this study, the study looked at the well-known databases, herbal treatments and complementary therapies in the syndrome, which, given the high prevalence of this syndrome and the complications of chemical treatments, should be used.

Keywords: *Treatment, Complementary Medicine, Premenstrual syndrome*

INTRODUCTION

Premenstrual syndrome is the common disorder among women that are in the childbearing age, and it appears periodically in luteal phase of their menstrual cycle and ends with onset of menstrual bleeding¹. Symptoms of this syndrome appear seven to ten days before menstrual bleeding and disappear at the first days of bleeding²⁻⁴. Women with premenstrual syndrome have low quality of life and this syndrome increases use of health care and reduces working efficiency. Premenstrual syndrome occurs in 80 percent of women of childbearing age⁶. Epidemiological reviews suggest that about 85 percent of women experience physical and psychological premenstrual symptoms⁷. However, its severe cases were reported by only 5 - 10 percent of women⁸. Underlying disorders and medical disorders including hyperthyroidism and hypothyroidism, migraine headache, chronic fatigue syndrome symptoms, irritable bowel syndrome, hyperprolactinemia and polycystic ovary syndrome, endometriosis and adrenal

disorders may have similar symptoms to premenstrual syndrome, which these disorders should be passed⁹⁻¹⁰. The highest prevalence of dysmenorrhea is in the first 20 years of life and begins to decrease after age 35-30^{11, 12}. Premenstrual syndrome occurs in 80 percent of women of childbearing age. Prevalence of this disorder has been reported as 13 - 80 percent in adolescent girls¹³. Premenstrual syndrome (PMS) symptoms are divided into three classes of behavioral, psychological and physical symptoms, including as follows: Stomach bloating, anxiety or tension, breast tenderness, crying periods, depression, fatigue, lack of energy, anger or irritability without reason, concentration problems, appetite changes, thirst, and variable degree of endometrial edema. This disorder may disturb marital relationship, cause social isolation, school and work absenteeism, poor performance, reduced attention, increased complaints about psychological diseases and even suicide and its legal problems¹⁴. Various assumptions have been proposed for PMS, including: Progesterone deficiency, hormonal imbalance, sodium and water retention (increased aldosterone), excessive prolactin overload and nutritional factors (pyridoxine deficiency)¹⁵. Although etiology of this disorder is not clear, researchers suggest that neurohormones and neurotransmitters are unclear in its etiology, thus no

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definitive treatment for it has been proposed. Various therapeutic strategies for PMS have been used, such as hormone therapy, replacement of essential fatty acids, and the use of pyridoxine and psychoactive drugs¹⁶. Nowadays women mostly prefer to treat their symptoms using complementary and natural medicine¹⁷. Given high prevalence of this syndrome among women, current research addresses herbal treatment and complementary medicine for premenstrual syndrome.

METHODS FOR REVIEW OF LITERATURE

This is a review paper, in which research scientific papers, data in Google scholar search engine, Up to date, pubmed, scopus, web of science databases as well as related books were analyzed.

FINDINGS

Herbal treatments and complementary medicine affecting premenstrual syndrome are highly diversified and extensive. Recognized risk factors are very wide, some of which will be explained below. Evening primrose oil: There are many evidence suggesting effectiveness of evening primrose oil in treatment of premenstrual syndrome. The main origin of this plant is in North America, and it has been transmitted to others areas from there and huiledonager oil is taken from seeds of this plant. Huiledonager oil has greenish yellow color. This oil is made up of various acids such as palmitic acid (6.5%), stearic (1.5%), oleic (11%), linoleic acid (72%), alpha linolenic, gamma linoleic and arachidonic acid. The value of this oil is due to its drying properties and presence of gamma linoleic acid in it. There are also agents that provide prostaglandin biosynthesis in this oil¹⁸. Fallah et al. (2008) conducted a study entitled "The effect of Evening Primrose Oil on Premenstrual Syndrome" in Isfahan University of Medical Sciences on 76 women above 18 years old with PMS referring to health center of Isfahan. It was a double blind trial study. Participants were randomly classified into two groups (n = 38), and were treated for two consecutive cycle at least 14 days before menstrual cycle. Three capsules of evening primrose oil (1000 mg) in three consecutive doses were given to the first group (38) and the second group (38) received a placebo capsule in three doses, which was in a medicinal form similar to the evening primrose oil. They received it daily (morning, noon, evening) for two consecutive months in the luteal phase

of the menstrual cycle. Research findings indicated that evening primrose oil is effective in improving PMS symptoms¹⁹.

Vitamin E: The other treatment is using Alpha tocopherol (vitamin E). The mechanism of this vitamin in relation with PMS is not clear²⁰. However, it may inhibits release of arachidonic acid, and prohibits conversion of arachidonic acid into prostaglandin via the action of the phospholipase AZ enzyme and cyclooxygenase²⁰. Akhlaghi et al. (2009) conducted a randomized clinical trial entitled "Effect of Vitamin E on Primary Dysmenorrhea" on 200 students with primary Dysmenorrhea in Mashhad University of Medical Sciences. Students received vitamin E200 mg gelatin capsules. They took one pill every day for 5 days from 2 days before starting menstruation for up to its 3 first days. Results suggested that vitamin E caused significant decrease in duration and severity of pain in patients with primary Dysmenorrhea and it can be used as a treatment method²¹. In addition, Proctor et al. (2001) conducted a review study entitled "Herbal and dietary therapies for primary and secondary dysmenorrhoea". In this study, impact of using different treatments such as Magnesium, Omega-3, Vitamin E, and Mefenamic was investigated. Comparison of Vitamin E and Mefnamic Acid indicated that daily consumption of vitamin E along with usage of Ibuprofen during menstruation with consumption of Ibuprofen alone in menstruation was compared and no difference was observed between relief of symptoms in both groups²⁰. Fenugreek Seed: Using Trigonella foenum-graecum is one of the herbal treatments proposed for primary dysmenorrhoea. The herbaceous fenugreek belongs to the legumes family of lemon grass. Diosuginin in fenugreek seed has estrogenic and anti-inflammatory effects and its mucilage compounds can have anti-inflammatory and healing properties. It has many therapeutic effects, including analgesic, anti-inflammatory, anti-inflammatory, anti-cancer, lowering blood glucose, enhancing libido, astringent, cardioprotective, bile duct, laxative, corticosteroids, lowering blood cholesterol, lowering blood lipids, decreasing Hypertension, hypoglycemic agents, serum triglyceride, lactation, laxatives, tonsillitis, and menstrual bleeding reduction effects^{23, 24}. Younesy et al. (2014) conducted a double-blind clinical trial entitled "Effects of Fenugreek Seed on the Severity and Systemic Symptoms of Dysmenorrhea". 101 female single students living in dormitory were randomly divided

into test (n=51) and control (n=50) groups. 2-3 capsules containing fenugreek seed (900 mg) were given to participants three times per day for 2 consecutive cycles. Pain severity was measured using Visual Analog Scale (VAS) form. Finally it was found that using fenugreek during menstruation may reduce Dysmenorrhea symptoms²⁵. Yan et al. (2010) conducted a random clinical trial entitled "Effect observation on treatment of dysmenorrhea due to endometriosis (adenomyosis) with Modified Fenugreek Bolus in 40 cases" in china. 40 mg fenugreek was given to 40 participants with Dysmenorrhea and headache and vascular distension due to endometriosis. Symptoms of Dysmenorrhea reduced in them after three months following the treatment, and quality of life was improved. It was concluded that Dysmenorrhea symptoms were reduced in 95 percent of students, which was statistically significant. Thus, fenugreek was effective in treatment of Dysmenorrhea²⁶.

Vitamin B6: The other proposed treatment is using Vitamin B6. The mechanism of action of this vitamin in relation to PMS is unclear, but may cause reduction of production of prostaglandins by inhibiting release of arachidonic acid. Sabet-Birjandi et al. (2010) conducted a study entitled "Comparison the effect of Hypericum perforatum and vitamin B6 in the treatment of premenstrual syndrome". It was a double-blind clinical trial on 72 students with premenstrual syndrome living in Ahvaz Shahid Chamran Dormitory. The samples were randomly assigned to two groups of 50. Hypericum perforatum was given to students for three days during 7 days. 80 mg pills of B6 vitamin were given to intervention group for 7 days within two-month period. Psychological and physical symptoms were measured after two months through daily status form separately for before and after intervention. Finally, it was found that both Hypericum perforatum and vitamin B6 were effective in reducing premenstrual syndrome symptoms, but Hypericum perforatum was less effective in reducing physical symptoms compared to vitamin B6²⁷. Whelan et al. (2009) conducted a systematic review entitled "vitamins and minerals in the treatment of premenstrual syndrome: a systematic review". It was a randomized clinical trial with inclusion criteria. Herbal medicines, vitamins, and minerals were compared to placebo in treatment or reduction of premenstrual syndrome symptoms. Data were collected from databases like Cochrane Library, Embase, IBID, IPA, Mayoclinic, Medscape, MEDLINE Plus and Database Natural

Medicines Comprehensive. They reviewed studies that supported using calcium in premenstrual syndrome. They also reported that vitamin B6 and Vitagnus might also be useful in this regards. No evidence of using evening primrose oil and magnesium oxide was found to improve the symptoms of premenstrual syndrome. These researchers concluded that more research with adequate sample size and suitable classification are needed for measurement of effects on severity of menstruation symptoms²⁸.

Calcium: Some studies have indicated that calcium is effective in treatment of premenstrual syndrome. Sutariya et al. (2011) conducted a study entitled "Interventional study (calcium supplementation & health education) on premenstrual syndrome-effect on premenstrual and menstrual symptoms" on 355 women at ages of 15 - 45 years old during luteal phase. In the first stage, 400 women were screened. 355 ones included in the study with inclusion criteria. 215 ones were assigned in intervention group and 140 ones were assigned in control group. They used calcium carbonate or calcium gluconate 500 mg supplementation twice daily, and health and nutrition education was given for 3 consecutive cycles, then the data were analyzed. Finally, it was reported that improvement of premenstrual syndrome symptoms was observed after one month of treatment and all symptoms except fatigue and insomnia showed significant reduction after second and third months in intervention group. However, back pain was more in intervention group and 55 percent of women in intervention group reported over 50 percent improvement and 30 percent of women reported over 75 percent improvement in premenstrual syndrome symptoms. Significant difference was observed between two groups at the end of third month²⁹. Pourmohsen et al. (2010) conducted a study entitled "Evaluation of effect of vitamin E on premenstrual syndrome". It was a triple-blind clinical trial on 87 female students living in dormitories of Iran University of Medical Sciences. 100 qualified individuals were included in the study, and were randomly assigned into two groups. In the placebo group (n=50), 1000 mg of starch powder was used in 2 capsules per day. In the control group (n=50), 2 capsules, one containing 1000 mg of calcium and the other containing 400 units of vitamin E, were used as one capsule in the morning and one at night. At the end of research, the difference between two groups was statistically significant and caused 63 percent

reduction in mood symptoms and 49 percent reduction in behavioral symptoms and 55 percent reduction in physical symptoms. In addition, there was significant statistical difference between 2 groups of calcium and vitamin E and placebo³⁰.

CONCLUSION

Conclusion Herbal and chemical treatments have been reported for premenstrual syndrome. Considering complications of chemical medicines and tendency to use herbal medicines, these medicines can be prescribed. Evening primrose oil, calcium, vitamin E, B6, fenugreek can be mentioned herbal treatments and complementary medicine, which are available as capsule and pills, and they can be used for relieving severity of symptoms.

Ethical Clearance: This research project was approved by the ethics committee of Qazvin University of Medical sciences.

Source of Funding: Qazvin, University of Medical sciences.

Conflict of Interest: None.

REFERENCES

- Dickerson LM, Mazyck PJ, Hunter MH. premenstrual syndrome Americal family Physician, 2003; 67(8): 1743-52.
- Khalili A, Shadi D, Kalvandi N, Nasiri M, Sadegh R. Triage methods in children, a systematic review. Electron J Gen Med. 2108;15(3):em26.
- Brahmbhatt S, Sattigeri B, Shah H, Kumar A, Parikh D. A prospective survey study on premenstrual syndrome in young and middle aged women with an emphasis on its management. International Journal. 2013; 1(2): 69-78.
- Jokar S, Motamed N, Kamali F, Azodi F, Khalili A, Jahanpour F. The attitudes and practice of mothers who were referred to the health care centers in Iran for the use of medicinal plants in the treatment of children's diseases. J Pharm Sci Res. 2017;9(3): 2349-52.
- Alizadeh Z, Paymard A, Khalili A, Hejr H. A systematic review of pain assessment method in children. Annals of Tropical Medicine and Public Health. 2017; 10(4):847-49.
- Shooshtari MH, Tirandaz F. Prevalence of Premenstrual dysphoric disorder in female students of medical sciences, 2010.
- Paymard A, Bargrizan S, Ramezani S, Khalili A, Vahdatnejad J. Comparing changes in pain and level of consciousness in open endotracheal suction catheters with two sizes: 12 and 14: A randomized clinical trial. Eurasian Journal of Analytical Chemistry. 2017; 12(5): 591-97.
- Domoney, C.L., A. Vashisht, and J.W.W. Studd Premenstrual Syndrom and the use of alternative Therapies. Annals of The Newyork Acodemy of sciences , womens health and Diseses . Gynecologic And Reproductive issue, 2003. 997(3): 330-40.
- Pearlstein T, Steiner M. Premenstrual Dysphoric Disorder: Burden of Illness and Treatment Update. FOCUS: The Journal of Lifelong Learning in Psychiatry. 2012; 10(1): 90-101.
- Fritz A, LeonSperoff M. clinical Gynecologic Endocrinology and Infertility. eighth, editor, 2011.
- Dawood MY. Primary dysmenorrhea: advances in pathogenesis and management. Obstet Gynecol. 2006; 108(2):428-41.
- Talaei A, Bordbar MRF, Nasiraei A, Pahlavani M, Dadgar SA. Epidemiology of premenstrual syndrome (PMS) in Students of Mashhad University of Medical Science. Iran J Obstet Gynecol Infertil. 2009; 12(2): 15-22.
- Rasoolzade N, Zebardast J, Zolfaghari M.. Effects of relaxation on primary dysmenorhea among first year nursing and midwifery female students. Hayat 2007; 13: 23-30.
- Alimohammadi N, Jokar M, Khalili A, Aghamohammadi M. The requirements of the caregivers of patients hospitalized in intensive care units. Natl J Physiol Pharm Pharmacol. 2018; 8(4): 18-26.
- Eftekhari, N., Eslamnik, P.A., Khalili, A., Davoodi, M. Comparing cesarean wound complications in high-risk women with and without anticoagulation. Journal of Mazandaran University of Medical Sciences. 2015; 25(124): 48-55.
- Loch, E., H. Selleh, and N. Boblitz, Treatment of premenstrual syndrom with a phytopharmaceutical Formulation vitex agnus castus. Journal of womans health and gender based Medicine. 2000. 9(3): 315-20.

17. Brien IO. Premenstrual Syndrome Womans Health Medicine. IJHF. 2005. 6(3): 272-75.
18. Bordoni A, Biagi PL, Turchetto E, Serroni P, De Jaco AP, Orlandi C. Treatment of premenstrual syndrome with essential fatty acids (evening primrose oil). G Clin Med. 1987; 68(1): 23-8.
19. Fallah, L.T., et al., The effect of Evening Primrose Oil on Premenstrual Syndrom. scientific journal Hamadan nursing & midwifery faculty, 2010. 16(1): 35-39.
20. Harel Z. Dysmenorrhea in adolescents and young adults: from pathophysiology to pharmacological treatments and management strategies. Expert Opin Pharmacother. 2008; 9(15): 2661-72.
21. Akhlaghi F, Zyrak N, Nazemian S. Effect of Vitamin E on Primary Dysmenorrhea. Hayat. 2009; 15(1): 13-9.
22. Proctor ML, Murphy PA. Herbal and dietary therapies for primary and secondary dysmenorrhoea. Cochrane Database Syst Rev. 2001; 4(3): CD002124.
23. ashish DP, Sancheti VP, Puja MS. Review article on fenugreek plant with it's medicinal uses. SND college of pharmacy, yeola. 2014; 4(4): 20-32.
24. Mandegary A, Pournamdari M, Sharififar F, Pournourmohammadi S, Fardiar R, Shooli S. Alkaloid and flavonoid rich fractions of fenugreek seeds (*Trigonella foenum-graecum* L.) with antinociceptive and anti-inflammatory effects. Food Chem Toxicol. 2012; 50(3): 2503-07.
25. Younesy S, Amiraliakbari S, Esmaeili S, Alavimajd H, Nouraei S. Effects of Fenugreek Seed on the Severity and Systemic Symptoms of Dysmenorrhea. J Reprod Infertil. 2014; 15(1): 41-8
26. Yan L, Tie W, Mei S, Dong W. Effect observation on treatment of dysmenorrhea due to endometriosis (adenomyosis) with Modified Fenugreek Bolus in 40 cases. Chinese Medicine. 2010; 7(2): 20-33.
27. Sabet-Birjandi S, Tadayon-Najafabadi M, Siyahpooshan A, Haghighizadeh M. Comparison the effect of *Hypericum perforatum* and vitamin B6 in the treatment of premenstrual syndrome. Zahedan Journal of Research in Medical Sciences. 2011; 13(4):1-5.
28. Whelan AM, Jurgens TM, Naylor H. Herbs, vitamins and minerals in the treatment of premenstrual syndrome: a systematic review. Can J Clin Pharmacol. 2009; 16(3): e407-e29.
29. Sutariya S, Talsania N, Shah C, Patel M. An interventional study (calcium supplementation & health education) on premenstrual syndrome-effect on premenstrual and menstrual symptoms. National Journal. 2011; 2(1): 100.
30. Pourmohsen M, Taavoni S, Zounemat KA, Hosseini F. Evaluation The Effect of Vitamine E on Premenstrual Syndrome. Journal of Guilan University of Medical Sciences. 2010; 8(3): 10-9.

Estimation of Drug Containing Tranquilizers by Thin Layer Chromatography (TLC)

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ABSTRACT

Considering the high consumption of benzodiazepines worldwide, there is increased potential for addiction and abuse in cases of crime, driving under the influence of drugs, suicide and drug-facilitated sexual assault (DFSA). For these reasons, this class of drugs and their metabolites are frequently present in both clinical and forensic cases. Therefore, it is important to develop an efficient sample preparation procedure as well as method able to determine benzodiazepines in different matrices. In this article the information concerning the current available analytical methods for the determination of tranquilizers in biological materials and pharmaceutical formulations are reviewed. Developed methods are classified as chromatography (TLC). The present work is mainly based on drug screening through TLC. In this study the comparison was made between R_f-value and standard R_f-value to establish the identity.

Keywords- *Tranquilizer, Drug facilitated sexual assault, TLC, Benzodiazepines.*

INTRODUCTION

Tranquilizers are the chemicals having the versatile medicinal values. These are the type of psychotropic drug, that is, they concern the mind and can amend frame of mind. Benzodiazepines enhance the effect of the neurotransmitter gamma-aminobutyric acid (GABA) and are subsequently used therapeutically as anxiolytics, tranquilizers, hypnotics, anticonvulsants in epilepsy and centrally acting muscle relaxants. Benzodiazepines (BDZs) are generally commonly used as anxiolytic and/or hypnotic drugs as a ligand of the GABA-benzodiazepine receptor. Moreover, some of benzodiazepines are widely used as an anti-depressive and sedative drugs, and also as anti-epileptic drugs and in some cases can be useful as an adjunct treatment in refractory epilepsies or anti-alcoholic therapy. Procedures for quantification of drugs reviewed by different authors^{1,2} included benzodiazepines in the bio-samples blood, plasma, serum, or oral fluid (saliva, etc.)

An overview included elaborated sample preparation and isolation technologies for the chromatographic determination of 1,4-benzodiazepines in biological matrices.³ As benzodiazepine derivatives end up on the illicit market from diversion from legitimate sources, reference should be made to national pharmacopoeias and drug tablet and capsule identification guides for preliminary screening information. Reference can also be made to the Multilingual Dictionary of Narcotic Drugs and Psychotropic Substances under International Control.⁴ Because of its simplicity and speed, thin layer chromatography (TLC) has found many applications in medical, biological, chemical and pharmaceutical sciences.^{5,6} Some of the more common components found in over-the-counter analgesic products include aspirin, phenacetin (withdrawn), caffeine, paracetamol (acetaminophen), and codeine, (methyldorphine).⁷ Paracetamol (acetaminophen) is one of the most popular over-the-counter analgesic and antipyretic drugs. Paracetamol is available in different dosage forms: tablet, capsules, drops, elixirs, suspensions and suppositories. Dosage forms of paracetamol and its combinations with other drugs have been listed in various pharmacopoeias.^{8,9} Numerous methods have been reported for the analysis of paracetamol and its combinations in pharmaceuticals or in biological fluids.

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Paracetamol has been determined in combination with other drugs using quantitative thin-layer chromatography (TLC)¹⁰.

The chromatography method of separation, in general, involves the following steps:

Table-1: Various Types of Coating Materials Used in TLC

S.no.	Adsorbent	Acidic or Basic	Activity	Separatory mechanism	Component to be separated
1.	Silica gel	Acidic	Active	Adsorption partition	Acidic and neutral substance
2.	Alumina	Basic	Active	Adsorption partition	Basic and neutral
3.	Kieselguhr	Neutral	Inactive	Partition	Strongly hydrophilic substance
4.	Cellulose powder	Neutral	None	Partition	Water soluble compounds

Eutrophic series of selected one and two component solvent systems with increasing eluting power or polarity

Solvent System

1. Cyclohexane, ethyl acetate (95:5)
2. Chloroform, acetate (9:1)
3. Ethyl acetate, methanol (99:1)
4. Benzene, acetone(1:1)
5. Chloroform, acetone (85:15)

METHODOLOGY

Step-1: Collection of Drug Sample:

i) All the testing drugs samples containing tranquilizers in their chemical composition were collected from local medical stores of Bilaspur District (C.G).

ii) Total 25 samples of drugs containing Tranquilizers were collected.

iii) The tranquilizers namely viz. chlorpromazine, promazine, Diphenylhydramine, methanol, Pheniramine was analyzed among above mentioned drugs.

Table-2: Relative Information of Drugs

S. No.	Common name	Trade name	Chemical Composition	Quantity (mg)
1	Pheniramine	Avil	- Diphenylhydramine hydrochloride IP - Pheniramine maleate IP	20.00 mg 2.00 mg
2	Diphenhydramine	Benadryl	- Diphenhydramine - Hydrochloride IP	14.08mg 138.0 mg

iii) All these 25 drugs samples were screened out for their presence or absence by screening test i.e. colour tests.

iv) The quantitative analysis was done with the use of Thin Layer Chromatography

Method (TLC).

v) After detection of tranquilizer in drug sample its Rf- value were calculated by applying given standard formula.

$$\text{Rf-Value} = \frac{\text{Total Distance travelled by the Solute}}{\text{Total Distance travelled by the Solvent}}$$

vi) The common name ,trade name and chemical composition of testing drug samples are given under the following table.

Cont... Table-2: Relative Information of Drugs

3	Acetaminophen	Paracetamol	• Paracetamol, • Phenylephrine hydrochloride, • chlorpheiramine,	500.0 mg 2.00 mg 30.00 mg
4	Dextromethorphan Or/Phenyl Propanamine	Lysocof	• HydrobromideIP • chlorpheiramine, maleate IP • phenylephrine, hydrochloride IP	10.00 mg 2.00 mg 5.00 mg
5	Dextromethorphan	Tus.Q.D	• Dextromethorphanhydro-bromide IP, • chlorpheiramine maleate IP, • PhenylephrinebhydrochlorideIP.	15.00 mg 2.00 mg 5.00 mg

Requirements:

Round bottom flask (500ml), beaker(100ml), separating funnel(500ml), conical flask, column, TLC plates, ammonium sulphate, methanol, bismuth sub nitrate, potassium iodide, fluorosis, diethyl ether, silica gel-G, anhydrous sodium sulphate etc. are required for experiment.

B) Processing of Samples:

Took 1-gm of drug

I

Crush it

I

Add 5-ml methanol and dissolve it

I

Now perform spotting on previously saturated TLC plates with the help of capillary tube

I

Put the spotted TLC plate on saturation chamber containing solvent system (Chloroform : Methanol (9:1))

I

Run it for 45- minutes

I

Remove the TLC Plate and left it for 5-minutes

I

Visualized the spots with the help of freshly prepared Dragendroff's Reagent

C) Calculation:

- After visualization of the spots calculated their R_f-Values.
- For the every spot three reading were taken and the mean value was under considered for its R_f-Value.
- The R_f-Value of the sample was calculated by applying the following Formula.



Combined Avil 1 and 2 Lysocof 1

Fig. 1

Fig. 2



Combined paracetamol 1 and 2

Lysocof 1

Fig. 3

Fig. 4

Table-3: Observations

Name of Drug	Tranquilizer	S.S.*	V.R.**	Rf-Value Standard	Rf-Value Measured
Avil	Pheniramine	CH ₃ Cl:CH ₃ OH (9:1)	Dragendroff's	0.33-0.58	Sample-1 0.74 Sample-2 0.39 Sample-3 0.67 Sample-4 0.49 Sample-5 0.56
Benadryl	Diphenhydramine	CH ₃ Cl:CH ₃ OH (9:1)	Dragendroff's	0.85-0.93	Sample-1 0.81 Sample-2 0.96 Sample-3 0.91 Sample-4 0.83 Sample-5 0.87
Sinarest	Acetaminophen	CH ₃ Cl:CH ₃ OH (9:1)	Dragendroff's	0.65-0.88	Sample-1 0.78 Sample-2 0.81 Sample-3 0.75 Sample-4 0.68 Sample-5 0.84

Cont... Table-3: Observations

Lysocof	Dextromethorphan Or/Phenyl Propanamine	CH ₃ Cl:CH ₃ OH (9:1)	Dragendroff's	0.85-0.93	Sample-10.94 Sample-2 0.94 Sample-30.91 Sample-4 0.89 Sample-50.86
Tus.Q.D.	Dextromethorphan	CH ₃ Cl:CH ₃ OH (9:1)	Dragendroff's	0.85-0.93	Sample-10.97 Sample-2 0.89 Sample-30.95 Sample-4 0.94 Sample-50.90

*Solvent System ** Visualizing Reagent

SUMMARY

The total five drugs sample were taken namely viz Avil, Benadryl, Paracetamol, Lysocof and Tus.Q.D From different companies of each drug where analyzed with the help of TLC and measured there Rf-value. The measured Rf-value were compared with their standard Rf-value to know the exact chemical composition of Tranquilizer, or any alternation or impurities present in tested drug sample. Trice Rf-value were taken under consideration and finally mean value were calculated for each drug or tested sample.

In case of Avil (Pheniramine) red spot were observed and the range of standard Rf-value was 0.33-0.58 and the sample readings ranges from 0.39-0.74. this values were found to close to standard Rf –value.

In case of paracetamol (Acetaminophen) orange-red spot were observed and the measured Rf-value was ranges from 0.68-0.84 and this measured Rf value was found to close to standard Rf value range that is 0.65-0.88.

In case of cough syrup such as Benadryl (Diphenylhydramine) and Lysocof (Phenylpropanolamine) and Tus.Q.D (Dextromethorphan) red spot were observed and the range of above mention drug that is Benadryl, Lysocof, and Tus.Q.D the measured Rf value were 0.81-0.96, 0.86-0.94 and 0.89-0.97 respectively. in case of Benadryl,

Lysocof all the measured value were found to close to standard Rf value that is 0.85-0.93. in case of Tus.Q.D measured Rf value were found little bit fluctuating that is 0.89-0.97 from standard range that is 0.85-0.93 that is might be because of our concentration in the chemical composition of drug or due to manufacturing alteration during its preparation.

CONCLUSION

Tranquilizers are the drug which relive anxiety and mental tension without producing sedation or sleep. They are used in various neurotic conditions, anxiety states and for the relief of tension, so common now a day due to complexities of life. They are also used in anaesthesia for their muscle-relaxant properties. A large number of Tranquilizers are available in the market under different trade names. The common drugs which were taken for the study of Rf-value are Benadryl, Lysocof, Tus.Q.D, Avil, Pheniramine, and acetaminophen.

The forensic aspects related to social costs of drugs include property crime, this drug effect on cognitive function can influence alleged cognitive disability as relevant to brain injury claims, employment disability claims and can interfere with performance in the neuropsychological tests used to evaluate such brain function. The present work was mainly based on drug screening through TLC. In this study the comparison was made between Rf-value and standard Rf-value to establish the identity by its presence and absence.

Ethical Clearance- Not Required

Source of Funding- Self

Conflict of Interest – NIL

REFERENCES

1. Kintz P (2007) Bioanalytical procedures for detection of chemical agents in hair in the case of drug-facilitated crimes. *Anal Bioanal Chem* 388: 1467-1474
2. Drummer OH (2006) Drug testing in oral fluid. *Clin Biochem Rev* 27: 147-159.
3. Uddin MN, Samanidou VF, Papadoyannis IN (2010) Sample preparation overview for the chromatographic determination of 1,4-benzodiazepines in biological matrices (Chapter 7), *Reviews in Pharmaceutical and Biomedical Analysis*, Editors: Constantinos K, Zacharis and Paraskevas D, Tzanavaras. 84-107, Bentham Science Publishers Ltd.
4. Multilingual Dictionary of Narcotic Drugs and Psychotropic substances under International Control, ST/NAR/1/Rev. 2, 2006. Available at www.unodc.org
5. Stahl, E. *Thin Layer Chromatography*, 1st. Ed. (1969).
6. Lieu, V.T. *Journal of Chem. Educ.*, 48(7) 479 (1971).
7. Ganshirt, H., Malzacher, A., *Arch. Pharmz.* 293(65) 925 (1960).
8. J.E.F. Reynolds, "Martindale The Extra Pharmacopoeia", 31st ed., pp. 27-28, Pharmaceutical Press, London, 1996.
9. The United States Pharmacopoeia, 24th revision, pp. 17-39, U.S. Pharmacopeial Convention, Rockville, MD, 2000
10. P. Kahela, E. Laine and M. Anttila, *Drug Dev. Ind. Pharm.*, 13 (2), 213-224 (1987).

Intensive Care after Cardiac Surgery

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ABSTRACT

Post-surgical cardiac surgery is one of the most critical therapeutic courses in patients undergoing cardiovascular surgery. Complications such as bleeding, heart failure, arrhythmias, organ failure, neurological disorders, respiratory failure, infection, and hemodynamic disorders are some of the most prominent and life-threatening events in this period. The management and treatment of these patients is done in partnership with a team that plays a key role for nurses. A prospective review article is an integrated review of the articles which have been evaluated and analyzed during three stages of the search of texts. Searching for texts in valid databases was searched using the keywords “nursing care”, “heart surgery”, “nursing” and “cardiac surgery complications”, subject to their publication period from 2000 to 2016. The data extracted from the reviewed articles is analyzed and categorized. Among the critical nursing practices in the management of this critical period, one can explore and identify people at risk, heart rate monitoring and monitoring, hemodynamic monitoring, correction of hypertension disorders, diagnosis and treatment of hemodynamic disorders, and prevention and treatment of neurological disorders. Be The forthcoming review study attempts to explain and explain the nurses’ responsibilities to specialized care units during post-operative heart surgery by systematically reviewing nursing texts.

Keywords: Nursing care, postoperative period, complications

INTRODUCTION

The post-cardiac period is one of the most critical and critical moments during the hospitalization period for patients underlying these surgeries. Because of the risk of complications such as bleeding, heart failure, arrhythmias, organ failure, neurological disorders, respiratory failure, infections and low cardiac output, this course is one of the most challenging acute life-threatening situations. Patients^{1,2}. Many deaths of patients undergoing heart surgery occur at the time of admission to the CICU^{3,4}. Open heart surgery requires their cardiac hypothermia with a cardiologic cold solution and placement of patients on a cardiopulmonary bypass

pump⁵. The CPB device always has many complications. The spinal exertion of blood in tubes and synthetic filters triggers inflammatory reactions that occur due to inflammatory factors and inflammatory mediators. The occurrence of these inflammatory reactions increases the permeability of the vascular wall, which leads to the outflow of intravascular fluid to the interstitial space and edema^{6,7}. The tissue edema leads to organ failure, known as the systemic inflammatory response. Incidence of small and large embolisms, coagulation disorders, acute respiratory distress syndrome and electrolyte, including other complications of CPB and open heart surgery⁵. Management and treatment of patients in the post-cardiac period is responsible for a wide range of healthcare professionals who act as a therapeutic team. Meanwhile, due to the time spent by nurses with these patients and their existence as the first line of treatment in many cases, nurses play a key role in managing and treating patients in post-cardiac surgery⁸. Nowadays, the relevant experts believe that even with a perfect surgery,

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advanced devices and technologies, if there is no proper nursing care, surgical procedures will not come with good results⁹. The lack of information about nursing care in the post-cardiac surgery period and the lack of literature on this subject made us search for available information and provide a review article. The purpose of this article is to review, describe and describe possible events and complications in post-cardiac surgery that nurses play in the prevention, diagnosis and management of the heart.

MATERIALS AND METHOD

The forthcoming review study is an integrated overview of articles that were conducted during three stages of the search of texts, evaluation and analysis of data. IranMedex, Magiran, Pubmed central, EMBASE, EBSCO and CINAHL databases using the keywords “nursing care”, “cardiac surgery”, “nursing” and “cardiac surgery complications”, subject to their publication from 2000 to 2016 searches. Out of 897 articles, 7 papers^{1,2,6,8,10-12}, have been studied based on the criteria for entry. Focus on post-cardiac care, access to full text of the article, and writing. After selecting the articles, the quality of these articles was reviewed and approved by the authors. In the next step, the data of each resource was explored and extracted one by one. Interventions and actions that have not been performed by nurses have been excluded from classified information based on the consensus of the authors. Finally, the extracted data is integrated and categorized, summarized and presented.

Recognizing Patients at Risk

Knowing as soon as possible the at-risk patients will greatly reduce the complications and mortality of patients undergoing cardiac surgery. Investigating and identifying risk factors in these patients is also important due to the necessity of remediation to prevent secondary complications¹³. So far, many institutions, associations and centers have been studying these risk factors and weighting them. The results of the activities of these centers are presented as tools that are based on regression models. Scores between 0 and 4 good results, grades 5 to 9 average results, scores 10 to 14 poor results, grades 15 to 19, high risk and scores above 20 indicate a high risk of surgery (Table 1).

Transferring the Patient to the CICU Department

After the completion of heart surgery, patients are in a very unstable condition. Transmission of patients

is considered to be a serious condition because of the various risks that threaten these patients in this period. In order to minimize possible risks, patients should fully transfer to the CICU^{1,2}, along with ECG and hemodynamic monitoring devices, with full compliance with safety requirements for movement. Some patients may be treated with anesthetic drugs before being transferred to the CICU, in order to avoid unwanted waking in the route of transmission. Such patients are at risk for hypotension, and if they develop such an event, they can be treated with colloidal fluids or increased doses of injectable inotropic drugs^{12,14}. Once patients arrive at the CICU, patients are monitored and monitored by the hemodynamic and ECG monitoring devices in the department. In case of any disturbance in the monitoring systems, the pulses of the patient should be controlled by the hand and ensure that they have a natural pulse¹⁵. Ventilation is appropriate for patients with cases of airborne hearing in lungs, bilaterally raised lungs, favorable pulse oximetry, and natural arterial gas analysis (ABG)^{10,15}.

Monitoring of Cardiac Rate and Rhythm

In order to increase the strength of the surgeon's maneuver, the heart of patients undergoing open heart surgery is immobilized by cardioplasty. On the right ventricular epidermal suture, most patients with heart surgery are a stitch suture that can be attached to the pacemaker generator at the time of arrhythmias. Most experts have a heart rate above 90 beats per minute to ensure adequate tissue perfusion and balance between the supply and demand for myocardial oxygenation. An electrocardiogram is also a shock to the heart with an electrocautery device^{1,12}. Applying high-speed impulses to the heart, in many cases leads to arrhythmias. In the absence of arrhythmia or successful arrhythmia control, the pacemaker can be removed on the fourth day after surgery, with an INR of <2.5^{6,16}.

Monitoring of Cardiac Output

One of the most important goals of nursing care for patients in the post-surgical period is to monitor, maintain and restore normal cardiovascular outcomes. Heart transplantation and normal hemodynamics require adequate perfusion of vital organs and organs. Even short periods of hypoperfusion of vital organs can lead to lethal events, such as organ failure and MODS^{11,17}. Diagnostic procedures for ventricular

function and ventricular dysfunction diagnosis include TEE and TTE echocardiography¹⁷. Management and treatment of LOCS is based on drug support, with or without mechanical support for the heart. The need for drug support is more likely to be needed, despite the amount of circulation in circulation; the ventricular function is still low. These drugs often include catecholamines such as adrenaline, dopamine, and dibutamine, or phosphodiesterase inhibitors such as melirinone. Mechanical support of the heart is often done by inserting a balloon into the aortic pump^{16,18}. IABP reduces myocardial oxygen demand by reducing postpartum and increasing myocardial oxygenation through increased coronary blood flow^{6,19}.

Hypotension

Most cases of hypotension occur at the time of admission of the patient to the CICU due to hypovolaemia. In the first step, the nurse can perform the fluid challenge test and differentiate the hypovolaemia from other causes of hypotension (Table 2). In this test, about 250CC of colloidal or crystalloid fluids is infused over 5 minutes^{6,20}. In case of hypovolaemia, the patient's response to fluid therapy is a form of increased blood pressure; otherwise blood pressure will not change or diminish. In the absence of or modification of the hypovolaemia, other treatments include the administration of inotropic drugs and the elimination of underlying causes^{1,21}.

Hypertension

The incidence of hypertension following CABG surgery increases the pressure on the grafts and, in the presence of weak aortic sutures in the aortic surgery, causes rupture of the muzzlers. Hence, the occurrence of hypertension after heart surgery can be very dangerous and fatal. Hypertension due to high systemic vascular resistance can cause impairment and impairment of left ventricular and myocardial function^{1,21}. One of the rational strategies in this area is to maintain blood pressure at low levels in the early hours after surgery and to increase progressively and gradually in the next hours. Infusion of vasodilators such as nitrates is one of the acceptable treatments^{9,11}.

Monitoring of Bleeding

Postoperative hemorrhage occurs due to surgery, coagulation disorders, or both. Coagulopathy followed

by a multifactorial CPB. Examples of anticoagulant drugs, re-surgery, prolonged CPB, platelet dysfunction, hypothermia, excessive blood dilatation, high blood transfusion, blood dyskrasia, hypothermia, uremia and hepatic impairment are among the risk factors for the risk of bleeding. Cardiac tamponade forms are formed within the first 24 hours after heart surgery. The incidence of this complication is greater in surgical valves replacing mechanical valves due to the early onset of anticoagulant drugs. The classic symptoms of this complication are threythabs. A person with oliguria may also be diagnosed^{18,21}. To prevent bleeding complications and control bleeding, a series of blood coagulation tests is recommended for 10 minutes after administration of protamine sulfate at the end of the surgery.

Monitoring Neurological Complications

The prevalence of neurological disorders following cardiac surgeries is very high and a wide range of 18-80% is reported. Occurrence of neurological complications leads to a sharp increase in CICU residence, hospitalization time, complications and mortality after cardiac surgery. Post-cardiac neurological disturbances are divided into two types, which include more severe and permanent disorders such as CVA and TIA, and type II, which includes milder and more temporary disorders such as delirium and cognitive impairment^{3,7,9,17}. Improvement and maintenance of acceptable hemodynamics of patients is one of the effective measures in the prevention of neurological disorders. Also, correction of glycemic level, timely treatment of arrhythmias, such as atrial fibrillation, is another preventive measure²². Ensuring adequate brain oxygenation is one of the most effective measures to reduce brain ischemia. It should be noted that, based on evidence, long-term hyperactivation of patients increases the release of radicals and increases the risk of neurological disorders¹⁵. In the event of agitation, norepinetics such as haloperidol are more effective, risperidone and olanzapine, sedative drugs such as benzodiazepines and in very severe cases with low dose anesthetics. It should be noted that prescribing benzodiazepines and opiates is one of the main causes of Delirium after cardiac surgery. Physical restraints such as closing his hands can also be used in case of agitation of severe psychomotor in patients and the risk of injury to themselves or others^{3,7,9}.

Table 1. Pursount Scale

Variable	Factors	Weight
Associated illnesses	Obesity	3
	Diabetes mellitus	3
	Hypertension	3
	Dependence on dialysis	2
	Dependence on Pacemaker	2
	Left ventricular aneurism	5
	Emergency Surgery (Following PTCA)	5
	ARF	10
	Cardiogenic shock	10
Ejection fraction	50% well (LVEF $\geq$)	0
	(LVEF=30-40%) moderate	2
	poor (LVEF<30%)	4
Age	Less than 70 years old	0
	70-74	7
	75-79	12
	Age>80	20
Surgery again	First surgery	5
	Second Surgery	10

Table 2. Common causes of hypotension after cardiac surgery

Cause	Examples
Circulation	Hypovolemia Severe bleeding SIRS
Cardiac	myocardial ischemia
Decreased cardiac contractility	Ventricular failure Coronary artery occlusion arrhythmia tamponade
Respiratory	Tension pneumothorax Hyperventilation
Drug	Anesthetic drugs and sedative nitrates Discontinue inotropic drugs
Technical errors	incorrect calibration of the monitoring system

DISCUSSION

Post-surgical cardiac surgery is one of the most challenging therapeutic courses in patients undergoing cardiovascular surgery. The patient's placement on the CPB causes a lot of complications on the patient's body. CPB reduces the overall body tissue overgrowth, long-term ischemic damage to the heart and other vital organs, triggers inflammatory reactions and SIRS, hypothyroidism and coagulation disorders. In addition to CPB complications, heart surgeries also have their own complications, including bleeding and various arrhythmias. The management and treatment of these patients are closely coordinated with a team of health professionals who play a key role in nursing. One of the special nursing measures in managing this critical period can be the examination of individuals at risk, heart rate monitoring, hemodynamic monitoring, correction of blood pressure disorders, diagnosis and treatment of LOCS, and the prevention and treatment of neurological disorders²³. The above is only part of the critical responsibilities of nurses in the CICIU sections. Sufficient knowledge of nurses in these areas can reduce the complications and mortality of patients after heart surgery and improve the clinical outcomes of heart surgery.

CONCLUSION

This review article has been confronted with limitations, including the scope of post-surgical care for nursing care. This part of the knowledge of cardiovascular care is so extensive that it cannot be fully described in an article. However, it has been tried to review the articles briefly and simply by referring to the sources searched and relying on many years of experience in the CICIU's authors.

Ethical Clearance: This research project was approved by the ethics committee of Hamadan University of Medical Sciences.

Source of Funding: Hamadan, University of Medical Sciences.

Conflict of Interest: None

REFERENCES

- Stephens RS, Whitman GJ. Postoperative Critical Care of the Adult Cardiac Surgical Patient: Part II: Procedure-Specific Considerations, Management

- of Complications, and Quality Improvement. *Critical Care Medicine*.2015;43(9):1995-2014.
2. Paymard A, Bargrizan S, Ramezani S, Khalili A, Vahdatnejad J. Comparing Changes in Pain and level of consciousness in Open Endotracheal Suction Catheters with Two Sizes: 12 and 14: a Randomized Clinical Trial. *Eurasian Journal of Analytical Chemistry*.2017;12(5B):591-97.
3. Mardani D, Bigdelian H. Predictors and clinical outcomes of postoperative delirium after administration of dexamethasone in patients undergoing coronary artery bypass surgery. *International Journal of Preventive Medicine*.2012;3(6):420-27.
4. Mazzeffi M, Zivot J, Buchman T, Halkos M. In-hospital mortality after cardiac surgery: patient characteristics, timing, and association with postoperative length of intensive care unit and hospital stay. *The Annals of thoracic surgery*.2014;97(4):1220-25.
5. Fazelifar S, Bigdelian H. Effect of esmolol on myocardial protection in pediatrics congenital heart defects. *Advanced Biomedical Research*.2015;4(2):246-55.
6. Alizadeh Z, Paymard A, Khalili A, Hejr H. A systematic review of pain assessment method in children. *Annals of Tropical Medicine and Public Health*.2017;10(4):847-49.
7. Mardani D, Bigdelian H. Prophylaxis of dexamethasone protects patients from further post-operative delirium after cardiac surgery: A randomized trial. *Journal of research in medical sciences : the official journal of Isfahan University of Medical Sciences*.2013;18(2):137-43.
8. Stephens RS, Whitman GJ. Postoperative Critical Care of the Adult Cardiac Surgical Patient. Part I: Routine Postoperative Care. *Critical Care Medicine*.2015;43(7):1477-97.
9. Afshari A, Khalili A, Dehghani M, Beiramijam M, Lotf MD, Noodeh FA, et al. Comparing the frequency of occupational injuries among medical emergency staff and nurses of intensive care units in Hamadan. *Ann Trop Med Public Health*.2017;10(1):646-50.
10. Baltimore JJ. Perianesthesia care of cardiac surgery patients: a CPAN review. *Journal of perianesthesia nursing : official journal of the American Society of PeriAnesthesia Nurses/American Society of PeriAnesthesia Nurses*.2001;16(4):246-54.
11. Shahriyari M, Khalili A, Shamsizadeh M, Mardani D, Paymard A, Vardenjani MM. Effects of foot reflexology on pain in patients after lower limb amputation. *J Mazandaran Univ Med Sci*.2016;26(2):18-26.
12. Pezzella T, Ferraris VA, Lancey RA. Care of the adult cardiac surgery patient: part I. Current problems in surgery.2004;41(5):458-516.
13. Evans C, Abel R. Preoperative assessment for cardiac surgery. *Anaesthesia & Intensive Care Medicine*.2009;10(9):405-10.
14. Whittle J, Kelleher AA. Preoperative assessment for cardiac surgery. *Anaesthesia & Intensive Care Medicine*.2015;16(10):484-90.
15. Mansour M, Massodnia N, Mirdehghan A, Bigdelian H, Massoumi G, Alavi ZR. Evaluation of effect of continuous positive airway pressure during cardiopulmonary bypass on cardiac de-airing after open heart surgery in randomized clinical trial. *Advanced biomedical research*.2014;3(4):136-43.
16. Bigdelian H, Gharipour M. Amiodarone Versus Propranolol Atrial Fibrillation PRE-Vention After CABG in Patients With Low Ejection Fraction. *ARYA atherosclerosis*.2010;4(4):22-31.
17. Bigdelian H, Sedighi M, Mardani D. Right ventricular Hemodynamic Alteration after Pulmonary Valve Replacement in Children with Congenital Heart Disease. *Journal of Cardio-Thoracic Medicine*.2015;3(1):273-77.
18. Bigdelian H, Mardani D, Sedighi M. Comparative effects of pulmonary valve replacement (PVR) surgery with bioprosthetic and mechanical valves on early and late outcome of patients after congenital heart surgeries: 10 years of experience. *Indian Journal of Thoracic and Cardiovascular Surgery*.2014;30(4):257-63.
19. Bridgewater B, Soon SY. The intra-aortic balloon pump. *Surgery (Oxford)*.2012;30(1):17-8.
20. Vincent J-L, Weil MH. Fluid challenge revisited. *Critical Care Medicine*.2006;34(5):1333-37.

21. Bigdelian H, Mardani D, Sedighi M. The Effect of Pulmonary Valve Replacement (PVR) Surgery on Hemodynamics of Patients Who Underwent Repair of Tetralogy of Fallot (TOF). *Journal of Cardiovascular and Thoracic Research*.2015;7(3):122-25.
22. Masoumi G, Frsatkhish R, Bigdelian H, Ziyaefard M, Sadeghpour-Tabae A, Mansouri M, et al. Insulin infusion on postoperative complications of coronary artery bypass graft in patients with diabetes mellitus. *Research in Cardiovascular Medicine*.2014;3(2):e17861.
23. Shayan A, Jamshidi F, Tahmasebiboldaji V, Khani S, Babaei M, Havasian MR, Masoumi SZ. Impact of a Stress Management Intervention Program on Sexual Functioning and Stress Reduction in Women with Breast Cancer. *Asian Pacific journal of cancer prevention: APJCP*. 2017; 18(10):2787-93.

An Investigation into the Correlation between Emotional Intelligence and Communication Skills among Nursing Students

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ABSTRACT

Background: Nursing is an important field of study in which multiple intelligences such as emotional intelligence and spiritual intelligence play a more important role than in other fields of study. **Aims:** The present study was aimed at examining the correlation between emotional intelligence and communication skills among nursing students studying in Kurdistan University of Medical Sciences. **Method:** In the present descriptive-correlational study, 286 nursing students were selected by a convenience sampling method. The required data were collected by a self-report method using Siberia Sharing Emotional Intelligence Questionnaire and Barton Communication Skills Questionnaire. The collected data were analyzed using descriptive statistics and correlational tests through SPSS 21.0. **Results :** According to Pearson correlation coefficient, the level of correlation between communication skills and emotional intelligence and its areas was significant and positive ($p < 0.001$). **Conclusion:** Emotional intelligence and communication skills are closely correlated. Paying attention to this important issue among students along with physical, mental, and social dimensions can lead to an improvement in communication skills of this community and quality of nursing care in the future.

Keywords: Emotional intelligence, communication skill, students, nursing

INTRODUCTION

Emotional intelligence is one of the phenomena that has paid special attention in recent decades. This is because of the significant role of emotional intelligence reducing the level of conflict between intellectual and emotional perceptions, which leads to optimal communication with others, self-regulation, compliance and motivation increase, stress management, and general mood.^{1,2} Bar-on considers emotional intelligence as the mere cause of development of the individuals' capacity to succeed in life, and believes that it is correlated with emotional health and in general the individual's mental

health. Bar-on puts much emphasis on the interpersonal component in emotional intelligence. This component refers to the individual's capability to be aware of and controlling his/her emotions which are self-esteem, excitement, assertiveness, independence, and self-actualization.^{4,3}

It seems that multiple intelligences such as emotional intelligence and spiritual intelligence play a more important role in nursing than other fields of study.⁵ Such intelligences have a remarkable effect on how nurses and nursing students communicate.

Communication is one of the essential needs of human, which is uniquely important in nursing profession. Among the health groups, nurses are the only group that have a long direct communication with patients. In nursing science, nurse-patient relationship is the core of health care.⁶ This relationship is a professional one and based on mutual trust and respect.

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The communication is because of collaboration which forms between the nurse and the patient in order to promote the patient's health.⁷ In order to establish a communication to help the patient, the nurse needs to be familiar with communication skills without which it is impossible to create a relationship, and since patients belong to different age, belief, social, cultural, and economic groups, there should be a common comprehensible language for the care providers (nurses) and care receivers (patients).⁸ The quality of the provided health services improves if nurses can establish an appropriate relationship with the patients, their relatives, doctors, other nurses and care team members, and other personnel working in other sectors of health center; therefore, it is necessary for the nurses to have more communication capacity.⁹

Nursing students play a unique role in the phenomenon of health, because nursing is the profession of helping, and nurses need to be equipped with sufficient knowledge and skills in order to be able to predict the situations and outcomes. However, having mere knowledge is not enough, they need to be equipped with methods of how to deal with different behaviors of individuals.¹⁰ Emotional intelligence is uniquely important in individuals' success in health care organizations, and such skills enable individuals to think better in hard situations, prevent the waste of time as a result of emotions such as anger, anxiety, and fear, pacify their brain easily, and open up the way for their inner insight and creative ideas.¹¹

Nursing students, as future nurses, play a significant role in the treatment team. The researchers of the present study decided to investigate into the correlation between emotional intelligence and communication skills among nursing students so as to take an effective step to understand the students' problems and help promote the health of individuals and community.

METHOD

The present descriptive-correlational study was carried out from September to December 2017 in Nursing Faculty, Kurdistan University of Medical Sciences. The study sample was selected by a stratified sampling method. In so doing, the nursing students who studied over 2013-17 were chosen. Afterwards, a number of students were selected in a certain proportion and by a randomized sampling. According to previously

conducted studies,⁵ by considering $p=77\%$, $d=0.05$ (precision), confidence interval of 95%, and based on the following formula, the sample size was calculated to be 283 which was raised to 300 in order to increase the level of precision. Finally, since some of the questionnaires were not filled out completely, the data obtained from 286 individuals were analyzed. The study's inclusion criteria included studying nursing bachelor, lack of confirmed mental illness, and willingness to participate in the study. The study's exclusion criterion was the individuals' unwillingness to participate in the study.

The data collection instruments were a demographic information questionnaire, Siberia Sharing Emotional Intelligence Questionnaire, and Barton Communication Skills Questionnaire. Siberia Sharing Emotional Intelligence Questionnaire was developed in 1999 by Siberia Sharing. It consists of the subscales of self-motivation (7 items), self-awareness (8 items), self-regulation (7 items), social intelligence (6 items), and social skills (5 items). It is scored using a 5-point Likert scale (Never=5 to Always=1). The score range for each individual is between 33 and 165, and higher scores on this scale indicates higher emotional intelligence.

Communication Skills Questionnaire was developed by Barton in 1990. It consists of 18 items in 3 subscales including verbal skill (6 items), listening skill (6 items), and feedback skill (6 items). Higher scores indicate that the individual uses more communication skills. The validity and reliability of Barton Communication Skills Questionnaire were confirmed in the study conducted by Raeissi.¹² In the present study, Cronbach's Alpha was used to determine the reliability of the questionnaires. Cronbach's Alpha for emotional intelligence and communication skills questionnaires was respectively 0.814 and 0.750, which shows that the questionnaires had appropriate reliability.

After the necessary permission letters were obtained from Kurdistan University of Medical Sciences and Nursing and Midwifery Faculty, the researchers referred to the students. After the students were provided with the introduction letter, the aims of the study were explained to them, and written consent letter was retrieved from them. The study's instruments were given to the students. The collected data were analyzed using descriptive statistics and correlation tests at a confidence interval of 95% through SPSS 16.0.

RESULTS

The results of the present study showed that the mean ($\pm$ standard deviation) age of the students was 21.37($\pm$ 2.39). Most of the students were men (55%), single (85%), and second child (34.6%). Moreover, most of them lived in dormitories (61.9%) and studied in fourth year (30%) (7th semester (17.1%)). The mean score of emotional intelligence among the students was 104.04 (13.75). In addition, the mean (standard deviation) score of their communication skills was 51.83 (10.10) (Tables 1 and 2). According to the results of Pearson correlation coefficient, the level of coefficient among communication skills and emotional intelligence and its fields was significant and positive ($p < 0.001$) (Table 3).

Table 1. Description of the studied students based on the variables of emotional intelligence and communication skill

Variable	Min.	Max.	Mean	SD
Emotional Intelligence (33-165)	67	151	104.04	13.75
Self-motivation (7-35)	13	35	21.79	3.35
Self-awareness (8-40)	16	37	26.74	4.86
Self-regulation (7-35)	10	35	21.14	3.56
Social intelligence or empathy (6-30)	9	30	18.83	3.76
Social skills (5-25)	9	23	15.53	2.75
Communication skills (18-90)	27	86	51.83	10.10
Verbal skill (6-30)	8	30	17.58	4.38
Listening skill (6-30)	7	26	16.37	3.96
Feedback skill (6-30)	7	30	17.88	4.15

Table 2. Frequency distribution of the students based on emotional intelligence and communication skill

Variable	Frequency	Frequency percentage	Mean	SD
Emotional intelligence (0-100)				
Low (0-25)	0	0	0	0
Moderate (25-75)	277	96.90	52.91	9.24
High (75-100)	9	3.10	81.73	2.99
Communication skills (0-100)				
Low (0-25)	18	6.30	18.82	3.66
Moderate (25-75)	260	90.90	47.77	10.63
High (75-100)	8	2.80	85.41	7.04

Table 3. The relationship between communication skills and emotional intelligence and its aspects among the students under study

		Emotional intelligence					
		Emotional intelligence	Self-motivation	Self-awareness	Self-regulation	Social intelligence or empathy	Social skills
Communication skill	Correlation coefficient	0.396	0.175	0.281	0.255	0.315	0.373
	Probability	p<0.001	0.003	p<0.001	p<0.001	p<0.001	p<0.001
Verbal skill	Correlation coefficient	0.313	0.181	0.262	0.209	0.257	0.257
	Probability	p<0.001	0.002	p<0.001	p<0.001	p<0.001	p<0.001
Listening skill	Correlation coefficient	0.196	0.056	0.062	0.238	0.175	0.256
	Probability	0.001	0.345	0.299	p<0.001	0.003	p<0.001
Feedback skill	Correlation coefficient	0.380	0.180	0.348	0.173	0.327	0.390
	Probability	p<0.001	0.002	p<0.001	0.003	p<0.001	p<0.001

DISCUSSION

The present study was aimed at investigating into the relationship between emotional intelligence and communication skills among nursing students. According to the results, there was a significant relationship between emotional intelligence and communication skills of the students, which means that individuals with high emotional intelligence are expected to listen well, accept others, and act well in their interactions with others. As future nurses, those nursing students who have high emotional intelligence possess higher communication skills, which affects not only the patients' satisfaction but also the nurses' job satisfaction. Higher emotional intelligence and communication skills lead to self-efficacy in individuals and can cause the nurses to carry out their responsibilities with higher occupational skills. Although the concept of communication and communication skills is an essential element in delivering care and an effective tool in nursing profession, nurses are not provided with any direct education in this regard (it is only referred to in the form of different lessons, though) and they acquire communication skill to a moderate extent by

working in medical teams and responding to the patients. In explaining the results of their study (communication skills and its related factors), Safavi et al, stated that nurses have an average level of communication skills.¹³

In agreement with the results of the present study, Yousefi et al.,¹⁴ carried out a study entitled, "The relationship between emotional Intelligence and communication skills in university students" and stated that there is a statistically significant relationship between emotional intelligence and communication skills in university students.¹⁴ Despite the difference between the participants (nursing students in the present study, and nurses working in psychiatric clinic in the study above) of the two studies and use of different instruments, similar results were obtained. The results of other studies have also showed that good relationship between the medical staff and patients and companions plays a significant role in quality of services and satisfaction among patients. Moreover, in agreement with the results of the present study, Aslefattahi et al.,¹⁵ examined the relation between emotional intelligence and self-esteem and social skills and concluded that there was a significant relationship between emotional

intelligence and social skills and between self-esteem and social skills, and this relationship is significant at a confidence interval of 99%.¹⁵

In the present study, most of the students obtained an average score on emotional intelligence (54.5%). Ghaderi et al.,¹⁶ studied emotional intelligence among the students attending the universities of Ahvaz. Their study sample consisted of 303 students. The results of their study showed that the emotional intelligence of most of the students was moderate (77.23%).¹⁶ The results of the present study are not in agreement with the results of the study conducted by Chinipardaz et al.,¹⁷ who examined emotional intelligence and its relationship with academic achievement among medicine intern students of Tehran University of Medical Sciences. The results of their study showed that the average emotional intelligence score in all 15 subscales of the questionnaire was lower than the defined standard. The reason for such a difference is probable due to difference in the samples and their size. The present study was carried out on nursing students while medicine students were the focus of the study conducted by Chinipardaz et al.,¹⁷. Moreover, the results of the study conducted by Shahbazi,¹⁸ indicated that emotional intelligence among nursing students was not at a standard level because no formal training is presented for it; however, this skill can be improved by training the students, which is not in line with the present study.

In the present study, most of the students obtained a moderate score on their communication skill (90.90%). Among the communication skills, verbal skill received the highest mean. In disagreement with the results of the present study, Baghiyani et al.,¹⁹ reported that the highest mean score of communication skills was related to feedback skill.¹⁹ This difference can to some extent be attributed to the difference in the nature of nursing profession and other professions of medicine, because an important role of nurses is to train the patients and their families, and this training occurs in each verbal communication. Therefore, it is obvious that establishing verbal communication is more important in nursing profession than other medical professions. The results of different studies that utilized different instruments and scoring systems reported that nurses and nursing students had a moderate level of communication skill.

The results of the present study can be employed to promote the level of communication skills among

nursing students. It is recommended that studies should be carried out in order to understand barriers to promote emotional intelligence among university students. It is also suggested that students of other fields of study should be studied and compared with nursing students. In order to achieve more precise results and generalize them to communities of nursing students, studies with larger sample size should be carried out. Since questionnaires are filled out by self-report method, students may not pay enough attention while completing them, which is one of the limitations of the present study.

4 paragraphs (suggested): Short summary of your data, results of this study compared to other similar studies in the literature, strengths and limitations of this study, implications for practice and policy or implications for future research.

CONCLUSION

The results of the present study showed that there was a positive correlation between the nursing students' emotional intelligence and their communication skills. Nowadays, training the manpower is the most important element of higher education and one of the most outstanding factors of national development. Student community is one of the largest groups of society. It is highly significant to pay attention to emotional intelligence and communication skills of this group of students in order to promote their emotional intelligence and thus their communication skills.

Conflict of Interest : There are no conflicts of interest between the authors.

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Ethics Committee Approval : The present study was retrieved from a research project approved by the Research Council of Kurdistan University of Medical Sciences and Health Services. The project is registered in Ethics Committee under the code of IR.MUK.REC.1396/145

REFERENCES

1. Damasio A, Sutherland S. Descartes' Error: Emotion, Reason and the Human Brain. *Nature*. 1994;372(6503):287-.
2. Moshki M, Noori SM, Peyman N. Association of Health Locus Control Theory and Self-Esteem with

- Physical Activity in University Students. Scientific Information Database. 2009;16(53):142-49.
3. Bar-On R. The Bar-On model of emotional-social intelligence (ESI). *Psicothema*, 18, suppl., 13-25. Model overview retrieved from the Consortium for Research on Emotional Intelligence in Organizations website. 2006.
4. Beshlideh K. Effects of Emotional Intelligence on General Health of Divorced Women. *Quarterly Journal of Social Work*. 2015;3(4):28-39.
5. Hosseini FH, Anari AMZ. The Correlation between Emotional Intelligence and Instable Personality in Substance Abusers. *Addiction & health*. 2011;3(3-4):130.
6. Barth J, Lannen P. Efficacy of communication skills training courses in oncology: a systematic review and meta-analysis. *Annals of oncology*. 2010;22(5):1030-40.
7. Moore PM, Rivera Mercado S, Grez Artigues M, Lawrie TA. Communication skills training for healthcare professionals working with people who have cancer. *The Cochrane Library*. 2013.
8. Bowles N, Mackintosh C, Torn A. Nurses' communication skills: An evaluation of the impact of solution-focused communication training. *Journal of Advanced Nursing*. 2001;36(3):347-54.
9. Wysong PR, Driver E. Patients' perceptions of nurses' skill. *Critical Care Nurse*. 2009;29(4):24-37.
10. Javaher Aa, khaghanizade M, Ebadi A. Study of Communication Skills in Nursing Students and its Association with Demographic Characteristics. *Iranian Journal of Medical Education*. 2014;14(1):23-31.
11. Stichler JF. Emotional intelligence. *AWHONN lifelines*. 2006;10(5):422-5.
12. Raeissi P, Kalhor R, Azmal M. Correlation between emotional intelligence and communication skills in managers in educational hospitals of Qazvin. *Journal of Qazvin University of Medical Sciences*. 2010;13(4):57-62.
13. Safavi M, Ghasemi PS, Fesharaki M, Esmail pour BM. Communication skills and related factors gualans teaching hospitals' nurses94. 2016.
14. Yousefi F. The relationship between emotional Intelligence and communication Skills in university students. 2006.
15. Aslefattahi B, S N. The relationship between emotional intelligence and self-esteem and social skills. *Journal of Teaching and Evaluation*. 2013;6(23):123-36.
16. Ghaderi M, Nasiri M, Zakeri Y, Khedri Meirghaidi R. Assessment of Emotional Intelligence in Ahvaz Universities Students in 2014. *Journal of Rafsanjan University of Medical Sciences*. 2015;14(5):379-92.
17. Chinipardaz ZAGB, Mehri%A Pasalar, Parvin%A Shiravy khozany, Abofazl%A Keshavarz, Athefe. Investigation of Emotional Intelligence and Its Relationship with Academic Achievement in Medical Students of Tehran University of Medical Sciences in 2008-2009. *Strides in Development of Medical Education*. 2012;8(2):167-72.
18. Baghiyani Moghadam M, Momayyezi M, Rahimdel T. Communication skills of department heads in Shahid Sadoughi university of medical sciences. *Iranian Journal of Medical Education*. 2012;12(6):448-57.
19. Shahbazi S, Hazrati M, Moattari M, Heidari M. The Effect of Problem Solving Skills Training on Emotional Intelligence of Nursing Students of Shiraz (2008). *Iranian Journal of Medical Education*. 2012;12(1):67-76.

Patterns and Profile of Poisoning Cases at Bidar Institute of Medical Sciences, Bidar (Karnataka)

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ABSTRACT

Poisoning is one of the causes of unnatural death worldwide and is more in developing countries and the methods of poisoning varies from one place to other

Aim: To study the pattern and profile of poisoning cases at Bidar Institute of Medical Sciences, Bidar

Material & Method: The present study is a prospective study conducted at Bidar Institute of Medical Sciences, Bidar from 1st January 2016 to 31st December 2017.

Total 158 poisoning cases were studied from OPD to IPD, followed from admission to recovery or death in a systematic manner. All these cases were analyzed with an objective of knowing age & sex distribution of victims, commonest type of poison, the manner of poisoning, occupation, and also the rural & urban trends.

Among 158 cases, male (58.22%) predominated females (41.77%) with majority (41.30%) belonging to 21-30 yrs age group. The commonest poison encountered was the Organophosphorous compounds (66.45%). Suicide (71.74%) was the commonest manner than accidental poisoning.

Agricultural farmers with rural background, belonging to lower socioeconomic strata were the commonest victims (72.78%) compared to others.

Keywords: Poisoning cases, Organophosphorous compounds, Suicide, Accident.

INTRODUCTION

Among unnatural deaths poisoning is one of the second common cause following road traffic accidents. It is one of the methods of taking one's life, which may be suicidal, homicidal or accidental in nature. Acute poisoning forms one of the commonest causes of emergency hospital admissions¹.

Pattern of poisoning in a region depends upon variety of factors, ranging from availability and access of poison to the socio-economic status of the individual; also not to forget of the cultural and religious influences. Poisoning forms a major problem all over the world,

though the type of poison, the associated morbidity and mortality varies from place to place and changes over a period of time².

Poisonings claim substantial numbers of lives throughout the world, in the form of Suicide, Accident or Homicide. Suicides by poisoning are increasing recently, possibly due to the stress and strain of modern life style. This in turn could be from the changes occurring due to globalization and urbanization. Extensive usage of chemicals in industries, agricultural sector and domestic front is causing increased accidental poisoning.

The traditional methods of suicide by drowning, hanging etc. are being replaced by poisoning. The poisons and their compounds are cheap and easily available with out any questions or documentation, especially in developing countries like India.

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A detailed study about the profiles of the poisoning

cases observed in a particular area is not only important for immediate diagnosis and treatment, but also is necessary for evaluation of the current scenario and introduction of new means to curb the increasing incidences of poisoning.

The aim was to collect authenticated data of the poisoning cases and analyze them in all respects. These kinds of data are in turn helpful for the concerned authorities to look for solutions to the problem and evolve necessary policies to reduce or prevent them.

MATERIALS AND METHOD

Study design- Descriptive

This study was conducted in the Department of Forensic Medicine and Toxicology, Bidar Institute of Medical Sciences, Bidar, Karnataka.

Study period- 01-01-2016 to 31-12-2017

Study Method- A total of 158 poisoning cases admitted and autopsied at District hospital & Bidar Institute of Medical Sciences, Bidar Karnataka were analyzed during 2016-2017.

The victims were studied from the time of OPD admission to wards and followed up till recovery or death. Data were collected in a Performa, from the history given by the patient, hospital records, police inquest reports, post mortem reports, FSL reports and also personal interview with the concerned relatives. The emphasis was on the age, sex, rural / urban, type of poison and manner of poisoning. All data was documented and statistically analyzed.

RESULTS

The following results were observed in our study. Among 158 cases of poisoning studied during 2016 - 2017, majority of the victims were males (58.22%) (Table No.1) and male and female ratio was 1.3:1. 21-30 yrs (41.77%) (Table No.2) was the commonest age group involved and were residents of (in and around) Bidar.

The commonest type of poison encountered was the compounds of Organophosphorus (66.45%) (Table No.3) and last was the Datura & scorpion bite with single case (0.63%).

The commonest manner (Table No.4) of poisoning

was suicide both in male (71.74%) and female (72.73%) followed by accidental poisoning accounting for 25% and 25.75% in male and female respectively. 3 cases of homicidal poisoning was observed in our study. Occupation wise (Table No 5) agricultural farmers topped the list (37.34%) followed by laborers (24.05%). Most of the victims belonged to rural area i.e. 102 (64.55%) compared to urban area (Table No.6).

Persons of low socio-economic strata are the commonest victims (72.78%) followed by middle class (24.68%) and least involved were the upper class (1.90%) (Table No.7).

Table.No.(1) Sex wise Distribution of victims

Age	Males		Females	
	No	%	No	%
0-10	1	1.08	3	4.54
11-20	09	9.78	18	27.27
21-30	38	41.30	28	42.42
31-40	24	26.08	11	16.66
41-50	12	13.04	6	9.09
51-60	6	6.52	0	0.00
61 and Above	2	2.17	0	0.00
Total	92	100.00	66	100.00

Table .No.(2) Age wise distribution of victims

Age	No of patients	Percentage
0-10	4	2.53
11-20	27	17.08
21-30	66	41.77
31-40	35	22.15
41-50	18	11.39
51-60	6	3.79
61 and Above	2	1.26
Total	158	100

Table No (3) Commonest type of poison

Poison	No of Cases	Percentage
Organophosphorus compounds	105	66.45
Aluminium Phosphide	16	10.13
Organochlorine	09	5.70
Alcohol	12	7.60
Kerosene	2	1.30
Snake bite	8	5.06
Datura	1	0.63
Cyanide	3	1.90
Scorpion bite	1	0.63
Carbamates	1	0.63
Total	158	100.00

Table No.(4) Manner of poisoning

Manner	Males		Females	
	No	%	No	%
Accidental	23	25.00	17	25.75
Suicidal	66	71.74	48	72.73
Unknown	1	1.08	0	0.00
Homicidal	2	2.17	1	1.51
Total	100	100.00	66	100.00

Table. No (5) Occupation of Victims

Occupation	No of patients	Percentage
Farmer	59	37.34
Labourer	38	24.05
House wife	29	18.35
Student	16	10.12
Driver	6	3.80
Clerk	4	2.53
Others	6	3.80
Total	158	100

Table. No.(6) Rural / Urban distribution of victims

Areas	No of patients	Percentage
Rural	102	64.55
Urban	56	35.44
Total	158	100.00

Table.No. (7) Socio- economic status of victims.

Status	No of Cases	Percentage
Lower class	115	72.78
Middle class	39	24.68
Upper class	3	1.90
Unknown	1	0.63
Total	158	100

DISCUSSION

The study included 158 cases with a history of poisoning. The following were the observations noted after analysis of the recorded data.

The present scenario of globalization, urbanization and industrialization is creating lot of stress on individuals in particular as well as on the society in common. Persons who are not able to sustain these stressful situations are the major victims of either suicidal or accidental poisonings

Males outnumbered the females and majority were in the age group of 21-30 yrs (41.30%). This particular age group is the most active phase of life for men who are involved mentally, physically and socially. They are exposed to day to day stresses of life than females. This observation is consistent with previous studies ³⁻⁸.

The commonest poison observed was the Organophosphorus compounds and least encountered was the scorpion bite. This is consistent with the observations made by earlier studies ⁹⁻¹¹. Suicide being the commonest manner of poisoning (71.74%) with agricultural farmers being the major victims (66.45%) residing in rural setup (64.55%) belonging to lower socio economic strata (72.78%). These observations are similar to the other earlier workers ¹²⁻¹⁴. This is possibly due to illiteracy and poverty of the agricultural farmers

residing in rural parts. They solely depend on the agricultural income for their living. Due to some reason (i.e. either lack of water or flood) if they are not able to generate the required income for their day to day living and commitments, they may get frustrated and resort to suicide by these agricultural insecticides, pesticides or weed killers which are available in their backyard.

Even though the government and other agencies are trying their best to prevent these unfortunate events by various projects and programmes, but still the trend continues. Knowing the pattern of poisoning in an area, not only helps in early management of poisoning cases but also suggests taking earliest preventive measures¹⁵.

CONCLUSION

The study identified the most vulnerable stratum of the society against poisoning, and also the most common causes of poisoning observed.

The study clearly highlights the pattern of poisoning in Bidar (Karnataka) area, showing that the males of 21-30 yrs age group are the major victims. It also points towards the commonest poison used i.e. Organophosphorous compounds to commit suicide by agricultural farmers of rural area belonging to lower socio-economic strata.

The incidence, trends of poisoning, the morbidity & mortality due to poisoning can be possibly curtailed by following means:

The more stringent legislation and enforcement regarding the sale and distribution of the toxic substance is needed and substitution of the pesticide with safer agents is necessary.

By creating awareness about first aid measures and proper medical care at the earliest that can prove life-saving, instead of the common practice of visiting local quacks.

Good treatment facilities (i.e. antidotes etc) at rural areas like P H C's & P H U's.

Establishing Poison Information Centers.

Apart from medical efforts, social efforts on the part of Government, NGOs and other social groups through sincere work at many levels like boosting the economy, poverty, eradication, irrigation schemes, agriculture and markets is the need of the hour.

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

1. Zhou L et al. Poisoning deaths in Central China (Hubei): A 10-year retrospective study of forensic autopsy cases; J. Forensic Sci. 2011;56(1):234-237.
2. Sharma B R, Harish Dasari, Sharma, Vivek Vij Krishnan. Poisoning in Northern India, changing trends, causes and prevention thereof. Med.Sci. Law. 2002; 42(3), 251-255.
3. Escoffery T Carlos, Shirley E Suzane. Fatal poisoning in Jamaica. A Coroner's autopsy study from the University hospital of West Indies; 2004; 44(2), 116 – 120.
4. Peterson H, Brosstad F. Pattern of acute drug poisoning in Oslo. Acta-Med-Scand. 1977; 201 (3), 233-37.
5. Dalal, Poisoning trends – a post mortem study. J.Ind.Acad.Forensic Med. 1998; 20(2); 27 -31.
6. Karlstedde Lakshman, Senanayake Nimal. Acute Organophosphorous insecticide poisoning in Sri Lanka. For.Sci.Int. 1988; 36, 97-100.
7. Jamil H. Organophosphorous insecticide poisoning. J.-Pak- Med.Asso. 1989; 39(2), 27-31
8. Dogra. Trends of pesticides consumption and poisoning in District of Faridabad. (Haryana) Med. Legal Update, 1996; 1(2), 32 -34.
9. Otto K R, Spate H F. Suicidal trends in Urban and Rural districts of Brandenburg, Psychiatr – Neurol – Med – Psychol, 1975; 27 (4); 239 – 46.
10. Kumar A, Vij K. Trends of poisoning in Chandigarh – A six year autopsy study. Journal of Forensic Medicine and Toxicology 2001; 18(1):8-11.
11. Gupta S. Kumar S and Sheikh M I. comparative study and changing trends of poisoning in year 2004-2005, at Surat, India: International Journal of Medical Toxicology & Legal Medicine: 2007;10(1).
12. Gargi J, Rai H, Chanana A, Rai G et al. Current trend of poisoning- a hospital profile: J Indian Med. Assoc. 2006;104(2):72-3.

13. Sharma B.R, et al. Poisoning in Northern India: Changing Trends, Causes and Preventions thereof. *Med Sci Law*. 2002; 42(3):251-257.
14. Kiran N, Shoba Rani R H, Jai Prakash V, Vanaja K, Pattern of Poisoning Reported at a South Indian Tertiary Care Hospital. *IJFMT*. 2008; 2(2): 17-19.
15. Aggarwal N.K, Aggarwal B.B.L, Trends of Poisoning in Delhi. *Journal Ind Acad For Med*. 1998; 20(2): 32-36.

The Effect of Lavender Scent on the Severity of Pain Caused by Bone Marrow Biopsy

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ABSTRACT

Introduction: Pain is the most frequent complaint in bone marrow biopsy. The aim of this study was to determine the effect of lavender scent on the severity of pain caused by bone marrow biopsy. **Materials and Method:** This clinical trial was performed on 80 patients attending Imam Khomeini Hospital in Tehran for bone marrow biopsy. Samples were selected using convenience sampling method and were assigned into an intervention and a control groups using random blocks of 4. A random sequence was generated using RAS software. Drops of distilled water were placed on cotton ball for the control group and drops of lavender essential oil were placed on cotton ball for the intervention group, then the intensity of pain was immediately assessed after biopsy sampling. The results were analyzed by SPSS software version 25 using covariance analysis and ranking regression for the scores and levels of pain variables, respectively. **Results:** The results showed that, the mean scores of pain in the control and intervention groups were 6.9 ± 1.37 and 4.1 ± 1.24 , respectively. There was a significant difference in pain scores between the two groups ($P < 0.05$). Also, the results showed that, by adjusting the variables such as age, gender, physician experience, biopsy history and biopsy location, a significant difference occurred in pain scores between the intervention and control groups ($P < 0.05$). The adjusted pain score (-1.3) in the intervention group was less than the control group.

Conclusion: The results of present study showed that, patients undergoing bone marrow biopsy report a moderate to severe levels of pain during biopsy, and smelling the lavender scent is effective in reducing the pain they experience.

Keywords: Pain, Lavender scent, Bone marrow biopsy and aspiration.

INTRODUCTION

Pain is a common complaint in cancer, and medical procedures significantly contribute to the pain that cancer patients endure.¹ Bone marrow biopsy and aspiration is an invasive method that is routinely performed by hematologists and oncologists to diagnose blood disorders and tumors.² Nearly 15,000 people worldwide undergo bone marrow biopsy every year.³ Among the

limitation of this procedure is a discomfort experienced by patients.⁴ Pain is the most frequent complaint in these patients, which in recent studies has been reported by 1.3% of patients as moderate to severe pain.² The pain experienced during and after the procedure creates fear and anxiety, and discourages patients to continue with the biopsy. In an attempt to relieve the pain and discomfort caused by this procedure, some healthcare providers choose a sedation method, but the sedation itself will expose the patient to many physical risks and increases the workload of service providers as it requires monitoring during and after the procedure.⁴ Even if sedation and analgesia are well tolerated and effective, they are not able to relieve the pain completely.¹

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Despite progress in medical sciences, there are not many studies regarding the pain caused by bone marrow biopsy.⁵ Information on the prevalence, predictor factors, and pain prevention associated with this procedure is also limited^{5,6} and there is no official guideline to help reduce the pain experienced by patients undergoing such procedures.^{2,5,7} There are however two pharmacological and non-pharmacological methods to relieve the pain associated with bone marrow biopsy and aspiration.⁵ Today, the use of non-pharmacological methods for controlling pain is being evermore considered and is advancing.⁸ Aromatherapy is one of the effective non-pharmacological methods of pain relief.⁹

Aromatherapy is simple, fast and non-invasive, and can be used in independent nursing interventions. Efforts to demonstrate the important effects of aromatherapy as a comprehensive intervention and tranquilizer mediator have been actively pursued in nursing profession.¹⁰ Aromatherapy among nurses is the second most commonly used method of complementary medicine,¹¹ and is the second most commonly used complementary therapy in the clinical practice to reduce pain.¹² Among the different plants, lavender has been the main choice of the researchers for aromatherapy.⁹

Lavender is the most used pure essential oil¹³ and is the most important essential oil for the relief of pain and relaxation.¹⁴ Lavender has a long history of drug use,¹⁵ as it has analgesic effects.¹⁶ The lavender plant, due to linalyl acetate that it contains, has an analgesic effect and its flowers and leaves are used for pain relieve.⁹

Since the pain caused by the procedure is considered a restriction, patients are reluctant to continue with their biopsy, and also as the relief of pain are the basis of nursing care and the analgesic effects of lavender are well known, this study was conducted to examine the effect of lavender scent on the severity of pain caused by bone marrow biopsy.

MATERIALS AND METHOD

This research was a clinical trial with the code: 2016121431417 N1, which was performed on 80 patients attending Imam Khomeini Hospital in Tehran In 2018 to have bone marrow biopsy. The samples were divided into two groups of intervention and control (N=40). The research samples were selected by convenience sampling method and then assigned into an

intervention and a control groups using random blocks of 4 after giving their written consent and being informed about the research objectives. A random sequence was generated using RAS software.

Entry requirements included; being 18 years old or above, being aware of time, place and people during data collection, lack of allergy to lavender fragrance, lack of alcohol and drug abuse, having ability to smell, having at least reading and writing ability, having no history of mental illness, and not suffering from moderate or severe pain. Exclusion criteria included; having a severe cold, use of analgesic drugs up to 8 hours before biopsy, unwilling to continue with the study, and death of the patient.

Data collection tool consisted of a demographic questionnaire and visual pain scale. The demographic questionnaire included variables such as age, gender, level of education, marital status, occupation, diagnosis, frequency of biopsy (first or next time), and experience of physician. The visual pain scale, for measuring the intensity of pain, was a horizontal line that had been numbered from 0 to 10. Using this scale, the researcher could measure the severity of pain based on the comments of the samples. After determining the amount of pain felt by each sample, the pain scores were divided into 5 levels, including (0) no pain, (1-3) mild pain, (4-6) moderate pain, (7-9) severe pain, and (10) the most severe pain ever.

Patients in the control group, before bone marrow biopsy, smelled 3 drops of distilled water on a cotton ball placed in a container in a package from a distance of 7-10 cm for 15 minutes, and immediately after the biopsy, pain intensity of the patient was evaluated using visual pain scale. In the intervention group, 3 drops of 10% lavender essential oil were placed on a cotton ball and was placed inside a canister 15 minutes before the biopsy, and then the patients were asked to open the lid of the container and from 7-10 centimeter distance smell normally for 15 minutes. Then, the severity of pain was measured immediately after the procedure. Later on, the results were compared with each other.

Data were summarized and reported for qualitative variables with frequency and percentage and for quantitative variables with mean and standard deviation (SD). Normality of the quantitative variables was assessed by K-S test. To compare demographic and

baseline variables, as well as scores and levels of pain, Chi-square and independent t-test were used for qualitative and quantitative variables. Covariance analysis was used to assess the effect of intervention and to moderate the potential confounders. Regression analysis was used for scores and levels of pain variables, respectively. Data analysis was done using SPSS software version 25 at a significant level of 0.05.

RESULTS

The results of study showed that, 67.5% of the patients in the control and intervention groups were between 30-50 years old and there was no significant difference between the two groups in term of age ($P >$

0.05), (Table 1). The results of the study also showed that, the mean score of pain in the control and intervention groups was 6.9 ± 1.37 and 4.1 ± 1.24 , respectively and there was a significant difference between the pain scores of the two groups ($P < 0.05$). The pain score (-2.8) in the intervention group was lower than the control group (Table 2).

The results showed a significant difference between the pain scores in the two groups ($P < 0.05$) when the variables of age, gender, physician experience, biopsy history and location of biopsy were adjusted. The adjusted pain score (-1.3) in the intervention group was lower than the control group (Table 3). No side effects of lavender smelling were reported.

Table 1: Demographic characteristics

Comparison		Control group Number (percentage)	Control group Number (percentage)	P-Value
Age (mean $\pm$ standard deviation)		43 $\pm$ 10.01	40 $\pm$ 10.26	0.396
Sex	Man	19(47.5)	22(55.0)	0.655
	Woman	21(52.5)	18(45.0)	
Marital status	Married	36(90.0)	34(85.0)	0.737
	Single	4(10.0)	6(15.0)	
Occupation	Unemployed	20(50.0)	18(45.0)	0.344
	Laborer	0	1(2.5)	
	Office worker	10(25.0)	13(32.5)	
	Self-employed	7(17.5)	8(20)	
	Retired	3(7.5)	0	
Education	Under diploma	9(22.5)	9(22.5)	0.408
	Diploma	23(57.5)	18(45)	
	University education	8(20.0)	13(32.5)	
Diagnosis	Leukemia	24(60.0)	18(45.0)	0.478
	Lymphoma	8(20.0)	6(15.0)	
	Osteosarcoma	2(5.0)	6(15.0)	
	Other	6(15.0)	10(25.0)	
Medical history (year)	0-5	32(80.0)	37(92.5)	0.193
	5-10	8(20.0)	3(7.5)	
History of bone marrow biopsy	None	27(67.5)	32(80.0)	0.360
	Second time	10(25.0)	7(17.5)	
	Several times	3(7.5)	1(2.5)	
Location of bone marrow biopsy	Iliac crest	40(100)	40(100)	0.057

Table 2: The mean score of pain caused by bone marrow biopsy in the control and intervention groups

Comparison	Control group Mean $\pm$ standard deviation	Control group Mean $\pm$ standard deviation	Independent t-test
Pain score	6.9 $\pm$ 1.37	4.1 $\pm$ 1.24	P<0.05

Table 3: Comparison of pain score in the two groups by adjusting the confounding variables based on covariance analysis

Variable	SS	Df	MS	F	P-Value
Age	13.827	1	13.827	12.942	0.001
Gender	3.949	1	3.949	3.696	0.058
Physician experience	16.108	1	16.108	15.077	0.000
History of biopsy	4.026	1	4.026	3.376	0.056
Location of biopsy	0.219	1	0.219	0.205	0.652
Group	170.137	1	170.137	159.243	0.000
Error	77.994	73	1.068		

DISCUSSION

The results of study showed that, the control group experienced moderate to severe levels of pain during bone marrow biopsy. In a study by Liden et al, 70% of patients reported moderate to unimaginable levels of pain during the bone marrow biopsy, and one third of them had experienced a severe pain.¹⁷ In the Portnow study of cancer patients undergoing invasive procedures, 40% of the patients reported moderate to severe levels of pain during bone marrow biopsy.¹⁸

The results of present study showed a significant difference between the pain scores of the intervention and control groups (P <0.05).

In the study of Huang in 2014 entitled; “the beneficial effect of lavender scent on pain relief after arthroscopy” patients were divided into two groups, and 28 patients in the intervention group received a necklace bottle containing 0.5 ml of 2% lavender oil and 32 patients in the control group wore an empty necklace bottle. The 2% lavender oil effectively decreased the severity of pain in long-term (72 hours), and a significant difference in pain level was observed between the two groups. No significant difference in both groups was observed in 15 minutes and 4, 8, 24, and 48 hours. However, the decrease trend in pain score at 72 hours in

the intervention group was more than the control group. The pain score in the intervention group decreased from 6.9 to 1.8, while in the control group it decreased from 6.4 to 3.5.¹⁹

The results of Olupur’s study showed that, pain after cesarean section decreased significantly in 4, 8 and 12 hours after the onset of symptoms following smelling of lavender essential oil compared to placebo group.²⁰

The Gorgi’s study showed that, lavender is effective on the severity of pain caused by coronary artery bypass graft.²¹ A study by Hadi et al, on post-cesarean section pain showed that, the mean score of pain after lavender inhalation decreased significantly.²² In another study by Mir-Mohammad Ailiei et al, the results showed that inhalation of lavender scent was effective on the pain caused by IUD insertion.⁹ Study of Kim et al, on the effect of lavender on the severity of venipuncture pain found that, the stress level, tolerance index for sedation monitoring, and the severity of pain associated with needle insertion in a group that was using oxygen mixed with lavender for 5 minutes significantly decreased compared to the control group that was only receiving pure oxygen.²³ Study of Saeki et al showed that, aromatherapy with lavender was not effective in reducing pain,²⁴ which is not consistent with the results of present study.

CONCLUSION

The results of present study indicated that, smelling lavender scent is effective in reducing the pain associated with bone marrow biopsy. Therefore, considering the effects and benefits of lavender and its easy application, it is recommended to be used in the hematology and non-hematology clinics to reduce the pain caused by bone marrow biopsy. It is also suggested that, more studies should be conducted on how and when the lavender should be used to reduce the pain associated with bone marrow biopsy.

Among the limitations of this research was the previous experiences and patients' mental status during bone marrow biopsy, which was affecting the severity of pain.

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Ethical Clearance : This study has an ethical code number(IR.TUMS.FNM.REC.1395.780) Which is taken from the Ethics Committee of Tehran University of Medical Sciences.

REFERENCES

1. Lechtzin N, Busse AM, Smith MT, Grossman S, Nesbit S, Diette GB. A Randomized Trial of Nature Scenery and Sounds Versus Urban Scenery and Sounds to Reduce Pain in Adults Undergoing Bone Marrow Aspirate and Biopsy. *The Journal of Alternative and Complementary Medicine*. 2010;16(9):965-72.
2. Degen C, Christen S, Rovo A, Gratwohl A. Bone marrow examination: a prospective survey on factors associated with pain. *Annals of Hematology*. 2010;89(6):619-24.
3. Azizi-Fini I, Adib-Hajbaghery M, Salahshoorian-Fard A, Khachian A. The effect of health-promotion strategies education on self-care self-efficacy in patients with bone marrow transplantation. *Iranian Journal of Critical Care Nursing*. 2011;4(3):109-16.
4. Miller LJ, Philbeck TE, Montez DF, Puga TA, Brodie KE, Cohen SC, et al. Powered bone marrow biopsy procedures produce larger core specimens, with less pain, in less time than with standard manual devices. *Hematology Reports*. 2011;3:e8:22-5.
5. Hjortholm N, Jaddini E, Halaburda K, Snarski E. Strategies of pain reduction during the bone marrow biopsy. *Ann Hematol*. 2013;93:145-49.
6. Vanhelleputte P, Nijs K, Delforge M, Evers G, Vanderschueren S. Pain During Bone Marrow Aspiration: Prevalence and Prevention. *Journal of Pain and Symptom Management*. 2003;26(3):860-66.
7. Faizan-Zahid M. Methods of reducing pain during bone marrow biopsy: a narrative review. *Ann Palliat Med*. 2015;4(4):184-93.
8. Asgari MR, Motlagh NH, Soleimani M, Ghorbani R. The comparison of effect of Transcutaneous Electrical Nerve Stimulation (TENS) and lidocaine spray on pain intensity during insertion of vascular needles in hemodialysis patients. *Iranian Journal of Critical Care Nursing*. 2012;5(3):117-24. (persian).
9. MirmohamadAliei M, Khazaie F, Rahnema P, Rahimikian F, Modarres M, Bekhradi R, et al. Effect of Lavender on Pain during Insertion of Intrauterine Device: A Clinical Trial. *J Babol Univ Med Sci*. 2013;15(4):93-9. (Persian).
10. Cho M-Y, Min ES, Hur M-H, Lee MS. Effects of Aromatherapy on the Anxiety, Vital Signs, and Sleep Quality of Percutaneous Coronary Intervention Patients in Intensive Care Units. *Evidence-Based Complementary and Alternative Medicine*. 2012;2013(381381)((381381)):1-6.
11. Ghods AA, Hoseini-Abforosh N, Ghorbani R, Asgari MR. Effect of lavender inhalation on pain intensity during insertion of vascular needles in hemodialysis patients. *J Babol Univ Med Sci*. 2014;16(10):7-14. (persian).
12. Heidari-Gorji MA, Ashrastaghi OG, Habibi V, Yazdani-Charati J, Ebrahimzadeh MA, Ayasi M. The effectiveness of lavender essence on sternotomy related pain intensity after coronary artery bypass grafting. *Adv Biomed Res*. 2015;4(127):1-10.
13. Damian P, Damian K. Aromatherapy: Scent and Psyche: Using Essential Oils for Physical and emotional well-being. U.S.A. 1995.

14. Enteen S. Essential Oils for Pain Relief. *Massage Today*. 2005;5:2(2):1-4.
15. Koulivand PH, Ghadiri MK, Gorji A. Lavender and the Nervous System. *Evidence-Based Complementary and Alternative Medicine*. 2013;2013(681304):1-10.
16. Schiller C, Schiller D. *The Aromatherapy Encyclopedia: A Concise Guide to Over 385 Plant Oils*. U.S.A.2008.
17. Lidén Y, Landgren O, Arnér S, Sjölund K, Johansson E. Procedure-related pain among adult patients with hematologic malignancies. *Acta Anaesthesiol Scand*. 2009;53(3):354-63.
18. Portnow J, Lim C, Grossman SA. Assessment of pain caused by invasive procedures in cancer patients. *J Natl Compr Canc Netw*. 2003;1:435-39.
19. Huang S-H, Fang L, Fang S-H. The Effectiveness of Aromatherapy with Lavender Essential Oil in Relieving Post Arthroscopy Pain. *JMED Research*. 2014;2014(2014):1-9.
20. Olapour A, Behaeen K, Akhondzadeh R, Soltani F, Razavi FAS, Bekhradi R. The Effect of Inhalation of Aromatherapy Blend containing Lavender Essential Oil on Cesarean Postoperative Pain. *Anesth Pain*. 2013;3:1(1):203-7.
21. Heidari-Gorji MA, Ashrastaghi OG, Habibi V, Yazdani J, Ebrahimzadeh ME, Ayasi M. The effectiveness of lavender essence on sternotomy related pain intensity after coronary artery bypass grafting. *Advanced Biomedical Research*. 2015;4(127):1-10.
22. Hadi N, Hanid AA. Lavender Essence for Post-Cesarean Pain. *Pakistan Journal of Biological Sciences*. 2011;14(11):664-67.
23. Kim S, Kim HJ, Yeo JS, Hong SJ, Lee JM, Jeon Y. The effect of lavender oil on stress, bispectral index values, and needle insertion pain in volunteers. *J Altern Complement Med*. 2011;17(9):823-6.
24. Saeki Y, Tanaka YL. Effect of inhaling fragrances on relieving pricking pain. *Int J Aromather* 2005;12(2):74-80.

Clinical and Paraclinical Signs and Symptoms of Patients with Ingested Processed Cannabis (Majoon Birjandi) in the Eastern Iran

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ABSTRACT

Background: The pattern of drug abuse varies in different parts of the world. Youngsters in the east of Iran abuse processed cannabis which is an ingredient of a traditional pie called Majoon Birjandi(MB). The aim of this study was to evaluate the clinical and paraclinical signs and symptoms in patients poisoned with MB.

Method: We designed a cross-sectional descriptive study using a standardized questionnaire administered to all cases with MB poisoning who was admitted to the toxicology Emergency department of the Vali-Asr hospital in Birjand, Iran from March 2010 - 2012. Demographic, medical, psychiatric and electrocardiographic indices, vital signs on admission were studied.

Results: The study included 69 patients aged 23.5 years in average, 64 of whom were men and five women. Patients had consumed a mean of 1.36 (0.8, 0.5-5) pie. All patients were positive to tetrahydrocannabinol (THC) by urinary immunoassay. Common Symptoms reported according to frequency were sore throat (94.2%) followed by dry mouth (91.3%), flashing (81.2%), panic (75.4%), conjunctivitis (69.6%), vertigo (65.2%), agitation (56.5%). Most patients had mydriasis.

Conclusion: It appears that the major ingredient of MB is cannabis. In comparison to the literatures related to smoking cannabis, clinical manifestation of ingesting MB appears later and last longer.

Keywords: Majoon Birjandi, Cannabis, Overdose, Poisoning

INTRODUCTION

Substance and illicit drug abuse is a major health problem in Iran ^{1,2}. Based on international reports, Iran

has the highest rate of raw opium use in the world which can be related to cultural medicinal use of opioids as well as or neighboring Afghanistan, which is the major productive country producing opioids in the world ^{3,4}. Cannabis has long been used in this country by a less frequency.

The pattern of drug abuse varies in different parts of the world. In this country, adulteration of the street drugs is widespread and the most common adulterants include lead, corticosteroids, and thallium⁵⁻⁷. We recently reported recreational use and overdose of ingested processed cannabis (Majoon Birjandi) in the

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eastern Iran ⁸, but there is no study evaluated clinical and paraclinical signs and symptoms of the patients with MB overdose in the literature.

In east of Iran, a special traditional solid pie consisting of the processed cannabis exists and is locally called Majoon Birjandi (MB). It is frequently abused by youngsters to induce euphoria. We previously showed that Urinary delta-q-tetra-hydrocannabinol (THC) and Urinary immunoassay test for cannabis is positive in these cases ⁸.

Cannaboid is one of the main ingredients of this illicit solid lozenge. Other ingredients and adulterants of this cocktail include saffron, date, cardamom, coconut, ginger, pistachio, and sugar. Because of its solid nature, it is easily smuggled and stored for a long time.

In recent years, orally administered cannabis extract has been medically used to increase appetite and treat cancer-related anorexia ^{9, 10}. While smoking cannabis-induced side effects and overdoses are widely reported ¹¹, very limited information is available in regard to illicit oral cannabis. Clinical findings, efficacy and bioavailability of the medication varies when ingested. Overdose or drug-induced side effects of ingested cannabis can provide valuable information in regard to cannabis ingestion.

This study aimed at evaluate the clinical and paraclinical signs and symptoms of the patients with MB overdose who referred to Imam Reza Hospital which is the referral hospital of poisoning in the east of Iran. This is the first study in this regard in the literature.

METHOD

We designed a cross-sectional descriptive study using a standardized questionnaire filled out for all cases with MB poisoning who were admitted to the toxicology emergency department of the Vali-Asr hospital in Birjand, Iran from March 2010 to March 2012. Urinary immunoassay test for marijuana, methadone, tramadol, morphine, amphetamine, methamphetamine, benzodiazepine, tricyclic antidepressant, phenothiazine were performed for admitted cases, and those who had positive for other toxicant except marijuana were excluded from study. Moreover, those who had ingested other toxicants, had unreliable history of MB overdose, and would not like to be interviewed were excluded. This study was approved by the ethics committee

of the faculty of medicine. Variables including demographic characteristics, neurological, psychiatric, gastrointestinal, ophthalmological, and cardiovascular signs and symptoms, electrocardiographic indices, vital signs on admission, time elapsed between ingestion and hospital presentation, and the treatment performed were recorded and studied. The data was analyzed using Statistical Package for the Social Sciences (SPSS Inc. Chicago, IL, USA) version 22. chi-square and t-test were used for analysis of variables. P-values <0.05 were considered to be significant.

RESULTS

Socio-demographic

A total of 69 patients were included. They were mainly men (92.6%) with a mean (SD, min-max) age of 23.5 (6.64,14-60) years. 67.6 percent of patients were single. Almost half of cases (46.4%) had an education level of diploma. Worker were the most frequent job in our cases (34.8% of cases were workers).

The drug was mostly abused in the afternoons and evenings (19.35 (2.47,14-23:30). Elapsed time between ingestion and hospital presentation was 3.29 hours (1.23,0-6) hours with a mean hospitalization period of 2.88 (3.04, 0-22) hours. Patients consumed 1.36 (0.8, 0.5-5) pie in average. 27.5 percent of the patients reported previous use.

CLINICAL FINDINGS

General

The most common reported symptoms were sore throat (94.2%) followed by dry mouth (91.3%). Flashing (81.2%), muscular pain (21.7%) and sweating (14.5%) were of the other signs and symptoms. Mean Blood sugar was 114.75 (36.52, 56-273)mg/dL.

Neurologic and psychiatric

Panic (75.4%), vertigo (65.2%), agitation (56.5%), feeling freezing time (56.5%), delirium (40.6%), auditory hallucination (37.7%), talkativeness (43.5%), relaxation (20.3%), visual hallucination (33.2%), and dermal hallucination (39.1%) were of the most common neurological signs and symptoms.

Gastrointestinal

Increased appetite (51.2%), abdominal

fullness(35%), nausea (4.3%), and vomiting (27.5%) were most common.

Cardiovascular and pulmonary

Mean pulse rate of 97.75 (18.90,64-169) bpm, respiratory rate of 19.36 (8.13,13-80), sitting systolic blood pressure of 11.12 (1.60, 6-17) mmHg, sitting diastolic blood pressure of 6.99 (0.99,5-11), sleeping systolic blood pressure of 11.20 (1.52, 9-16) mmHg, and sleeping diastolic blood pressure of 6.89 (0.85,6-10) were detected. There is no statistically differences between sleeping and sitting of systolic and diastolic blood pressure.

Ophthalmology

Conjunctivitis (69.6%) and blurred vision (55.1%) were mostly detected. Most cases had mydriasis (67.2%), while midsize pupil and miosis were found in 27.9% and 4.9% of the cases, respectively.

Electrocardiographic indices

Mean PR interval was 146.28 (28.49,13-200) msec, mean QRS duration was 96.52 (37.65, 64-283) msec and mean QTc was 424.15 (46.14,340-628) msec. Axis 66.70 (28.27, 7-141) msec.

24.1% of patients had QRS greater than 100 msec. QT interval of just one patient (1.9%) was greater than 450 msec.

Treatment

Charcoal was given to 84.1% of the cases. Other treatments included fluid therapy (56.5%), gastric lavage (15.9%), oxygen therapy (7.2%), intramuscular diazepam (4.3%), and metoclopramide (2.9%). Most of the patients (92.3 %) were discharged from the emergency department around 5 hours and only 3 patients were admitted to the poisoning ward. Using Pearson correlation revealed that there was no significant difference between the amount of ingested MB and duration of hospitalization (p -value = 0.126) as well as Elapse time (p -value = 0.893) was observed. Comparison of clinical findings in patients with prior use of MB and those who didn't have history of MB use didn't show any significant difference (p -value>0.05).

DISCUSSION

Abuse of the cannabinoids has been popular for

millenniums. Although marijuana is the most commonly abused agent after smoking cigarettes and alcohol¹², it is not reported to be common in Iran. In recent reports, cannabis was the most commonly abused drug in students^{13,14}, a fact that is on the rise¹⁵.

Smoking is the most common method of cannabis abuse. Ingestion has rarely been reported¹⁶. Generally, 2.5 mg of THC in a marijuana cigarette is enough to induce mental and physical effects in a normal person¹⁶. When ingested, the cannabinoid levels are almost 25 to 30 percent less than that compared with the smoking method and the onset of its action may be delayed by 0.5 to 2 hours¹⁷. In addition, the duration of effect may be prolonged¹⁶.

Cannabinoids are also used for medicinal purposes¹⁶. Marinol® is one of the available cannabinoid tablets. To date very limited data is available about its toxicity in the literature¹⁸. Similarly, data on recreational oral use of cannabinoids is scarce.

In eastern Iran, a special traditional solid pie, locally called Majoon Birjandi (MB) is frequently abused. Most of the euphoric effects induced by it are related to the cannabinoid ingredient. Potential saffron euphoric effects may be ignored due to its very low concentration. MB is traditionally produced mainly in the South Khorasan province especially in the Birjand and Khoosf city. It is also transferred to other parts of Iran including Khorasan Razavi province and Mashhad city. Majority of the moderate to severe intoxicated patients are referred to the hospitals.

In acute intoxication with MB, dryness of the airway mucosa and mouth, flushing of the face, panic attack, congestion of the conjunctiva, weakness, dyspnea, hallucination (especially tactile), mydriasis, abdominal fullness, and nausea and vomiting are the major signs and symptoms.

Psychiatric findings include anxiety^{17,19}, dysphoria, euphoria, and paranoid and psychotic thoughts^{17,19}. Tachycardia¹⁷, dry mouth^{17,19}, gait disorders, memory loss, disorders of concentration, and visual and hearing loss¹⁵ may also be present. Most of the THC effects are dose-related¹⁹.

Signs and symptoms similar to the oral ingestion of cannabis can be seen in body packers who have ingested cannabis-containing packs. Centers for

Disease Control and Prevention (CDC) in year of 2009 reported Inadvertent marijuana ingestion in a group of 6 preschool teachers ²⁰. The constellation of symptoms described in this reports are as below:

1. Neurological: drowsiness ,fatigue ,ataxia ,dizziness ,Weakness, Dizziness, Unbalanced/Ataxia, Headache, Agitation, Anxiety, Giddiness, Altered mood, Numbness, Tingling, Muscle twitching, Chills.

2. Gastrointestinal symptoms: Altered taste, Increased appetite, Dry mouth/throat, Mouth irritation, Nausea, Vomiting.

3. Cardiopulmonary: Shortness of breath, Palpitations.

4. Integumentary: Excess sweating, Itching, Burning eyes, Itching eyes

Since almost 25% to 30% of the smoked THC is absorbed, signs and symptoms of equal amount of ingestion overdoses should be less severe than the toxicity induced by its smoking. The general belief of the people that the cannabioids are harmless ¹⁶ is incorrect ¹⁵.

In these patients, delirium, becoming talkative, auditory, tactile and visual hallucinations, increased appetite, fear sensation and dry mouth have been reported which are similar to the signs and symptoms of the cases intoxicated by smoking cannabis. However, there were some signs and symptoms in our patients which had not previously been reported in smoking cannabis toxicity including sweating, abdominal fullness, dizziness, diplopia, muscular pain, and hypo and hyperglycemia. Although dizziness and sweating are seen in a case series of accidentally cannabis ingestion It, therefore, seems that the signs and symptoms in these patients are not exactly compatible with cannabis overdose. These effects may be related to other ingredient of MB including saffron. It seems that ingestion of cannabioids may generate symptoms later and last longer in comparison to smoking methods.

Limitation: Electrolytes were not checked for majority of cases as they were stayed in hospital for a short period and not admitted.

Conflict of Interest: None to be declared.

Ethical Clearance: This study was approved by

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REFERENCES

1. Mehrpour O, Sezavar SV. Diagnostic imaging in body packers. *Mayo Clin Proc.* 2012 Jul;87(7):e53-4. doi: 10.1016/j.mayocp.2012.03.014.
2. Karrari P, Mehrpour O, Balali-Mood M. Iranian crystal: a misunderstanding of the crystal-meth. *Journal of Research in Medical Sciences.* 2012;17(2).
3. Goudarzi F, Mehrpour O, Eizadi-Mood N. A study to evaluate factors associated with seizure in tramadol poisoning in Iran. *Indian J Forensic Med Toxicol.* 2011;5:66-9.
4. Alinejad S, Aaseth J, Abdollahi M, Hassanian-Moghaddam H, Mehrpour O. Clinical Aspects of Opium Adulterated with Lead in Iran: A Review. *Basic Clin Pharmacol Toxicol.* 2018 Jan;122(1):56-64.
5. Ghaderi A, Vahdati-Mashhadian N, Oghabian Z, Moradi V, Afshari R, Mehrpour O. Thallium exists in opioid poisoned patients. *Daru.* 2015 Aug 1;23:39.
6. Hayatbakhsh MM, Oghabian Z, Conlon E, Nakhaee S, Amirabadizadeh AR, Zahedi MJ, Darvish Moghadam S, Ahmadi B, Soroush S, Aaseth J, Mehrpour O. Lead poisoning among opium users in Iran: an emerging health hazard. *Subst Abuse Treat Prev Policy.* 2017 Oct 5;12(1):43.
7. Koushesh H, Afshari R, Afshari R. A new illicit opioid dependence outbreak, evidence for a combination of opioids and steroids. *Drug and chemical toxicology.* 2009;32(2):114-9.
8. Mehrpour O, Karrari P, Afshari R. Recreational use and overdose of ingested processed cannabis (Majoon Birjandi) in the eastern Iran. *Human & experimental toxicology.* 2012;31(11):1188-9.
9. Riggs PK, Vaida F, Rossi SS, Sorkin LS, Gouaux B, Grant I, et al. A pilot study of the effects of cannabis on appetite hormones in HIV-infected adult men. *Brain research.* 2012;1431:46-52.
10. Strasser F, Luftner D, Possinger K, Ernst G,

- Ruhstaller T, Meissner W, et al. Comparison of orally administered cannabis extract and delta-9-tetrahydrocannabinol in treating patients with cancer-related anorexia-cachexia syndrome: a multicenter, phase III, randomized, double-blind, placebo-controlled clinical trial from the Cannabis-In-Cachexia-Study-Group. *Journal of Clinical Oncology*. 2006;24(21):3394-400.
11. Theunissen EL, Kauert GF, Toennes SW, Moeller MR, Sambeth A, Blanchard MM, et al. Neurophysiological functioning of occasional and heavy cannabis users during THC intoxication. *Psychopharmacology*. 2012;220(2):341-50.
12. Vlahov D, Galea S, Ahern J, Resnick H, Boscarino JA, Gold J, et al. Consumption of cigarettes, alcohol, and marijuana among New York City residents six months after the September 11 terrorist attacks. *The American journal of drug and alcohol abuse*. 2004;30(2):385-407.
13. Ahmadi J, Yazdanfar F. Current substance abuse among Iranian university students. *Addictive Disorders & Their Treatment*. 2002;1(2):61-4.
14. Ghanizadeh A. Shiraz University students' attitude towards drugs: an exploratory study. 2001.
15. Meimandi MS, Nakhaee N, Divsalar K, Dabiri S. Estimating the prevalence of cannabinoid use urine testing: a preliminary study in Kerman, Iran. *Addictive behaviors*. 2005;30(7):1464-7.
16. Ashton CH. Adverse effects of cannabis and cannabinoids. *British Journal of anaesthesia*. 1999;83(4):637-49.
17. Cho C, Hirsch R, Johnstone S. General and oral health implications of cannabis use. *Australian Dental Journal*. 2005;50(2):70-4.
18. ElSohly MA dH, Wachtel SR, Feng S, Murphy TP. Delta9-tetrahydrocannabivarin as a marker for the ingestion of marijuana versus Marinol: results of a clinical study. *J Anal Toxicol*. 2001.
19. Kalant H. Adverse effects of cannabis on health: an update of the literature since 1996. *Progress in neuro-psychopharmacology and biological psychiatry*. 2004;28(5):849-63.
20. Control CfD, Prevention. Inadvertent ingestion of marijuana-Los Angeles, California, 2009. *MMWR: Morbidity and mortality weekly report*. 2009;58(34):947-50.

Problems of Autistic Children- A Systematic Review

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ABSTRACT

Autism is the social interaction of abnormal, delayed and abnormal communication skills and limitation of the complex of activities and interests of the individual. Due to the nature of the disorder, the children are always facing significant challenges in their lives. This study aimed at systematically reviewing the studies that examined the problems of autistic children, in view of their identification and comparison. All studies performed during 2010-2018 using autism, autistic children, autism disorders, childhood autism problems of country and abroad databases including Magiran, SID, Medlib, CINHALL, PubMed, Scopus, web of science. Data were analyzed using meta-analysis. Autism covers a wide range of disorders. Disorders and problems associated with autism children are classified into nine areas: Physiological Path Disorders, Social Disorders, Disorders of Behavioral and Exercise Skills, Sensory-Motor Disorders, Disorders of Attention Deficit-Hyperactivity Disorders, Family-Related Disorders, Nutrition Disorders, Sleep Disorders and Disorders Oral and toothache. Autism children with many disorders and problems are encountered. Family-related problems in these children are very much welcomed by the researchers. More attention is being paid to identifying this after problems associated with family-based therapeutic interventions by the researcher.

Keywords: *Autism, Autism Children, Disorders*

INTRODUCTION

Pervasive developmental disorders are characterized by destruction in social interactions and doing imaginative activities, interpersonal verbal and nonverbal interpersonal skills, as well as limited interests and activities¹. These defects are revealed in the early years and affect the person's life during his lifetime. The recent report suggests that the prevalence of autism disorders is much higher than previously reported². According to studies The prevalence of autism and related disorders is twenty cases per 10,000 live births, with children between the ages of two and five years most likely to suffer from this disorder^{3,4}. The time and energy needed to treat a child with autism can seriously

threaten the resources of the family and society, so that in Asian countries, the cost of the treatment and care of these children is 70% of the salary of a government employee^{5,6}. In spite of the contradictory results of some studies, many of the Iranian society still do not have a proper attitude and knowledge about the disease, which may be the main cause of the new and unknown status of many aspects of autism, and in particular the identification of the problems of children with it^{7,8}. Therefore, as a first step in designing intervention and planning in order to reduce these problems, it is first necessary to explain the existing problems and then, by solving these problems, planners and members of the care system will be able to address the child and the family in this complex disorder and facilitate these problems help⁹. Nurses as an important group of care providers can play a significant role in identifying these problems in order to control and reduce them in these patients¹⁰. The aim of this study was to examine the system and to better understand these challenges. Available to help deeper thinking to develop effective

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interventions to reduce these problems.

MATERIALS AND METHOD

In this structured review, all studies conducted inside and outside the country during 2010-2018 using the keywords of autism, autistic children, autism disorders, autistic children's problems from the country's databases, including Magiran–Med-lib-SID-Iran-medex and Latin databases like CINHALL, PubMed-Scopus-web of science is investigated and the data are analyzed using the meta-analysis method (Random effects model) were investigated; And the data of the selected articles were collected. All articles were analyzed regardless of the location and location of the publication, and the manner in which the work was done. After reviewing and collecting all the articles being searched, the articles were duplicated and unrelated. Subsequent articles. The findings were evaluated based on the criteria for entering the study, which included: studies that examined or intervened the problems and disorders of children with autism that had been published in the years 2018-2010. Exclusion criteria also included data from case reports and posters, conferences and review articles. Finally, selected articles aimed at investigating the problems and disorders of children with autism were reviewed. All the ethical issues necessary for the correct use of the extracted articles and the standards for the publication of the work were observed.

FINDINGS

236 studies with autism disease content were collected. 191 did not study the problems with autism autism problems. Therefore, 43 studies according to the entry criteria were carefully examined to identify and prioritize problems in children with autism. The disorders that were included in the review of the studies by the investigators and interventions were classified into nine areas. The autism-related disorder, according to the number of studies that was done in the special field, was as follows: Pathophysiological disorders ³⁷, social skills disorders ¹⁰, behavioral and executive skills disorders ⁹, sensory-motor disorders ⁷, attention deficit hyperactivity disorder (6studies), disorders Family structure (4studies), nutritional disorders (3studies), sleep disorders (2studies), oral and dental disorders (2studies).

DISCUSSION

The most commonly diagnosed disorder was autism in the pathophysiology of the disease. The researchers identified several factors that predispose autism. Neurobiological, genetic, Regional cerebral blood flow, delivery, food allergies, and birth rearing rates were the most commonly studied in these studies. 10 studies aimed at analyzing the problems of social skills in children with autism. Interventions included communication skills training, intervention based on individual differences based on the expressed emotion, using responsive therapy, game therapy, animal communication, horse riding, music therapy, and therapeutic treatment. Data collection tools in these studies, children's social skills, intelligence tests, ASSQ, ATEC, ADI-R, Intelligence tests, Stanford Binet, Gilliam's test and social adjustment were analyzed. Analysis and analysis of data related to disorder The connection was sent in these tests, which is a profound difference Between autistic children and healthy children, social skills are more likely to be due to speech impairment, and the elimination of consonants, the transference of consonants, the inappropriate use of reliance on proper syllables, unusual words, the inappropriate use of grammatical timing, The lack of application or misuse of prepositions, the difficulty in adding names, the lack of use of compound sentences in children with autism and healthy. Interventions had a positive effect on the increase of social skills in these children ¹¹⁻²⁰. According to inferiority studies, the most important cognitive impairment that formed the basis of stereotypical behavior in children with autism. Interventions included environmental modification, neurofeedback therapy, occupational therapy, theater therapy, use of responsive training method, and the use of clinical teaching methods, the tools for collecting information were Gilliam, vanilla, adi-r, Wisconsin and Tower of London and at the level of the brain electroencephalogram. Interventions had a significant impact on the improvement of the behavioral-acoustic behavior of children ²⁹⁻²¹. A study on the study of sensory-motor disorders of children with autism. The results showed that children with autism have different patterns of sensory-motor processing. Certain interventions were performed by the researchers. Interventions included cognitive-motor exercises, exercises Sense of integration motor, frequency filter visual information and basic exercises gymnastics Bvdnd.mdakhlata made a great impact on particular sensory and motor skills were

³⁰⁻³⁶. A study of attention deficit hyperactivity disorder in children with autism has been studied. The results of these studies showed that hyperactivity and attention deficit disorders interfere with the learning process of seventy percent of the patients, and the most important barrier in the learning process, the disorder was reported in these studies. Another important problem for these children was the difficulty in identifying certain emotions, especially anger and fear. The data collection tool in these studies was a checklist for assessing autism, the World Health Organization's Quality of Life Scale, Conner and Davidson's Resilience Scale, self-report questionnaires on depression and anxiety, and quality of life in WHOQOL-BREF. The results of these studies are the frequency of high depression scores and showed anxiety in mothers of children with autism. Thus, 72.4% of mothers reported some degree of anxiety and half of them reported some degree of depression. Educational sessions are done individually and collectively for mothers. Results showed that after mothers' training and support interventions, they experienced less stress⁴³⁻⁴⁴. Interventions the prescribing and use of omega-3 fatty acids, zinc, iron, and vitamin B supplements was effective. Results showed that the use of supplements has beneficial effects in reducing otitis behaviors⁴⁵⁻⁴⁷. Findings showed that 55.4% of children had a problem with sleep latency and 51.8% had anxiety during sleep. In general sleep score, 30.4% of children had a sleep problem. Also, father's education and the birthright are a powerful predictor of children's sleep problems⁴⁸. Two studies on oral hygiene problems in children with autism were studied. The data collection tool was a survey of dental examinations of children. Data analysis and analysis revealed that children with autism did not meet more dental needs Dental system was significantly higher than healthy children ($P=0.002$), and also children with autism showed a higher prevalence of caries and poor oral hygiene.

CONCLUSION

Recent studies have shown that this group of people has always faced many problems in the future. Interviews for these patients should always be accessible and cost-effective. The result is the highest range of studies conducted specifically by in-house researchers Concentrated on the pathophysiology of this disease. This research concludes the poor participation of researchers and families of children with autism as well as costly and far-reaching interventions, and emphasizes

the need to promote more family-based therapeutic interventions, along with low-cost access to it.

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REFERENCES

- 1- Khalili A, Shadi D, Kalvandi N, Nasiri M, Sadegh R. Triage methods in children, a systematic review .Electron J Gen medicine.2018;15(3):em26.
- 2- Baron-Cohen S, Scott Fj, Allison C, Williams J, Bolton P, Matthews Fe, Brayne C. Prevalence Of Autism-Spectrum Conditions: Uk School-Based Population Study. Br.J.Psychiatry.2009; 194(2):500-09
- 3- Paymard A, Bargrizan S, Ramezani S, Khalili A, Vahdatnejad J. Comparing Changes in Pain and level of consciousness in Open Endotracheal Suction Catheters with Two Sizes: 12 and 14: a Randomized Clinical Trial. Eurasian.J.Analy. chem.2017;12(5B):591-97.
- 4- Geier Da, Kern Jk, Geier MR. The Biological Basis Of Autism Spectrum Disorders: Understanding Causation And Treatment By Clinical Geneticists. Acta.Neuro.Exp.2010;70(3):209-26.
- 5- Paymard A, Bargrizan S, Bekhradian N, Motlagh AH, Zarei Z, Khalili A. Case report of bilateral epidural. IIOAB.2016;7(5):307-08. Jeste Ss .The Neurology Of Autism Spectrum Disorders. Curr Opin Neurol .2011;24:132-139.
- 6- Billstedt E, Gillberg C. "Autism After Adolescence: Population-Based 13-22-Year Follow-Up Study Of 120 Individuals With Autism Diagnosed In Childhood". J.Autism.Develop. Dis.2005;35(3):351-60.
- 7- Alizadeh Z, Paymard A, Khalili A, Hejr H. A systematic review of pain assessment method in children. Ann.Trop.Med.Pub. Health.2017;10(4):847-49.
- 8- Hadjikhani N, Joseph R.M, Manoach DS, Naik P, Snyder J, Dominick K. Body Expressions Of Emotion Do Not Trigger Fear Contagion In

- Autism Spectrum Disorder. Social Affective And Ognitive Neuroscience.2009;4(1):70–8.
- 9- Khalili A, Shayan A, Khodaveisi M, Masoumi SZ, Soltani F, Havasia, MR, Horiat FE. Construction of professional ethics questionnaire in midwifery. *Indian Journal of Forensic Medicine and Toxicology*.2017;11(12):237-40
- 10- Frith C, Frith U. The Neural Basis of Mentalizing. *Neuron*.2006;50(4):531–34.
- 11- BaghebanVahidi M, HosseinKhanzadeh AA, Nadia N.The Effect Of Teaching Skills On Effective Communication To Mothers Of Children With Autism On Improving Their Social Skills. *Disability Studies*.2017;7(13):7-19.
- 12- Afshari A, Khalili A, Dehghani M, Beiramijam M, Lotf MD, Noodeh FA. Comparing the frequency of occupational injuries among medical emergency staff and nurses of intensive care units in Hamadan. *Ann.Trop.Med.Pub.Health*.2017;10(6):646-50.
- 13- Abazari K, Malekpour M, Ghamarani A, Abedi A, Faramarzi S. Impact Of Individual Differences Intervention (Floortime) Based On Parents' Expressed Emotion On Children's Social Skills With High-Functioning Autism Disorder. *Ijpcp*.2017;23(3):260-77
- 14- Eftekhari, N, Eslamnik, P, Khalili, A, Davoodi, M. Comparing cesarean wound complications in high-risk women with and without anticoagulation. *J.Mazandaran.Uni.Med.Scie*.2015;25(124):48-55.
- 15- Khalili A, Azodi F, Azodi P, Motlagh MD, Sedighi Z, Jahanpour F. Patient safety situation from the nurses viewpoints in an educational hospital. *J.Pharm.Sci.Res*.2017;9(1):1647-50.
- 16- Simpson K, Keend. Music Interventions for Children With Autism: Narrative Review Of The Literature. *Journal Of Autism And Developmental Disorders*.2011;41(11):1507–14.
- 17- Azodi F, Sharif F, Azodi P, Shirazi ZH, Khalili A, Jahanpour F. The reasons of tendency toward hookah smoking among teens and youth in Iran - A qualitative study. *J Pharm Sci Res* 2017;9(5):1642-46.
- 18- Ghasemi Z, Qarbaghi S, Khazaali Kh.A Review Of The Effect Of Horse Riding Therapy In Children With Autism Disorder. *Sports Specialty*.2013;10(7):896-905.
- 19- Hassanian ZM, Zali B, Khalili A, Kh O. The viewpoints of patients about observance of patients' rights by treatment staff by health and teaching centers affiliated with hamadan medical university. *J.Pharm.Sci.Res*.2017;9(2):2342-45.
- 20- Jamie B. Boster, John W. Mccarthy, Joann P. Benign. Music Therapy Is Beneficial For Children With Autism Spectrum Disorders, But More Specific Clinical Guidance Is A Future Need. *Evidence-Based Communication Assessment And Intervention* .2011;1(2):20-6.
- 21- Alimohammadi N, Jokar M, Khalili A, Aghamohammadi M. The requirements of the caregivers of patients hospitalized in intensive care units. *Natl J Physiol Pharm Pharmacol* 2018;8(4):27-38.
- 22- Title The Effect Of Theater Therapy On Stereotypic Behaviors, Self-Harm Behaviors And The Aggressive Behaviors Of Autistic Children: Reducing The Severity And Frequency Of Stylistic Behaviors And Self-Harm Behaviors. 6th International Congress On Child And Adolescent Psychiatry.2014.
- 23- Jokar S, Motamed N, Kamali F, Azodi F, Khalili A, Jahanpour F. The attitudes and practice of mothers who were referred to the health care centers in Iran for the use of medicinal plants in the treatment of children's diseases. *J.Pharm.Sci. Res*.2017;9(1):2349-52.
- 24- Shahriyari M, Khalili A, Shamsizadeh M, Mardani D, Paymard A, Vardenjani MM. Effects of foot reflexology on pain in patients after lower limb amputation. *J Mazandaran Univ Med Sci* 2016;26(3):18-26.
- 25- Vosooghifard F, Alizadeh Zarei M, Nazari M A, Kamali M. The Effect Of Neurofeedback Training And Neurofeedback With Occupational Therapy Based On Cognitive Rehabilitation On Executive Functions In Autistic Children. *Mrj*.2013;7(2):28-34
- 26- Ghamari-Givi H, Kian-Ersi F, Nasoudi R, Agh A, Mehrabadi S. The Comparison Of Effectiveness Of Applied Behavioral Analysis And Treatment-Education Approach On Stereotyped Behavior, Interactional And Communicational Problems In Autistic Children. *Jrehab*.2012;13(3):25-33
- 27- Jahanpour F, Paimard A, Pouladi SH, Azodi F,

- Shayan A, Azodi P, Molavi Vardenjani, M. Khalili, A. Comparing the durability of professional ethics' learning in two methods of group discussion and multimedia software. *Research Journal of Medical Sciences*.2016;10(3):120-23.
- 28- Hossein Khanzadeh A A, Imankhah F. The Effect Of Music Therapy Along With Play Therapy On Social Behaviors And Stereotyped Behaviors Of Children With Autism. *Pcp*.2017; 5(4):251-62
- 29- Vakilizad O, Malekpour M, Faramarzi S. The Effect of Shared Attention Education On The Level Of Initiative-Responsiveness Of Children With Autism Disorder: Single Case Study. *Journal Of Paramedicine And Rehabilitation*.2017;6(3):67-79.
- 30- Masumi Z, Khalili A, Delforooz F, Faradmal J, Shayan A. Comparison The Effect Of Evening Primrose Oil And Vitamin E On Premenstrual Syndrome. *Cmja*.2017; 7(2):1931-43.
- 31- Ahmadi A, Shahi Y. The Effect Of Perceptual Movement Exercises On Motor And Motor Skills Development In Children With Autism: A Single-Subjects Survey. *Principles Of Mental Health*.2010;12(2):534-41.
- 32- Khalili, A, Shayan, A, Khodaveisi, M, Masoumi SZ, Soltani F, Havasian, MR, Horiati, F.E. Construction of professional ethics questionnaire in midwifery. *Indian Journal of Forensic Medicine and Toxicology*.2017;11(2):237-40.
- 33- Sadeghian A, Bigdeli I, Alizadeh-Zarei M, Effectiveness Of Sensory Integrity Training On Improvement Of Children's Symptoms Of Autism Spectrum Disorder. *Disability Studies*.2017;7(1):1-8.
- 34- Movallali G, Nesayan A, Asadi Gandomani R. Psychometric Properties of Dunn's Sensory Profile School Companion. *J.Rehab*.2017;18(3):194-201
- 35- Bahareh Barzegar S, Nejat V, Pouraatmad H R. Effect of Face Filter Frequency Filter On Autistic And Healthy Children Attention. *Rehabilitation Medicine*.2014;3(1):19-28.
- 36- Rezazadeh N, Shareh H, Ahadi M, Karimi H. Auditory Brain Stem Responses In Children With Autism. *Journal Of Gorgan University Of Medical Sciences*.2010;11(2):17-22.
- 37- Dibajinia P, Moghadasin M, Zahir Al-Din A R. A Comparative Study Of Attention Deficit Hyperactivity Disorder (Adhd) In Children With Epilepsy And Healthy Children. *Rehabilitation Medicine*.2015;3(4):17-22.
- 38- Zadbood A. Investigating The Problems Of Understanding The Faces Of Human Face In Children With Hyperactivity Disorder (Adhd) - Referring To Imam Hossein Hospital. Received From The Thesis Of Shahid Beheshti University Of Medical Sciences.2010.
- 39- Mei-Chuncheung S, Chan SL, Winnie SW, Leung YC. Verbal Memory Deficits In Relation To Organization Strategy In High- And Low-Functioning Autistic Children. *Research In Autism Spectrum Disorders*.2010;4(4):764-71.
- 40- Ebrahimi M, Danaei Fard F. The Effect Of Sensory Integrity With Emphasis On Deep And Atrium Sensation On The Academic Achievement Of Children With Attention Deficit Hyperactivity Disorder In 6-12 Years In Semnan. 2nd Congress on the Psychology Of Children And Adolescents.2014.
- 41- Lee H, Marvin AR, Watson T, Piggot J, Law JK, Law PA, Constantino JN, Nelson S. F. Accuracy Of Phenotyping Of Autistic Children Based On Internet Implemented Parent Report. *Am. J. Med. Genet*.2010;153(1):1119-26.
- 42- Pereira Pondém Marinho Novaes C, Fiuza Losapiom. Frequency of Symptoms of Attention Deficit And Hyperactivity Disorder In Autistic Children. *Arq. Neuro-Psiquiatr*. 2010;68(1):18-29.
- 43- Salimi A, Abbasi A, Zahrakar K, Tameh B, Davarniya R. The Effect Of Group Based Hope Therapy On Resiliency Of Mothers Of Children With Autism Spectrum Disorder. *Armaghane Danesh*. 2017;22(3):350-363.
- 44- Koosha M. Anxiety, Depression And Quality Of Life In Mothers Of Children With Autism Spectrum Disorders In Patients Referred To The Psychiatric Clinic Of Children And Adolescents In Healing Education Educational Center. 6th International Congress On Child And Adolescent Psychiatry.2011.
- 45- Karl H. Pang. Constipation In Children With Autism And Autistic Spectrum Disorder. *Pediatric Surgery International*.2011;27(4):353-58.
- 46- Bashir Sh, Al-Ayadhi L. Effect Of Camel Milk On Thymus And Activation-Regulated Chemokine

- In Autistic Children: Double-Blind Study. *Ped. Res.*2014;75(2):559–63.
- 47- Xia W, Zhou Y, Sun C. *Eur J Pediatr.*2010;169(2):1201-12.
- 48- Mehri M, Chehrzad M M, Elahi M, Ghanbari Khanghah A, Khousha M, Talebnia H Et Al . Predictor Factors Of Sleep Problems In School-Age Children With Attention Deficit Disorder And Hyperactivity. *J Holist Nurs Midwifery.*2016;26(1):99-106.

Facilitating Factors in the Prevention and Control of Nosocomial Infections in the Intensive Care Units: A Qualitative Study

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ABSTRACT

Nosocomial or hospital-acquired infections (HAI) are a major problem in ICUs and one of the major causes of hospitalization, medical costs, and mortality. The purpose of this study was to investigate the facilitating factors in the prevention and control of nosocomial infections in the intensive care unit. The present study was a qualitative research with conventional content analysis approach. Twenty-one healthcare workers were selected by purposive sampling method and a deep and semi-structured interview was conducted with them. Data were analyzed using qualitative content analysis method. Data analysis revealed the main theme of facilitating factors, which included three categories of external, internal and organizational stimuli. According to the findings, it is necessary to identify facilitators to make nosocomial infections better diagnosed and provide appropriate and effective planning to improve the safety and quality of patient care.

Keywords: qualitative study, nosocomial infection, intensive care.

INTRODUCTION

If we consider health as the final product of care and treatment in an organization called hospital, nosocomial infection should be considered as a side-effect.¹ but also preventable by the organization. Nosocomial infection refers to an infection that occurs after the patient's admission to the hospital (48 to 72 hours), during a certain period of time (10 to 30 days) after the patient discharge, does not exist at the time of admission and should not be in its incubation period.²⁻³

According to the World Health Organization (WHO), in developing countries, the number of preventable infections caused by health care is estimated at 40% or more.⁴⁻⁵ The World Health Organization estimates that

1.4 million people every year suffer from nosocomial infections worldwide. This rate for developing countries is about 5 to 10 percent, and in some of these countries, more than 25 percent and according to studies conducted in some middle-income countries, about \$ 8 billion worth of economic damage is spent annually to address the problems associated with these infections.⁶⁻⁷

The control of nosocomial infections in Iran has no long history. Despite the fact that the records of infection control since 1972 are available at the universities of Ahvaz and Shiraz and then several hospitals in Tehran, however, only in Shiraz, since 1981, special attention has been paid to controlling hospital infections in Shiraz since 1980, and prevention and control programs have been followed up. The scattered statistics of developing countries reflect the fact that the exact rate of nosocomial infections in such countries varies due to many factors such as the number of hospital beds, the level of referral of the hospital, whether or not hospitals are teaching, the existence or absence of monitoring programs, the type of studied wards and the amount of facilities and

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financial resources for such care programs.⁸

In Iran, according to claim of hospitals there is no infection or about 1%, while actual prevalence is estimated to be about 15%. This means that out of every 7 patients one patient suffers from nosocomial infections that impose a very high cost to the country. The latest reports in 2010 in Iran,⁹ indicated that the status of control of nosocomial infections is in bad condition. Unfortunately, in this field in our country we do not have access to accurate data, however the prevalence of nosocomial infections afflicting most countries and not only for Iran. In order for the statistics to be real, facilitative factors need to be identified so that the planning can be done correctly.

MATERIALS AND METHOD

Data were analyzed using conventional content analysis method.²¹ Participants in this study were 21 healthcare workers included faculty member of the critical nursing department, clinical pharmacist resident in ICU, expert of the department of infection control of the University, head of ICU services Department, head of hospital, patient safety expert (one person), staff nurse, hospital administrator, infection control physician (2 persons), infection control supervisor, ICU head nurse and head of ICU (3 persons).

To reach the data immersion, the researchers listened to the interviews several times, transcribed word by word, and reviewed them repeatedly. Then, in order to extract the codes, the data was read word by word, and the highlight words of the text were marked and coded with the annotation on the margin of the text. For initial coding, the participants' words and researcher's perceptions of participants' statements were used.¹⁰ By coding, the semantic unit was extracted from the statements of the participants, then the codes were classified according to the similarities and differences, and by comparison, the main categories were formed. The inclusion criteria in this study included: having at least one year of work experience in the critical care unit and one year of management experience in centers with a critical care unit.

The data collection method was semi-structured face-to-face interviews. Of the 21 participants, 23 interviews were conducted in total. The first and key participant, a Master of Science (MSc) in Nursing and supervisor of nosocomial infection control, voluntarily

expressed their willingness to participate in the interview. 14 interviews were conducted in unannounced hours according to an agreement between the participants in the study and the research team.

In semi-structured interviews, at least guidance is provided to the collaborators by the researcher, and the result of the first interview will guide the subsequent stages of the interview so that, with the progression of the interview process, the researcher will focus on the specific subjects of the participants and lead to the emergence of new data. Semi-structured interview begins with an open question and gradually progress to more focus interviewing with the advancement of interviews.¹¹ Accordingly, the interview time was matched to the free time of the medical staff participating in the study, most of them in the afternoon. To listen deeply to the participants' conversations, a recorder was used. The researcher tried to enter the participants' experiences without giving a specific direction to conversations and interviewing. The interview time was 35 to 145 minutes, with an average of 50 minutes. The data analysis process was performed by adopting conventional content analysis method and using MAXQDA qualitative data analysis software based on the three main phases of preparation, organization and reporting.

The main question in this study was "What do you do to control infection in the ICU?" In general, the purpose of the interviews was to collect and discover the experiences of the medical staff in controlling and preventing nosocomial infections in the intensive care unit. In the present study, the rigor was assured through four criteria of dependability, credibility, transformability and confirmability as introduced by Lincoln and Guba.¹²

RESULTS

The majority of participants (57.1%) were male and most of them (42.8%) in the age range of 36-45 years. In terms of education, 9 (42.8%) were bachelor and 7 (33.3%) were specialists in medicine. At the end of the data analysis, 173 codes, 21 sub-categories and 6 categories of interviews were developed. By continuously reviewing extracted codes, removing duplicates and merging similar items, at last, 68 codes remained in the 7 sub-categories and 3 main categories. Facilitating factors in controlling and preventing nosocomial infections include organizational, external and internal stimuli. (Table 1)

Table (1): Facilitating factors in controlling and preventing nosocomial infections in intensive care unit

Main categories	Sub-categories
External stimuli	Material rewards
	Spiritual rewards
	Verbal encouragement
Organizational stimuli	Organizational support
	Transparency of procedures
Internal stimuli	professional commitment
	Adherence to standards

External stimuli

Today, infection control is based on the standard precautions. Some factors can act as external stimuli in controlling and preventing nosocomial infection in the ICU. It should be planned to use these stimuli.

Material rewards

“In this ward, they only see us for everything, not to be able to do things for patients, when we do things for our patients, we are constantly expecting to be on the way to God’s sake, finally, our life also has its own expense, as more authorities support us, we will definitely further support the patients...” (Participant 17)

Spiritual rewards

“Because of the timely service to these patients, which I see a lot of places God help me, I really feel the hand of God in the suffering of my life, providing service to the patients includes all aspects, such as patient safety, infection control, family education” (Participant 8)

Verbal encouragement

“Along with all the actions taken in the intensive care units, the medical and nursing staff working in this department should be seen in particular, we are always looking forward to special measures from hospital manager and the nursing office for the intensive care unit, and we expect to thank us more on special days ...” (Participant 12)

Organizational stimuli

One of the criteria for controlling nosocomial infection, especially in the intensive care units, is organizational stimuli. For this purpose, the organization should obviously protect the implementation of principles and regulations and reduce the deficiencies that exist in implementing the procedures.

Organizational support

“I am a supervisor of infectious disease control in this educational hospital; I cannot get in touch and struggle with all the managers and head of the department to control the infection, and I’ll go berserk, the deputy and head of the hospital must support me, when the head of the hospital is worse than expected, what else is there to expect from the rest of the department, especially the ICU?, when I went to the ICU department personnel, especially doctor and researcher, to follow the infection control instructions, those who violate the principles should be punished so that I can be sure that someone will protect me...” (Participant 1)

Transparency of procedures

In order to control infections in the hospital, especially the intensive care unit, all guidelines need to be explicit, clear and distinct, and there is no ambiguity for implementing the procedures.

“We have guidelines for all procedures from the World Health Organization and the Center for Disease Control; we copied some of them equally, which is not efficient for our country, their policies and methods are different from those of our country ...” (Participant 19)

Internal stimuli

Internal stimuli make healthcare workers aware of nosocomial infections. These stimuli can provide the basis for the emergence of science, especially in the field of nosocomial infections.

Professional commitment

A professional commitment is based on the sense of responsibility and interest in the individual’s profession, which is the sense of one’s commitment to the tasks that they are required to perform by assuming a role.

Adherence to the standards

In the implementation of infection control, standards and procedures must be identified and monitoring and training systems must be implemented at health centers.

“The doctor and the members of the infection control team should take precedence over the basic principles of infection control, which means that they must adhere to the basic principles of standard precautions, which are the same as hygiene, so as to be template for others ...” (Participant 7)

DISCUSSION

The results of qualitative content analysis using conventional approach in the field of the facilitating factors in the prevention and control of nosocomial infections in the intensive care units, revealed 3 main themes: “organizational stimuli “,”external stimuli”, and “internal stimuli”.

Organizational support is one of the subsets of the organizational stimuli factors. Today, organizational support is used as an important explanatory framework for understanding the relationship between employees and the organization.¹³ Incuriosity takes the work and effort motivation from the medical staff in controlling the nosocomial infection, and consequently, incurious employees form an incurious organization that causes the development of nosocomial infection and bacterial resistance. When employees feel that the organization values their opinions and feelings in the workplace and supports their employees at all times and situations, they do not separate themselves from the organization and feel responsibility and committed to the organization. Organizational support has a positive effect on the individual and the organization, which increases job satisfaction, motivates progress and creates a positive attitude in the staff, thereby also affecting the physical health of personnel and, at the organizational level, also increases commitment and improve performance, citizenship behavior and employee participation, and, on the other hand, reduce the desertion and organizational destructive behaviors among personnel.

Monitoring and controlling nosocomial infections are now worldwide a global priority, with the goal of minimizing infections, in addition to reducing mortality, it reduces the hospitalization time for patients and significantly reduce therapeutic costs. By observing

and implementing facilitators in controlling nosocomial infections, we can reduce nosocomial infections and increase patient safety and improve the quality of care. Nurses are one of the most important groups that can be effective in identifying and controlling nosocomial infections. Given that the nurses are the largest treatment group in the healthcare centers,¹⁴⁻¹⁵ they can be encouraged in identifying and controlling hospital infections by encouraging them to attend infectious disease control training courses.

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Ethics Committee Approval : This research project was conducted with the approval of the Ethics Committee of Shahid Beheshti University of Medical Sciences in Tehran, Iran. Other ethical issues in this study included the ensure confidentiality and interview information.

REFERENCES

- 1- Akbari, M., Nejad, Rahim R., Azimpour, A., Bernousi, I., Ghahremanlu, H.(2013). A survey of nosocomial infections in intensive care units in an Imam Reza hospital to provide appropriate preventive guides based on international standards .Urmia Medical Journal, 6(23), 591-596. [Persian]
- 2- Mohammadnejad E, Abbaszadeh A, Soori H, Afhami S. Prevention and control of nosocomial infections proceeding in intensive care units: A content analysis study. *Acta Medica Mediterranea*, 2016, 32: 1295.
- 3- Dasgupta S, Das S, Chawan NS, Hazra A. Nosocomial infections in the intensive care unit: incidence, risk factors, outcome and associated pathogens in a public tertiary teaching hospital of Eastern India. *Indian J Crit Care Med* 2015; 19(1):14-20
- 4- Abbaszadeh A, Mohamamdnejad E, Souri H, Afhami S. Resource allocation: the main problem in infection control in intensive care units of hospitals. *Journal of Nursing and Midwifery Scienc* 2016; 3 (2) :19-24.

- 5- Ducel G, Fabry J, Nicolle L. Prevention of hospital acquired infections: a practical guide. 2nd ed. Cambodia: Department of Communicable Disease, Surveillance and Response; 2002.
- 6- Mohammadnejad E, Abbaszadeh A, Soori H, Afhami S. Control and prevention of nosocomial infection: A must for medical centers. *Cardiovascular Nursing J.* 2015; 4(1) :58-65 (Persian).
- 7- Kalantarzadeh M, Mohammadnejad E, Ehsani SR, Tamizi Z. Knowledge and practice of nurses about the control and prevention of nosocomial infections in emergency departments. *Arch Clin Infect Dis* 2014; 9(4):e18278.
- 8- Masoomi asl, H. ,Zahraiee S,M. ,Majidpoor, A. ,Nateghian ,AR. ,Afhami, SH. ,Rahbar ,AR. ,et al. National guideline of nosocomial infections surveillance. 2nd ed. Tehran: Center for communicable Disease Control, Ministry of Health, 2007. [Persian]
- 9- Bagheri, P. (2014). The Review Systematic and Meta Analysis of Prevalence and Causes of Nosocomial Infection in Iran. *Iran J Med Microbiol*, 8(4);1-12. .[Persian]
- 10- Abbaszadeh, A., Ehsani, SR., Begjani, J., Kaji, MA., Dopolani, FN., Nejati, A., et al. Nurses' perspectives on breaking bad news to patients and their families: a qualitative content analysis. *J Med Ethics Hist Med* 2014. 12;7:18. eCollection 2014.
- 11- Mohammadnejad E, Nayeri ND, Hajiesmaeilpoor A. Live experience of nurses about occupational exposures in emergency wards. *World Family Medicine.* 2017; (10):170-175.
- 12- Graneheim UH, Lundman B. Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. *Nurse Educ Today* 2004; 24(2):105-12
- 13- Mohammad Nejad E, Begjani J, Abotalebi G, Salari A, Ehsani SR. Nurses awareness of patients rights in a teaching hospital. *Journal of Medical Ethics and History of Medicine.* 2011;4:2.
- 14- Ehsani SR, Cheraghi MA, Nejati A, Salari A, Esmaeilpoor AH, Nejad EM. Medication errors of nurses in the emergency department. *Journal of Medical Ethics and History of Medicine.* 2013;6:11.

The Association between the Type of Drugs Substances Used and Severity of Head Injury Following Road Accidents or Unexpected Events

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ABSTRACT

Background: There is very less knowledge about the severity of head injury due to consuming psychotropic drugs and psychoactive substances. Hence, the present study aimed to assess the relation between the severity of head trauma and the type of drugs used including opiates, cannabis, methamphetamines and benzodiazepines.

Method: Seventy five patients with moderate to severe head trauma were included into the present cross-sectional study. The severity of injuries was scaled based on the Injury Severity Score (ISS) and Glasgow Coma scale (GCS). Urine sample was screened for drugs and substances using the immunochromatography assay.

Results: With respect to the type of drug used, 32.0% of cases had no history of drug or substance abuse, whereas 45.3% used one of the substances studied as benzodiazepines in 8%, cannabis or marijuana in 9.3% and opiates in 28%. Also, 22.6% used a combination of these drugs. The severity of injury based on GCS score was independent to the type of drug or substances misused ($p = 0.780$). Similarly, no difference was found in the mean ISS score as another score for assessing severity of injury and type of drugs used ($p = 0.208$). Using the multivariable linear regression models, there was no relationship between the type of drug used and brain injury severity in head trauma patients adjusted for gender, age, and injured site.

Conclusion: About two-third of patients with brain trauma due to road accidents or unexpected events had recent history of drugs or substance consuming. The severity of brain injury may be independent to the type drug or substance misused.

Keywords: Head injury, Trauma, Drug, Substance use

INTRODUCTION

Brain functional status can potentially impacted by consuming drugs especially psychological medications

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and narcotics. Following the use of these agents, both cognitive and psychomotor are adversely affected leading disability to drive safety¹. In fact, by using the psychotropic drugs, psychomotor skills such as timely reaction to risky situations, attentiveness and concentration, appropriate coordination of hands and eyes in these conditions and totally suitable decision on the best performance may be significantly altered². This alteration may finally contribute to increase the likelihood of severe accidents and head trauma. A large range of substances and drugs have been identified to impair neural skills and reactions that required for safe

driving. For instance, the use of antidepressants or hypnotic drugs may reduce vigilance, increase reaction time in urgent situation such as speed control as well as decrease the ability to timely decision making³. Some psychological drugs can adversely exaggerate unpleasant behavioral traits^{4,5}.

Besides, Benzodiazepines and substance use has been also revealed as a main determinant for high rate of trauma due to accidents. Some studies could show that using psychoactive substances particularly cannabis and opiates led to high incidence rate of drivers killed in road accidents due to head and vital organs trauma⁶⁻⁸.

Despite the well-known fact that psychotropic drugs and psychoactive substances can increase the likelihood of head injuries due to road accidents, there is very less knowledge about the severity of head injury due to consuming these agents. Hence, the present study aimed to assess the relation between the severity of head trauma and the type of drugs used (opiates, cannabis and benzodiazepines) in injured subjects brought to a referral trauma center in Iran.

MATERIALS AND METHOD

All patients with moderate to severe head trauma who referred to Hasheminejad hospital in Tehran Iran during 2014 were included into the present cross-sectional study. The patients without a conscious desire to taking urine sample to analyze the level of pointed drugs and substances, anuric patients or those in shock state did not included into the assessment. The patients who unstable to provide sample or those with hepato-renal impairment were also excluded. Patients/guardians were first approached immediately after arriving in the emergency room and were explained about the study and were asked for consent to participate. All patients were visited by the emergency physician and the observed injuries were all recorded in the study checklist. Then, laboratory parameters and radiography required for managing trauma patients were ordered and requested for all subjects and the severity of injuries was scaled based on the Injury Severity Score (ISS). Urine sample was screened for drugs and substances (opiates, cannabis and benzodiazepines) using rapid detection kits based on the immunochromatography assay. All urine positive screening cases were considered as true positive for drugs. All different stages of study were conducted after due ethical approval at the University

of Medical Sciences and receiving written informed consent from the subjects.

Continuous variables were compared using t test or ANOVA test or with Mann-Whitney U test or Kruskal-Wallis test whenever the data did not appear to have normal distribution or when the assumption of equal variances was violated across the study groups. Categorical variables were, on the other hand, compared using chi-square test. For the statistical analysis, the statistical software SPSS version 16.0 for windows (SPSS Inc., Chicago, IL) was used. P values of 0.05 or less were considered statistically significant.

RESULTS

Total of 75 patients who suffered accidental trauma were assessed. The mean age of patients was 42.08 ± 21.10 ranged 13 to 91 years and 92% of them were male. Regarding reasons for trauma (Figure 1), the most common cause of trauma included car crash with pedestrian (25.3%) followed by car crash with motor rider (21.3%), and two motorcycles accident (10.6%). Overall, head injury led to EDH in 12.0%, SDH in 8.0%, ASH in 13.3%, brain contusion in 5.3%, skull fracture in 10.7%, orbital fracture in 4.0%, and combined injuries in other 28.0%. The average of GCS score was 11.45 ± 2.59 (ranged 5 to 14) that 18.7% had a GCS score lower than 10. In this regard, mild unconsciousness (>13) was found in none of the subjects, while moderate (GCS: 8 to 13) and severe (GCS <8) unconsciousness was revealed in 73.3% and 26.6%, respectively. With respect to the type of drug used, 32.0% of cases had no history of drug or substance abuse, whereas 45.3% used one of the substances studied as benzodiazepines in 8%, cannabis or marijuana in 9.3% and opiates in 28%. Also, 22.6% used a combination of these drugs. Table 1 summarizes age and gender distribution of drugs used. There was no difference between men and women in the type of drug and substances used ($p = 0.150$). Also, no difference was revealed in the type of drug or substances used across the difference age subgroups ($p = 0.902$). Moreover, the type of injury was not associated with the type of drug used ($p = 0.732$). As shown in Table 2, the mean GCS score did not significantly differ between the different types of substances used. In other word, the severity of injury based on GCS score was independent to the type of drug or substances misused ($p = 0.780$). Similarly, no difference was found in the mean ISS score as another score for assessing severity of injury and type of drugs

used ($p = 0.208$) (Table 2). Using the multivariable linear regression model (Table 3), there was no relationship between the type of drug used and GCS score on admission in head trauma patients adjusted for gender, age, and injured site. Similar model also showed no association between the severity of injury assessed by the ISS score and type of drug used (Table 4).

Table 1: Types of drugs and substances used according to gender, age, and type of injury

	None	Benzodiazepines	Cannabis	Opiate	Combined
Gender					
Male	20 (29.0)	5 (7.2)	21 (30.4)	6 (8.7)	17 (24.6)
Female	4 (66.7)	1 (16.7)	0 (0.0)	1 (16.7)	0 (0.0)
P-value	0.150				
Age group					
≤ 20y	5 (45.5)	0 (0.0)	3 (27.3)	1 (9.1)	2 (18.2)
21 – 40y	11 (35.5)	4 (12.9)	8 (25.8)	1 (3.2)	7 (22.6)
41 – 60y	4 (23.5)	1 (5.9)	5 (29.4)	3 (17.6)	4 (23.5)
> 60y	4 (25.0)	1 (6.2)	5 (31.2)	2 (12.5)	4 (25.0)
P-value	0.902				
Cause of trauma					
Car-car	0 (0.0)	1 (50.0)	0 (0.0)	0 (0.0)	1 (50.0)
Car overturning	2 (40.0)	0 (0.0)	2 (40.0)	1 (20.0)	0 (0.0)
Car-motor rider	5 (33.3)	2 (13.3)	5 (33.3)	0 (0.0)	3 (20.0)
Motorcycle overturning	2 (25.0)	0 (0.0)	2 (25.0)	1 (12.5)	3 (37.5)
Motor-motor	1 (16.7)	0 (0.0)	3 (50.0)	1 (16.7)	1 (16.7)
Car-pedestrian	7 (36.8)	1 (5.3)	7 (36.8)	1 (5.3)	3 (15.8)
Motor-pedestrian	0 (0.0)	2 (50.0)	0 (0.0)	0 (0.0)	2 (50.0)
Direct trauma	1 (20.0)	0 (0.0)	0 (0.0)	3 (60.0)	1 (20.0)
Fall from a low height	2 (40.0)	0 (0.0)	2 (40.0)	0 (0.0)	1 (20.0)
Fall from a high height	1 (33.3)	0 (0.0)	0 (0.0)	0 (0.0)	2 (66.7)
Fall down	3 (100)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
P-value	0.732				

Table 2: Severity of injury based on the mean GCS and ISS scores according to the types of drugs and substances used

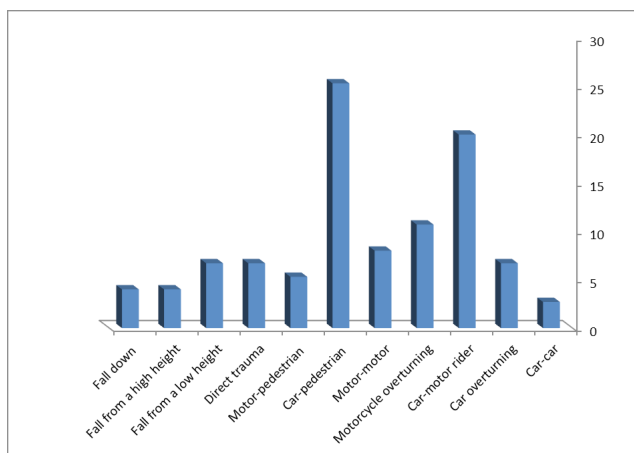
Type of drug used	GCS score (mean ± SD)	ISS score (mean ± SD)
None	11.20 ± 2.39	8.71 ± 3.92
Benzodiazepines	10.50 ± 2.88	14.00 ± 10.88
Cannabis	11.67 ± 3.03	10.19 ± 4.80
Opiate	11.28 ± 2.13	9.14 ± 2.91
Combined	11.94 ± 2.46	8.47 ± 5.33
P-value	0.780	0.208

Table 3: Multivariable linear regression model to determine association between severity of injury based on GCS score adjusted for age, gender, and types of drugs and substances used

Variable	Unstandardized Coefficients		Standardized Coefficients	t	P-value
	B	Std. Error	Beta		
(Constant)	9.785	1.437		6.809	.000
Type of drug used	.260	.206	.161	1.261	.212
Sex	1.734	1.100	.196	1.576	.120
Age	-.013	.015	-.111	-.901	.371
Type of head injury	.000	.001	-.052	-.434	.666

Table 4: Multivariable linear regression model to determine association between severity of injury based on ISS score adjusted for age, gender, and types of drugs and substances used

Variable	Unstandardized Coefficients		Standardized Coefficients	t	P-value
	B	Std. Error	Beta		
(Constant)	10.936	3.061		3.573	.001
Type of drug used	-.393	.440	-.116	-.894	.375
Sex	-1.870	2.343	-.101	-.798	.428
Age	.035	.031	.141	1.128	.263
Type of head injury	.000	.002	-.020	-.159	.874

**Figure 1: Types of drugs and substances used**

DISCUSSION

In line with the recent thesis on the adverse impact of drugs and substances use and increase the likelihood of brain injuries due to accidents and trauma, our study could interestingly demonstrated that about two-third of those with brain trauma due to car or motor accidents or due to falling had recent history of drugs or substance consuming. More interestingly, about one-fourth of them expressed to use a combination of these materials

including opiates, cannabis or methamphetamines or benzodiazepines. In other words, in majority of subjects exposed to accidents or falling form height because of drowsiness, lack of concentration, delaying decision making, and even psychosis. Unfortunately, the use of different types of substances especially opioids, narcotics, hashish, and methamphetamines has risen dramatically among our young people ⁹⁻¹³. Also, consuming antidepressants and anti-stress drugs was aberrantly increased. Thus, adverse outcome of using these substances and drugs as trauma to brain and vital organs due to accidental events are expectable. However the type of substance or drug used did not affect the severity of injury assessed by the two common severity scores including the GCS and ISS scores. In a similar study by Andelic et al ¹⁴ in 2010, about 47% of patients were positive for substance use on admission to hospital due to brain injury. Overall, the number of patients who have used substances while sustaining traumatic brain injury is considerable, with an estimate of 36-51% showing some substance use on emergency admission to hospital ^{15,16}. Besides, although the rates for using substances obtained in our survey was near

to previous reports, the association between the type and pattern of substance use and severity of brain injury remains paradoxical. Comparable to our study, in Andelic et al study¹⁴, although acute substance use at time of injury tended to decrease the probability of more severe intracranial injury, the effect was not statistically significant after adjusting for age, gender, education. In total, the association between the use of illicit drugs and severity of injury might be biased by clinical routines on admission and the clinical definition of substance use so opiates are the most common substances used by our subjects, while the cannabis is the most prevalent in most western countries. As shown by some other studies^{14,17}, cannabis was the most frequently detected drug. It is well known that cannabis and marijuana are the most frequently used illegal drugs in the European and American populations respectively and thus most accidents may occur following the use of these drugs.

Another important point that may be even considered as a potential limitation in various studies is the use of GCS score as a single severity scoring system to assess level and severity of consciousness. The level of consciousness seems to be obscured in acute settings due to substance use at the time of injury, medical sedation or paralysis¹⁸. In this study, the mean GCS score did not differ significantly between the substance-positive and substance-negative groups of patients, agreeing with results reported by Sperry^{19,20}. In contrast, it is now recommended to apply a combination of different scoring systems (as used in our study) or to apply neuroimaging modalities such as brain CT. In fact, stratifying the severity of injury by using a combination of both subjective and imaging methods can lead to accurately assess brain injury severity and thus can obtain valid relationship between types of substances and severity of brain injury.

In conclusion, about two-third of those referred to emergency departments due to brain trauma following accidents or falling express recent history of drugs or substances abuse. Regardless of baseline characteristics including demographics, the severity of brain injury is independent to the type of drugs or substances used.

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Conflict of Interest : Non

REFERENCES

1. Goodarzi F, Mehrpour O, Eizadi-Mood N. A study to evaluate factors associated with seizure in Tramadol poisoning in Iran. *Indian Journal of Forensic Medicine & Toxicology*. 2011 Jul 1;5(2).
2. Boyle MJ, Vella L, Moloney E. Role of drugs and alcohol in patients with head injury. *J R Soc Med*. 1991 Oct;84(10):608-10.
3. Orriols L1, Wilchesky M, Lagarde E, Suissa S. Prescription of antidepressants and the risk of road traffic crash in the elderly: a case-crossover study. *Br J Clin Pharmacol*. 2013 Nov;76(5):810-5.
4. Meuleners LB, Duke J, Lee AH, Palamara P, Hildebrand J, Ng JQ. Psychoactive medications and crash involvement requiring hospitalization for older drivers: a population-based study. *J Am Geriatr Soc*. 2011 Sep; 59(9):1575-80.
5. Gadegbeku B, Amoros E, Laumon B. Responsibility study: main illicit psychoactive substances among car drivers involved in fatal road crashes. *Ann Adv Automot Med*. 2011;55:293-300.
6. Neutel CII. Risk of traffic accident injury after a prescription for a benzodiazepine. *Ann Epidemiol*. 1995; 5(3):239-44.
7. Smink BE, Egberts AC, Luthof KJ, Uges DR, de Gier JJ. The relationship between benzodiazepine use and traffic accidents: A systematic literature review. *CNS Drugs*. 2010;24(8):639-53.
8. Walsh JM, Flegel R, Cangianelli LA, Atkins R, Soderstrom CA, Kerns TJ. Epidemiology of alcohol and other drug use among motor vehicle crash victims admitted to a trauma center. *Traffic Inj Prev*. 2004 Sep;5(3):254-60.
9. Amirabadizadeh A, Nezami H, Vaughn MG, Nakhaee S, Mehrpour O. Identifying Risk Factors for Drug Use in an Iranian Treatment Sample: A Prediction Approach Using Decision Trees. *Subst Use Misuse*. 2017:1-11.
10. Karrari P, Mehrpour O, Afshari R, Keyler D. Pattern of illicit drug use in patients referred to addiction treatment centres in Birjand, Eastern Iran. *J Pak Med Assoc*. 2013;63(6):711-6.
11. Mehrpour O. Addiction and seizure ability of tramadol in high-risk patients. *Indian J Anaesth*. 2013;57(1):86-7.

12. Mehrpour O. Methamphetamine abuse a new concern in Iran. *DARU Journal of Pharmaceutical Sciences*. 2012;20(1):73.
13. Taghaddosinejad F, Mehrpour O, Afshari R, Seghatoleslami A, Abdollahi M, Dart RC. Factors related to seizure in tramadol poisoning and its blood concentration. *Journal of medical toxicology*. 2011;7(3):183.
14. Andelic N1, Jerstad T, Sigurdardottir S, Schanke AK, Sandvik L, Roe C. Effects of acute substance use and preinjury substance abuse on traumatic brain injury severity in adults admitted to a trauma centre. *J Trauma Manag Outcomes*. 2010; 4:6.
15. Corrigan JD. Substance abuse as a mediating factor in outcome from traumatic brain injury. *Arch Phys Med Rehabil*. 1995;76:302–309.
16. Parry-Jones BL, Vaughan FL, Miles CW. Traumatic brain injury and substance misuse: a systematic review of prevalence and outcomes research (1994-2004) *Neuropsychol Rehabil*. 2006;16:537–560.
17. Taylor LA, Kreutzer JS, Demm SR, Meade MA. Traumatic brain injury and substance abuse: A review and analysis of the literature. *Neuropsychol Rehabil*. 2003;18:165–188.
18. Maas AI, Stocchetti N, Bullock R. Moderate and severe traumatic brain injury in adults. *Lancet Neurol*. 2008;7:728–741.
19. Sperry JL, Gentilello LM, Minei JP, Diaz-Arrastia RR, Fries RS, Shafi S. Waiting for the patient to “sober up”: Effect of alcohol intoxication on glasgow coma scale score of brain injured patients. *J Trauma*. 2006;61(6):1305–1311.
20. Hashemian A.M, Kariman, H, Mehrpour O, Eizadi-Mood N. Evaluation of blood ethanol and opium level in non survived drivers due to traffic accidents (2012) *Indian Journal of Forensic Medicine and Toxicology*. 2012; 6 (2):136-139.

Therapeutic Interventions in Premenstrual Syndrome

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ABSTRACT

Premenstrual syndrome is a psychological, neurological, ganglia disorder that interferes with communication and disrupts the natural activities of women in the community. This study aimed to investigate the effect of therapeutic interventions on reducing the symptoms of premenstrual syndrome in these patients. The search of electronic information was done by using the keywords of premenstrual syndrome, prevention of premenstrual syndrome. The studied bases included the Iran medex database, SID, Magiran, Pubmed, Elsevier and Scopus. The above mentioned database was searched from January 2017 to March 2018. 52 studies were conducted to evaluate the effect of interventions on reducing the symptoms of premenstrual syndrome. Finally, interventions were categorized into eight fields. The interventions were most useful in the following areas, respectively: Nutrition, exercise and stretching lead to muscle austerity, drug interventions, training, massage, acupuncture, cognitive-behavioral interventions, and interventions in management strategies. The results suggest that the use of new methods and traditional medicine can greatly reduce the erosive symptoms of premenstrual syndrome, but the inaccessibility along with the costs of these interventions, the most important pillar in the lack of Follow up of these treatment interventions in women with this disease. Therefore, it is suggested by the researcher to pay attention to the effective and less costly interventional interventions with ease of use in health centers.

Keywords: *Premenstrual syndrome, prevention, Behavior.*

INTRODUCTION

Menstruation, like other physiological phenomena in the body, may be disturbed¹. It is one of the most common menstrual disorders of the premenstrual syndrome. Pre-menstrual syndrome is a mental illness characterized by a wide range of emotional and physical changes, and with The performance of women in the community and family is directly related². Since women play a key role in the family, the onset of this syndrome can have an important effect on the performance of one's family and the family. The classic symptoms of premenstrual syndrome are often stress, irritability, anger, depression, feelings of self-control, Excessive appetite for food, swelling and puffiness, breast pain

and headache³. The early prostatic syndrome was discovered by Frank first in 1931, but his results were largely forgotten, and later more studies were done on the subject later on because of the suicide or family life impaired by women with this syndrome. The results show that only 10% of women do not suffer from premenstrual syndrome, while 50% of women have mild symptoms and 30% have severe symptoms requiring treatment. In ten months, the syndrome also causes The inability of women has been^{5,6}. Therefore, this syndrome is an important clinical situation that affects the majority of women in the community⁷. Therefore, a broad study to examine therapeutic interventions to improve the quality of women's health in this field seems to be necessary⁸. In relation to pre-syndrome since menstruation, there is no unit therapy that is globally accepted, and therapeutic interventions are only used to control symptoms of the syndrome⁹. The purpose of this study was to systematically review

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health interventions and to analyze their effectiveness in helping women deciding to adopt appropriate treatments for reducing symptoms of premenstrual syndrome.

MATERIALS AND METHOD

This systematic review was aimed at identifying and collecting studies in which interventions were used to reduce the symptoms of premenstrual syndrome. An electronic search of databases using the keywords of premenstrual syndrome, prevention of premenstrual syndrome from January 2017 to March 2018. The studied sites consisted of the Iran Medex database, Scientific Information Base, Pub-med, Magiran, Scopus. Inclusion criteria were: Empirical studies that interventions are the main framework for reducing the symptoms of premenstrual syndrome in individuals and studies published between 2008 and 2018. Also, the criteria for the withdrawal of descriptive studies and studies that were conducted on non-teaching interventions. According to the criteria for entry and the study, the papers were studied and articles that did not have the required quality were excluded from the study according to the purpose of the study. An overview of the details of the studies studied is provided. All of the questions related to the correct use of the extracted articles and the standards related to publication of the work were observed.

FINDINGS

Having searched the databases and abandoned a large number of articles on the basis of the title and abstract, 215 articles (88 articles from Persian sources and 127 articles from non-English sources) were investigated. Of these, 92 articles were deleted due to the lack of educational intervention. The study was conducted in which 71 of the interventions based on reducing the symptoms of PMS were not considered as the main intervention in this study. A total of 52 articles were included in this review study. Finally, interventions were carried out in eight areas. Interventions were the most commonly used interventions in the following areas: Nutrition, exercise, and stretching lead to muscle relaxation, drug interventions, training, massage, acupuncture, cognitive-behavioral interventions, and interactions in management strategies. A summary of the studies has been done.

DISCUSSION

Twenty-four main intervention studies were based on nutritional behaviors that included more of these studies. Researchers from the study considered the use of traditional medicine, herbal medicines and dietary supplements to be the best way to relieve the symptoms of premenstrual syndrome. 12 The study of the effect of medicinal herbs such as Ghorbakhsh, Grasshopper, Fingerprint, Sevilla, Valeriana, Saffron, Razineh, Golgarizade and Red Root was studied in reducing the symptoms of premenstrual syndrome. Twelve studies have also tested the effect of dietary supplements on relieving symptoms of premenstrual syndrome in a test case, including the effects of carbohydrate foods, two studies on calcium-rich foods, three studies of vitamin B6 foods, a study of ingredients containing Vitamin D examined four and four studies of foods containing steroids, especially omega-3, in reducing the symptoms of premenstrual syndrome ¹⁰⁻³³. A study of interventions in tensile and athletic stretching was considered by the researchers. The study found exercises such as aerobics and walking, compared with other uncomplicated and completely safe treatments, and believed that exercise stretching and Muscle relaxation, such as yoga, can be used as a non-specific analgesic to control symptoms of premenstrual syndrome ³⁴⁻⁴³. 6 studies of various hypotheses about the cause of premenstrual syndrome and the therapeutic intervention strategies used to cope with it. The effect of the relief of these drugs on the control of symptoms of premenstrual syndrome was confirmed ⁴⁹⁻⁴⁴. Five studies were conducted in the field of educational intervention. Educational materials include the definition of premenstrual syndrome, its stages, ways of having a healthy lifestyle such as reducing smoking and tobacco control, ways to control stress, and enough sleep ⁵⁰⁻⁵⁴. The results of the data analysis showed that total massage can be very effective in reducing the symptoms of premenstrual syndrome, but professional massage can affect the effect of this intervention ⁵⁵⁻⁵⁸. An acupuncture study was conducted as a primary intervention to reduce the symptoms of premenstrual syndrome in women with this syndrome between seven and ten days before menstruation. The samples participated in several acupuncture sessions, and self-reported pain data the results showed that acupuncture was able to reduce the symptoms of this syndrome after a few sessions ⁵⁹. Two studies were conducted on cognitive-behavioral interventions and management

strategies. These sessions included a combination of the mentioned methods and psychological counseling.

CONCLUSION

The results of these studies indicate that all interventions to reduce erosive symptoms And anxiety related to premenstrual syndrome But interventions such as yoga, acupuncture, herbal medicine, complex stretching and exercise, drug therapy, psychological interventions, and reflexology exercises are commonly used and supervised by a caregiver in the field of intervention, which involves the availability of cost-free services As a result, it is a major obstacle to the use of health services, while interventions such as self-care education and psychological counseling, which are often more cost effective and effective in women's access to self-care, are less welcomed by researchers. Therefore, interventions such as self-care education in women with this syndrome and the ease of use of the above interventions in health centers Recommended by the researcher.

Ethical Clearance: This research project was approved by the ethics committee of Abadan University of Medical Sciences.

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Conflict of Interest: None.

REFERENCES

- 1- Alizadeh Z, Paymard A, Khalili A, Hejr H. A systematic review of pain assessment method in children. *Ann Trop Med Public Health*.2017;10(1):847-49.
- 2- Fatukian Z, Ghaffari F. Efficacy Of Group Exercise Program On The Intensity Of Premenstrual Syndrome. *J Babol Univ Med Sci*.2005;8(4):76-80.
- 3- Karimi Nikchatrudi A. Efficacy of Group Aerobic Exercise Program On The Intensity Of Premenstrual Syndrome. [Thesis]. Mashhad :Mashhad University Of Medical Science,2003.
- 4- Daly A. Exercise And Premenstrual Symptomatology: A Comprehensive Review, *Journal Of Women's Health*.2009;6(18):895-99.
- 5- Afshari A, Khalili A, Dehghani M, Beiramijam M, Lotf MD, Noodeh FA, et al. Comparing the frequency of occupational injuries among medical emergency staff and nurses of intensive care units in Hamadan. *Ann Trop Med Public Health*.2017;10(3):646-50
- 6- Eftekhari, N, Eslamnik, P, Khalili, A, Davoodi, M. Comparing cesarean wound complications in high-risk women with and without anticoagulation. *Journal of Mazandaran University of Medical Sciences*.2015;25(124):48-55.
- 7- Khalili A, Azodi F, Azodi P, Motlagh MD, Sedighi Z, Jahanpour F. Patient safety situation from the nurses viewpoints in an educational hospital. *J Pharm Sci Res*.2017;9(3):1647-50.
- 8- Danno K, Colas A, Terzan L, Bordet MF. Homeopathic Treatment Of Premenstrual Syndrome: A Case Series. *Homeopathy*.2013;102(1):59-65.
- 9- Khalili A, Azodi F, Azodi P, Motlagh MD, Sedighi Z, Jahanpour F. Patient safety situation from the nurses viewpoints in an educational hospital. *J Pharm Sci Res*.2017;9(2):1647-50.
- 10- Sohrabi N. Evaluation Of The Effect Of Omega-3 Fatty Acids In The Treatment Of Premenstrual Syndrome: "A Pilot Trial". *Complementary Therapies In Medicine*. 2013;21(3):141-46.
- 11- Paymard, A, Bargrizan, S, Bekhradian, N, Motlagh, A.H, Zarei, Z, Khalili, A. Case report of bilateral epidural. *IIOAB Journal*.2016;7(2):307-08.
- 12- Azodi F, Sharif F, Azodi P, Shirazi ZH, Khalili A, Jahanpour F. The reasons of tendency toward hookah smoking among teens and youth in Iran - A qualitative study. *J Pharm Sci Res*.2017;9(4):1642-46.
- 13- Paymard, A, Bargrizan, S, Ramezani, S, Khalili, A, Vahdatnejad, J. Comparing changes in pain and level of consciousness in open endotracheal suction catheters with two sizes: 12 and 14: A randomized clinical trial. *Eurasian Journal of Analytical Chemistry*.2017;12(5):591-97.
- 14- Fathizadeh N. Evaluating The Effect Of Magnesium And Magnesium Plus Vitamin B6 Supplement On The Severity Of Premenstrual Syndrome. *Iran J Nurs Midwifery Res*.2010;15(1):401-05.
- 15- Hassanian ZM, Zali B, Khalili A, Kh O. The viewpoints of patients about observance of

- patients' rights by treatment staff by health and teaching centers affiliated with hamadan medical university. *J Pharm Sci Res.*2017;9(10):2342-45.
- 16- Doulati M, Ahmadi M. Comparison Of The Effect Of Vitamin B6 And Vitamin E On Symptoms Of Premenstrual Syndrome. *Journal Of Zanjan University Of Medical Sciences.*2008;9(37):5-10.
- 17- Alimohammadi N, Jokar M, Khalili A, Aghamohammadi M. The requirements of the caregivers of patients hospitalized in intensive care units. *Natl J Physiol Pharm Pharmacol.*2018;8(5):11-26.
- 18- Elizabeth R.Bertone-Johnsona. Dietary Vitamin D Intake, 25-Hydroxyvitamin D3 Levels And Premenstrual Syndrome In A College-Aged Population. *The Journal Of Steroid Biochemistry And Molecular Biology.* 2010;121(1):434-37.
- 19- Jokar S, Motamed N, Kamali F, Azodi F, Khalili A, Jahanpour F. The attitudes and practice of mothers who were referred to the health care centers in Iran for the use of medicinal plants in the treatment of children's diseases. *J Pharm Sci Res.*2017;9(2):2349-52.
- 20- Omidali F. The Effect Of Pilates Exercise And Consuming Fennel On Pre-Menstrual Syndrome Symptoms In Non-Athletic Girls. *Cmja.*2015;5(2):1203-13.
- 21- Shahriyari M, Khalili A, Shamsizadeh M, Mardani D, Paymard A, Vardenjani MM. Effects of foot reflexology on pain in patients after lower limb amputation. *J Mazandaran Univ Med Sci.*2016;26(1):18-26.
- 22- Alizadeh Sh.Farzad L. † Rahbar.Effect Of Valerian Root Extract On Severity Of Mood And Behavioral Symptoms Of Premenstrual Syndrome. *Iranian Journal Of Obstetrics And Gynecology.*2008;18(61):1-9.
- 23- Seyedeh Bahareh Kamranpour. Effect Of Valerian Root Extract On Severity Of Mood And Behavioral Symptoms Of Premenstrual Syndrome. *Journal Of Internal And Surgical.*2014;3(2):71-9.
- 24- Jahanpour, F, Paimard, A, Pouladi, S.H, Azodi, F, Shayan, A, Azodi, P, Molavi Vardenjani, M. Khalili, A. Comparing the durability of professional ethics' learning in two methods of group discussion and multimedia software. *Research Journal of Medical Sciences.*2016;10(3):120-123.
- 25- Beidokhti H, Heidari M, Firozeh M. The Soy Bean Effect On The Premenstrual Syndrome Concerning Its Physical'Psycho And Behavioral Effects In Female Students Of Semnan University Dormitory. *J Urmia Nurs Midwifery Fac.*2013;11(5):41-56.
- 26- Sabet-Birjandi S, Tadayon-Najafabadi M, Siyahpooshan A, Haghighizadeh M. Comparision The Effect Of Hypericum Perforatum And Vitamin B6 In The Treatment Of Premenstrual Syndrome. *ZJRMS.*2011;13(4):1-5.
- 27- Javadi M, Hejr H, Zolad M, Khalili A, Paymard A. Comparing the effect of endotracheal tube suction using open method with two different size catheters 12 and 14 on discharge secretion, pain, heart rate, blood pressure, and arterial oxygen saturation of patients in the intensive care unit: A randomized clinical trial. *Ann Trop Med Public Health.*2017;10(3):1312-17.
- 28- Pakgohar M, Ahmadi M, Salehi Surmaghi M, Mehran A, Akhondzadeh S. Effect Of Hypericum Perforatum L. For Treatment Of Premenstrual Syndrome. *JMP.* 2008; 3 (15) :33-42.
- 29- Masumi Z, Khalili A, Delforooz F, Faradmaj J, Shayan A. Comparison The Effect Of Evening Primrose Oil And Vitamin E On Premenstrual Syndrome. *Cmja.*2017;7(2):1931-43.
- 30- Hassanian ZM, Bahrani F, Farhadian M, Khalili A. Effect of participatory care on the satisfaction of parents of children admitted to the children's wards: Clinical trial study. *Natl J Physiol Pharm Pharmacol.*2018;8(5):28-37.
- 31- Abedian Kasgari K, Shahhosseini Z, Danesh M. Assessment Of Starch Dietary Regimen Regarding Pre-Menstrual Syndrome Among High School Students In Sari During 2007. *J Mazandaran Univ Med Sci.*2008;18(65):19-27.
- 32- Khalili A, Shayan A, Khodaveisi M, Masoumi S.Z, Soltani F, Havasian M.R, Horiati FE. Construction of professional ethics questionnaire in midwifery. *Indian Journal of Forensic Medicine and Toxicology.*2017;11(2):237-40.
- 33- Sohrabi N, Kashanian M, Ghafoori SS, Malakouti SK. Evaluation Of The Effect Of Omega-3 Fatty Acids In The Treatment Of Premenstrual Syndrome:"A Pilot Trial". *Complement Ther*

- Med.2013;21(3):141-46.
- 34- Samadi Z, Taghian F, Valiani M. The Effects Of 8 Weeks Of Regular Aerobic Exercise On The Symptoms Of Premenstrual Syndrome In Non-Athlete Girls Iran. *J Nurs Midwifery Res.*2013;18(1):14-9.
- 35- Yekke Fallah L, Azimi H, Sadeghi T. The Effect Of Aerobic And Walking Exercise On Physical And Psychological Symptoms And Pain Of Premenstrual Syndrome. *IJN.*2013;25(80):46-55
- 36- Rajaeiyan A. The Relationship Between Premenstrual Syndrome Prevalence And Aerobic Fitness Of Athlete And Non-Athlete Girls. *Iranian Journal Of Obstetrics And Gynecology.*2012;14(5).
- 37- Najafi-Sharjabad F, Borazjani F, Avazzadeh Z. Investigation Of Prevalence And Severity Of Premenstrual Syndrome And Its Relationship With Exercise Among Female Students In Bushehr University Of Medical Sciences. *Psj.*2017;15(3):43-50.
- 38- Badavi M. The Effect of Different Intensities Of Aerobic Training On The Symptoms Of Premenstrual Syndrome In Non-Athlete Girls Aged 15-18 Years. *Third International Conference On Sport Sciences.*2017.
- 39- Figurea O, Virabeola V. The Effect Of A Selected Intermittent Training On Symptoms Of Premenstrual Syndrome. *IJN.*2016;29(103):24-32.
- 40- Valiani M, Samadi Z, Shadman F. Comparison The Effects Of Aerobic Exercise And Vitamin B6 In Severity Of Symptoms Of Premenstrual Syndrome In Non-Athlete Girls. *Cmja.*2013;3(3) 552-62.
- 41- Ghanbari Z, Dehghan Manshavi, Jafarabadi M. The Effect Of Three Months Regular Aerobic Exercise On Premenstrual Syndrome. *Journal Of Family And Reproductive Health.*2010;2(4):167-71.
- 42- Sharifi Rad Gh, Rabiei L, Masoudi R. The Effect of Progressive Muscle Relaxation Program On Depression Parameters And Anxiety Of Female Students In Premenstrual Syndrome. *Health Research Journal.*2014;1(2):1796-86.
- 43- Kashani Lotfi F, Sharifi Hp. The Effect of Musculoskeletal Training On Reducing Symptoms Of Premenstrual Syndrome. *Magazine Of Thoughts And Behavior.*2008;2(5):1-12.
- 44- The Premenstrual Syndrome: Effectiveness Of Vitex Agnus Castus. *Medizinische Monatsschrift Fur Pharmazeuten.*2009;32(5):186-91.
- 45- Agajani Delavar M, Nasiri F, Hoseini S. A Double-Blind Placebo-Controlled Evaluation Of Vitex Agnus Castus In Premenstrual Syndrome. *JMP.*2008;2(2):15-20
- 46- Nirav R. Shah. Selective Serotonin Reuptake Inhibitors For Premenstrual Syndrome And Premenstrual Dysphoric Disorder. *Obstet Gynecol.*2008;111(5):1175-82.
- 47- Sharifi F. Study Of The Effect Of Mefenamic Acid On Premenstrual Syndrome. Retrieved From Thesis The Shahid Beheshti University Of Medical Sciences.2014.
- 48- Mousavi P, Zaheri H, Najari S, Afshari P. The Effect Of Vitagnus On Physical And Emotional Symptoms Of Premenstrual Syndrome: A Randomized Clinical Trial. *Journal Of Clinical Nursing And Midwifery.*2015;4(1):68-76
- 49- Ellen W. Freeman, PhD,1,2 Mary D. Sammel. Clinical Subtypes of Premenstrual Syndrome And Responses To Sertraline Treatment. *Obstet Gynecol.*2011;118(6):1293-300.
- 50- Sooregi Z. Evaluating The Effect Of Education On Control Of Premenstrual Syndrome In Married Women Under The Imam Khomeini Relief Committee Of Birjand. Received From Thesis The Birjand University Of Medical Sciences.2011.
- 51- Karami J, Zali Poor S, Rahmani S, Zabet M. The Effectiveness Of Web Therapy On The Symptoms Of Premenstrual Syndrome. *Journal Of Urmia Nursing And Midwifery Faculty.*2016;13(12).
- 52- Khalilipour M, Panahi R. Effect Of Education On Promoting Preventive Behaviors Of Premenstrual Syndrome In Female Adolescents: Health Belief Model Application. *JECH.*2017;4(2):44-54.
- 53- Davoodvandi M, Navabinejad S, Lotfi Kashani F. The Effectiveness of Group Cognitive- Behavioral Instruction On Decreasing Physical Symptoms Of Premenstrual Syndrome. *MEDICAL SCIENCES.*2011;21(2):114-20.
- 54- Rezaei H, Amidi M. The Effect of Spouses' Education On Physical Activity In Women With Premenstrual Syndrome. *Health Research Journal.*2017;13(11):24-31.

- 55- Kathleen B. Lustyk. Premenstrual Syndrome and Premenstrual Dysphoric Disorder: Issues Of Quality Of Life, Stress And Exercise. Handbook Of Disease Burdens And Quality Of Life Measures.2015;3(2):1951-975
- 56- Sareh Abdollahi Fard, Mahrokh Dolatian, Reza Heshmat, Hamid Alavi Majd. Effect Of Foot Reflexology On Physical And Psychological Symptoms Of Premenstrual Syndrome . Pajoohande.2013;18(1):8-15.
- 57- Abdolahi Fard S. The Effect Of Foot Reflexology On Premenstrual Syndrome In Students Residing In Dormitories Of Jahrom University. Retrieved From Thesis Of Jahrom University Of Medical Sciences.2011.
- 58- Ghaedi L, Moradi M. Assessment of The Effects Of Massage Therapy On Premenstrual Syndrome. ZJRMS.2011;13(2):38-43
- 59- Hee Jang S, Min-Sunk Ch. Effects And Treatment Methods Of Acupuncture And Herbal Medicine For Premenstrual Syndrome/Premenstrual Dysphoric Disorder. Journal Of The International Society For Complementary Medicine Research.2014;14(11).

Comparison of Parental Satisfaction with Posttonsillectomy Pain Management with Two Methods of Acupressure and Pharmacological Analgesics in Children: A Clinical Trial Study

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ABSTRACT

Background: Tonsillectomy is one of usual surgeries in children population worldwide. One of the common complication after this surgery is pain and control of it is very imperative. There are many pain controlway such as pharmacologic treatments and complementary treatment. One of acceptable pain control in children is acupressure.

Objective: The present study aim to survey the comparison effect of acupressure with analgesic drugs on the pain and parental satisfaction after tonsillectomy in children aged 5 to 12 years old.

Method: In this study 144 children aged 5-12 years old were allocated into one of three groups of control, interventions and placebo. In the intervention group, children receive acupressure plus analgesic treatment as routine and in the placebo group, children receive sham acupressure plus analgesic treatment. In the control group just analgesic treatment provided. The acupressure was performed at three session after operation. Before and after each session amount of pain and parent satisfaction was measured. Data gathered were analyzed by SPSS 16 software with descriptive and non-parametric inferential statistical tests.

Results: The result of study show that the amount of pain reduction and parent satisfaction was a statistically significant at three session after operation in acupressure group ($P = 0.002$). Furthermore, it was found that amount of pain in the control group and the placebo group did not statistically significant (respectively: $P = 0.546$, $P = 0.332$).

Conclusion: The results indicated that acupressure technique is very useful on pain reduction after tonsillectomy and use of acupressure along with pharmacological drugs, will decrease the amount of analgesic requirement in children and will improve parental satisfaction with pain control of their children after operation.

Keywords: Acupressure, Postoperative pain, Tonsillectomy, Complementary medicine.

INTRODUCTION

Maintaining a child's health is very important ⁽¹⁻³⁾. Adenotonsillectomy is a very usual operation in children worldwide ^(4, 5). Hospital bedding causes Stress

for the child ^(6, 7). Tonsillectomy is the most common indication for surgery in pediatric population age 1 to 15 years ⁽⁸⁻¹²⁾. Pain is the most important side effect of surgery in children. Severe pain result in prolong morbidity, abstinence eating foods and liquid and can cause dehydration and many complications ⁽⁹⁻¹³⁾. There are a lot of studies have been done about post tonsillectomy pain management in pediatric. Pain relief methods in children include pharmaceutical and non-pharmaceutical methods. Although pain control drugs

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are effective, they have many side effects such as nausea and vomiting, dehydration, suppression of the respiratory system after the use of opiates, and in rare cases of death.⁽¹³⁻¹⁵⁾ In regard with this side effects, researcher suggest to use of non-pharmacological methods with pharmacological methods such as acupressure that have a little side effects^(14, 16-19). Acupressure does not use special devices and it is done by hand alone⁽²⁰⁾. Acupressure is a subset of acupuncture. In acupressure, pressure on acupuncture points leads to stimulation of the energy channels in the body that relieves pain through increased circulation and relaxation of the nerves of the body. Today we know that applying pressure on the acupoints can case to reduce pain by increase the level of endorphins, serotonin,encephalin⁽²¹⁾. Acupressure is a purposeful massage of acupoints that are used in mild to moderate pain⁽²²⁾.Acupressure is not invasive and is more acceptable in pediatric group in comparison with acupuncture⁽²³⁾.Acupressure is very inexpensive and has no side effects and does not require special facilities⁽²¹⁾. Various studies have shown that acupressure is one of the tasks of nurses and nurses can easily use this method to control children's pain along with drug therapy.⁽²³⁾ In regard to studies, tonsillectomy is a common surgery in the world^(13, 24-27), and there are a little research on the use of acupressure for tonsillectomy pain relief⁽¹⁵⁾.Providing nursing assistance is very important^(28, 29).Nurses are the most important providers of services to children⁽³⁰⁾. and Pain plays an important role in the health of the individual^(31, 32)This study conducted. We hypothesized that acupressure have positive effect on postoperative pain reduction in pediatric aged 5 to 12 years old admitted to hospital and can improve parental satisfaction for pain relief.

MATERIALS AND METHOD

This study has a randomized clinical trial design. In this study, 144 children aged 5 to 12 years old who were candidates for tonsillectomy,were assigned with random allocation in three groups: control, acupressure and placebo, and in each group was 48. Inclusion criteria was children aged between 5 to 12 who candidate for tonsillectomy. Exclusion criteria was: mental disorders, skin injury near acupressure area and severe pain that prohibited the child from participating in research. Surgical indications were: tonsillar hypertrophy with sleep disturbance breathing and. The objectives of study were described to the parents.To start the sampling, children who had inclusion criteria were randomly

allocated into intervention, control or placebo groups. Sampling period was from November 2016 to April 2017. Intervention with acupressure was done three session after tonsillectomy in the form of one hour, 2-4 hours and 8-6 hours after the surgery. In the this group, the child pain was measured and recorded, then acupressure on acupoints of LI-4(Hegu), ST-44(Neiting) and ST-36 (Zusanli) was done on the hands and legs (figure 1-3). In acupressure group, the deep massage was done. The period of intervention of each area was two minutes, so the overall pressure period for six acupoints was 12 minutes. At the end, the level of child pain was measured. In placebo group, pressure was applied to the identical acupoints with this difference that the pressure was not deep. In the control group just routine care was delivered. The pain level in children was recorded before and after the three sessions of intervention. The pediatric pain was measured with pain scale of Oucher. In addition, parents were request to say a score, on a five-point scale (1 = not satisfied, 5 = good satisfied), their general satisfaction with the postoperative analgesic treatment. The instrument used in this study was a questionnaire for demographic information and record of pain and analgesic consumption and Oucher pain scale. The personal information questionnaire in the first part contains 3 questions about demographic characteristics including age, sex and weight, and the second part consists of 6 parts for recording the child pain score before and after the first stage of acupressure, the second stage of acupressure, and the third stage acupressure. The third part was used to record the analgesic consumption and parental satisfaction. Oucher pain instrument is a tool for measure intensity of pain in children aged 5 to 12 years old. This instrument is used in a lot of study around the world and is valid and reliable⁽³³⁻³⁵⁾. Present study was registered in the Iranian Registry of Clinical Trials (IRCT ID: IRCT2017100836651N1) and was approved by the Ethics Committee of Guilan University of Medical Sciences (Ethical Code: IR.GUMS.REC.1396.229). After gathering data, the information were analyzed by descriptive statistical methods (median, and standard deviation) and inferential statistics (Kruskal Wallis, Wilcoxon). The significance level of the tests was considered with $P < 0.05$.

RESULTS

The demographic data of the samples presented in Table 1. The results of this study showed that acupressure

group showed less pain compared to placebo and control group in all three intervention stages. Parental satisfaction in the acupressure group was more than other two group. There was a statistically significant relationship between pain reduction in acupressure group in comparison to control and placebo group (Table 2 and 3).

Table 1. The Demographic Characteristics of the Children undergoing tonsillectomy

Variable	Category	Control		Acupressure		Sham Acupressure		Total		P-Value
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	
Gender	Female	20	41.7	22	45.8	20	41.7	62	43.1	0.89
	Male	28	58.3	26	54.2	28	58.3	82	56.9	
Age(year)	8> age	25	52.1	27	56.2	19	39.6	71	49.3	0.23
	8<age	23	47.9	21	43.8	29	60.4	73	50.7	
Age Mean(year)		7.67		7.75		8.27		7.89		0.35
Weight Mean(Kg)		28.25		30.36		29.06		29.22		0.58

Table 2-Pain score changes before and after three session intervention

Group	One hour after surgery	4-2 hour after surgery	6-8 hour after surgery	P-Value
	M±SD	M±SD	M±SD	
Control	1.25±4.43	0.62±2.44	0.62±2.44	P=0.546
Acupressure	6.04±6.76	5.62±8.22	10±4.61	P= 0.002
Placebo	1.25±3.92	-0.04±6.78	1.04±3.71	P= 0.332

Table 3-The amount of analgesic medication consumption and parental satisfaction about pain reduction in three groups

Variable	Acupressure	Placebo	Control	P- value
	M± SD	M± SD	M± SD	
Intravenous Acetaminophen (Total number of administered doses)	1±1.2	1.6±1.2	1.1±1.6	0.05
Oral Acetaminophen (Total number of administered doses)	0.9±0.7	1.3±1.1	0.8±1.1	0.18
Parental Satisfaction with postoperative analgesic treatment	4.8±0.7	3.9±1.2	3.8±0.6	0.001

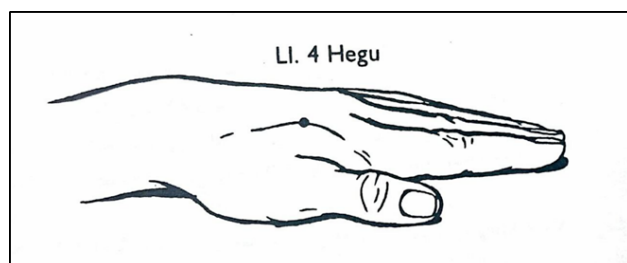


Figure1. Li 4 acupoint

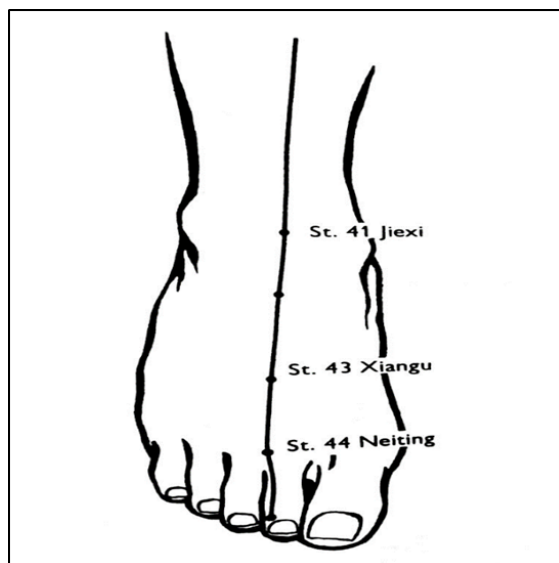


Figure2. St 44 acupoint

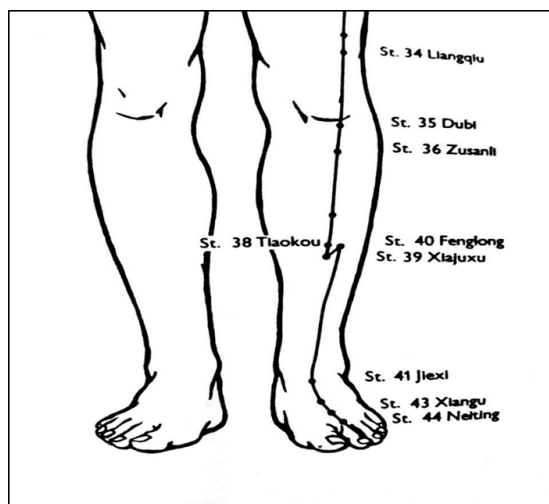


Figure3. St 36 acupoint

DISCUSSION

Tonsillectomy is one of the most surgeries around the world in children population, and the use of drugs for post-surgery pain control can cause many complications. The studies show that many parents are dissatisfied with drug therapy after surgery. This study is a novel study that was done to determine the effect of acupressure on pain after tonsillectomy in children aged 5 to 12 years old. So far, studies in the area of pain relief after pediatric

tonsillectomy have focused on the use of acupuncture in children. Based on the results of these studies, the use of acupuncture has led to a reduction in pain score after tonsillectomy in children and the satisfaction of parents but on the other hand, the use of needles in acupuncture leads to fear and panic, especially in young children. This restricts the widespread use of acupuncture in children⁽³⁶⁻³⁹⁾. Therefore, the use of other traditional medicine methods in children such as acupressure can be more effective.

Acupressure is a purposeful massage of acupuncture points that are used in mild to moderate pains. The results of this study showed that there is a significant statistical difference between the average of changes in the pain score before and after the intervention during time intervals of one hour, 2-4 hours and 6-8 hours after the tonsillectomy in the acupressure group ($P = 0.002$) but there is no significant difference in control group and placebo group (respectively: $P = 0.546$, $P = 0.332$).

As a result, acupressure on ST-36, Li-4 and ST-44 acupoints has had a positive impact on pain relief in children. With regard to the probability of the existence of the psychological effect of acupressure on pain, the placebo group was used in this study. Sham acupressure in the placebo group did not affect pain reduction ($P = 0.332$), therefore it is concluded that the positive effects of acupressure on pain relief was real and not suggestive.

The subjectivity of pain variable was the most important limitations of this study. In this study Self-report pain Oucher instrument was used to measure pain that young children may not have been able to accurately express their amount of pain and there was a possibility of error. Also in this study, researchers investigated the analgesic effect of acupressure up to 8 hours after surgery, and its long-term effects on pain and also after discharge of the child have not been investigated.

CONCLUSION

This study proposes acupressure as a non-pharmacological treatment for the pain control after tonsillectomy in children aged 5 to 12 years old. This is a clear perspective on the use of alternative and complementary medicine especially acupressure to reduce pain by nurses who care for these children. This technique even can be easily implemented by the parents of children. Therefore, in the future, considering the effectiveness of acupressure, suggested that nurses

participate in retraining and training programs as well as reinforcement and building the necessary skills in order to use acupressure for reducing children's pain after tonsillectomy.

Conflict of Interest: There is no conflict of interest between authors.

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Ethical Clearance: Informed consent, No cost to the patient.

REFERENCES

1. Borji M, Moradi M, Otaghi M, Tartjoman A. Relationship between Nutritional Status, Food Insecurity, and Causes of Hospitalization of Children with Infectious Diseases. *J Compr Ped. [Research Article]*. 2018;In Press(In Press):e63870.
2. Kazeminezhad B, Taghinejad H, Borji M, Tarjoman A. The Effect of Self-Care on Glycated Hemoglobin and Fasting Blood Sugar Levels on Adolescents with Diabetes. *J Compr Ped. [Research Article]*. 2018;In Press(In Press):e62661.
3. Badfar G, Mansouri A, Shohani M, Karimi H, Khalighi Z, Rahmati S, et al. Hearing loss in Iranian thalassemia major patients treated with deferoxamine: A systematic review and meta-analysis. *Caspian journal of internal medicine*. 2017;8(4):239.
4. Cho HK, Park IJ, Jeong YM, Lee YJ, SH. H. Can perioperative acupuncture reduce the pain and vomiting experienced after tonsillectomy? A meta-analysis. *The Laryngoscope*. 2016;126(3):608-15.
5. Dingemann J, Plewig B, Baumann I, Plinkert P, Sertel S. Acupuncture in posttonsillectomy pain. *HNO*. 2017;1-7.
6. Borji M, Shahbazi F, Nariman S, Otaghi M, Safari S. Investigating the Relationship Between Mother-Child Bonding and Maternal Mental Health. *J Compr Ped. [Research Article]*. 2018;9(1):e14014.
7. Sayehmiri K, Tavan H, Sayehmire F, Mohamadi I. Prevalence of epilepsy in iran using meta-analysis and systematic review. *Journal of Zanjan University of Medical Sciences and Health Services*. 2015;23(97):112-21.
8. Cheraghi F, Almasi S, GH R. Effect of parents training on controlling of pain due to tonsillectomy in hospitalized children: a randomized clinical trial study. *Scientific Journal of Hamadan Nursing & Midwifery Faculty*. 2014;22(2).
9. Fayoux P, Wood C. Non-pharmacological treatment of post-tonsillectomy pain. *European annals of otorhinolaryngology, head and neck diseases*. 2014;131(4):239-41.
10. Scalford D, Flynn-Roth R, D. H. Pain Management of Children Aged 5 to 10 Years After Adenotonsillectomy. *Journal of PeriAnesthesia Nursing*. 2013;28(6):353-60.
11. Setoodeh G, Sharif F, Z. M. The Effect of Preoperative Psycho- educational Intervention on Postoperative Pain in Children Undergoing Tonsillectomy. *Iran Journal of Nursing* 2013;26(84):53-62.
12. Sowder J, Gale C, J. H. Primary Caregiver Perception of Pain Control following Pediatric Adenotonsillectomy: A Cross-Sectional Survey. *Pediatric Otolaryngology journal*. 2016; 155(5):869-75.
13. Tsao GJ, Messner AH, Seybold J, Sayyid ZN, Cheng AG, B. G. Intraoperative acupuncture for posttonsillectomy pain: A randomized, double-blind, placebo-controlled trial. *The Laryngoscope*. 2015;125(8):1972-8.
14. AdibHajbaghery M, Etri M, M H. Pressure to the P6 Acupoint and Post-Appendectomy Pain, Nausea, and Vomiting: A Randomized Clinical Trial. *Journal of Caring Sciences*. 2013;2(2):115-22.
15. Tsao LCI, LK. Z. Complementary and alternative medicine approaches for pediatric pain: a review of the state-of-the-science. *Evidence-Based Complementary and Alternative Medicine*. 2005;2(2):149-59.
16. Motaghi M, Borji M, Moradi M. The effect of orange essence aromatherapy on anxiety in

- school-age children with diabetes. *Biomedical and Pharmacology Journal*. 2017;10(1):159-64.
17. Borji M. Investigating the effect of home care on death anxiety in patients with gastrointestinal cancer. *Govaresh*. 2017;22(2):131-2.
18. Otaghi M, Qavam S, Norozi S, Borji M, Moradi M. Investigating the effect of lavender essential oil on sleep quality in patients candidates for angiography. *Biomedical and Pharmacology Journal*. 2017;10(1):473-8.
19. Otaghi M, Bastami M, Borji M, Tayebi A, Azami M. The effect of continuous care model on the sleep quality of hemodialysis patients. *Nephrology monthly*. 2016;8(3).
20. Gangi Zh, Keramat A, M. A. effect of acupressure on labor pain reduction: A systematic review of randomize control trials. *Iranian Journal of obstetrics gynecology and infertility*. 2014;17(119):8-17.
21. Abbasoğlu A, Cabioğlu MT, Tuğcu AU, İnce DA, Tekindal MA, Ecevit A, et al. Acupressure at BL60 and K3 points before heel lancing in preterm infants. *Explore: The Journal of Science and Healing*. 2015;11(5):363-6.
22. Pomeranz B, Berman B, Stux G, N. S. *acupuncture: Textbook and Atlas*. Tehran: Dastan; 2012.
23. Wang SM, Escalera S, Lin EC, Maranets I, ZN. K. Extra-1 acupressure for children undergoing anesthesia. *Anesthesia & Analgesia*. 2008;107(3):811-6.
24. Cohen N, DD. S. Post-tonsillectomy pain control: consensus or controversy? *Pain*. 2016;6(1):31-7.
25. Gilbey P, Bretler SH, Avraham Y, Sharabi-Nov A, Ibrgimov S, A. L. Acupuncture for posttonsillectomy pain in children: a randomized, controlled study. *Pediatric Anesthesia*. 2015;25(6):603-9.
26. JW. O. Acupuncture instead of codeine for tonsillectomy pain in children. *International journal of pediatric otorhinolaryngology*. 2013;77(12):2058-62.
27. Stuck BA, Windfuhr JP, Genzwürker H, Schrotten H, Tenenbaum T, Götte K. Tonsillectomy in children. *Deutsches Ärzteblatt International*. 2008;105(49):852.
28. Shohani M, Abedi L, Rasouli M. Professional attitude in iranian nursing students. *Journal of Clinical and Diagnostic Research*. 2018;12(6):JC10-JC3.
29. Shohani M, Rasouli M, Sahebi A. The level of professional autonomy in Iranian nurses. *Journal of Clinical and Diagnostic Research*. 2018;12(5):LC01-LC4.
30. Borji M, Tarjoman A, Taghi Nejad H, Meymizade M, Nariman S, Safari S. Relationship between Knowledge-Skill and Importance of Physical Examination for Children Admitted to Infectious Wards: Examining Nurses' Points of View. *J Compr Ped. [Research Article]*. 2018;9(1):e63292.
31. Borji M THCTeodboaapcbD-P-Tiis-acAPID.
32. Borji M AT, Nurmohammadi H, Patients' Attitudes Toward the Cancer Pain Relief, *Asian Pacific Journal of Cancer Prevention*, 2018.
33. Vosough N, MitraChehrzad M, GH A. The effect of distraction technics on phisiological index and pain severity related to IV insertion in pediatrics. *Journal of The College of Nursing and Midwifery Tehran*. 2011;3(16):39-47.
34. Pirzadeh A, Ali□Mohammadi M, S. AA. The effect of peritonsilar lidocaine injection on post-tonsillectomy pain in children: A triple blind clinical trial. *Anesthesiology and Pain Journal*. 2013;3(2).
35. Beyer JE, Turne SB, Jones L, Young L, Onikul R, B. B. The alternate forms reliability of the Oucher pain scale. *Pain Management Nursing*. 2005;6(1):10-7.
36. Kemper KJ, R, Rebecca, LicAc MPH, al. e. On Pins and Needles? Pediatric Pain Patients9 Experience With Acupuncture. *Pediatrics*. 2000;105(Supplement 3):941-7.
37. Jindal V, Ge A, PJ. M. Safety and efficacy of acupuncture in children a review of the evidence. *Journal of pediatric hematology/oncology*. 2008;30(6):431.
38. Golianu B, Yeh AM, M. B. Acupuncture for pediatric pain. *Children*. 2014;1(2):134-48.
39. Adams D, Chen F, Jou H, al. e. The safety of pediatric acupuncture: a systematic review. *Pediatrics*. 2011:peds. 2011-1091.

The Effect of Time Management Training on the Performance of Head Nurses Working in Educational Hospitals Affiliated to Jondishapur University of Medical Sciences, Ahvaz

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ABSTRACT

Managers and professionals in the field of health are working in an environment with a lot of workload that requires effective leadership and management skills. The purpose of this study was to determine the effect of time management training on the performance of head nurses working in teaching hospitals in Ahwaz. This study is an experimental study of clinical trial type. 110 head nurses working in teaching hospitals in 2017 were selected by census method based on inclusion criteria and were divided into two groups of 55 test and control groups. For the test group, a two-day workshop was conducted on time management training. Data were analyzed by SPSS version 23.0. Most of the women's study units(96.4%) with the age range of 49-40 years(70.9%) had bachelor degree(96.4%), married(58.2%), with work experience of 11-15 years(43.6%) and nursing work experience from 6 to 10 years(43.6%). There was no significant difference between the two groups in determining the goals, organization and performance before and after the intervention ($P>0.05$). The observed difference was significant for two skills of mechanical and time control in the test group before and after training ($P<0.05$). The findings of the research showed that promoting the performance and empowerment of time management behaviors through training and improving the skills of time management mechanics and control over effective time. Suggested that by promoting awareness of nurses about managing their time through academic planning and in-service training periods, the principles of scientific management and performance among them will be promoted.

Keywords: head nurses, time management, performance.

INTRODUCTION

The pace of progress in science and technology indicates the importance and value of time as a precious resource ¹. Time is the most valuable resource available

to humans, because other sources are valuable on the condition of the existence of time². As in today's rapidly changing environment and widespread global competition, there is a continuous and growing awareness of the concept of time management, and time management has become a key indicator of organizational competence success³. Time management is the effective use of time that is achieved through certain targeted activities⁴. The management of time or, in fact, the effective use of individuals from time to time, in the today world, requires the development and promotion of human activities to achieve their goals⁵. Since the work environment of managers and employees in the field of health, especially teaching hospitals, is

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accompanied with a lot of workload and large number of patients, it is essential to implement effective leadership and management skills such as time management skill in such environments ⁶. This skill has a broad concept in a wide range of executive and managerial relationships that is closely related to the improvement of the quality of performance and its application can reduce or eliminate many of the daily pressures of managers ⁷⁻⁸. According to the mentioned issues, considering that one of the important tasks of nurses is management and the main part of management is knowledge of nursing management activities ⁹. Putz states that care planning is a good example of how to apply time management ¹⁰. Nemati study shows the importance and the necessity of planning and arranging time in health care workers to reduce stress by employing time management skills ¹¹. Hence, health workers with a wide range of nurses can benefit from time management by taking advantage of reduced fatigue, stress, and increased quality of nursing care ¹². Terry's study showed that there is a positive relationship between time management, self-regulation and self-efficacy ¹³. Unfortunately, despite the fact that the use of these time management skills is an important component of nursing managers' professional practice, it has not been considered ¹⁴. The correct recognition and on time of factors that waste time is very important. Meanwhile, managers must organize their activities based on all factors that affect performance¹⁵. Due to the relationship between time management and performance enhancement, performance can simply be considered as recording the rate of ascertained results. Kane believes that performance is what a person creates by his endeavor and it is as part of a goal ¹⁶. Zoghi et al. concluded that the need for time management training courses is essential to improve performance ¹⁷. Mccan believes that time management training programs can be used to reinforce three types of target setting and prioritization, time management mechanics, and organization, ¹⁸ that the goals of this research are based on these factors. The positive result of time management training is the results of Van Eerde's research, which shows that the use of time management training is in reducing worry and procrastination in work ¹⁹. The aim of this study was to determine the effect of time management training on the performance of head nurses working in teaching hospitals affiliated to Jondishapur University of Medical Sciences in Ahwaz, 2017.

This research is an experimental study of clinical

trial which was conducted after obtaining permission from the deputy of the research affairs of medical university and officials of teaching hospitals affiliated to Jondishapur University of Ahwaz. Sampling consists of 131 head nurses working in educational hospitals of Imam Khomeini, Razi, Golestan, Sina, Shafa, Taleghani and Abuzar. The inclusion criteria included employment in Hospital as head nurse with at least 1 year of experience in this position, having undergraduate or higher education, absence from the time management workshop in the last year, and willingness and satisfaction to participate in the research. 110 head nurses were selected and after obtaining written consent, they were randomly divided into two groups of 55 test and control groups to participate in the research. For both groups, a self-report questionnaire of time management skills by head nurses and a head-nurse performance evaluation checklist by the researcher were done indirectly at three different times in order to reduce the probability of error before and one month after the intervention. In this study, training how to use time management for the test group from the workshop classes was held in two sessions for 8 hours for two consecutive days. Discussions of the first session based on the first and second objectives of the research, which comprise goals and prioritization and time management mechanics including: Analysis of the status quo, Factors affecting time wasting, Prioritization of tasks and Examination of differences Individual topics and topics of the second session are based on the third and fourth objectives of the research, which control time and organization, including: admission styles, empowerment and management of the sessions. In order to motivate them to attend the workshop, one of the requirements to have a degree in clinical governance is to spend time management. The control group did not receive any training. Following the completion of the intervention, the ethical guidelines were given to the control group of the training package. The current questionnaire was designed by McCann and used by Hashemizadeh in Iran. The correlation coefficient between the two tests was 0.81²⁰. The headliners performance evaluation checklist consists of 63 questions in 7 dimensions. This form was approved by the Ministry of Health and was approved by the relevant ministry and communicated to all hospitals. In both instruments, the Likert grading scale has been used and the requested research units are one of the columns of always(4 points), most often(3 points), rarely(2 points) and never(1 point), and the sign

make a difference. Data were analyzed by SPSS version 23.0 and Chi-square, Mann-Whitney, covariance analysis, T test and Wilcoxon statistical tests.

FINDINGS

The results showed that most female study units(96.4%) with bachelor degree(96.4%) with marital status(58.2%) with a work experience of 11-15 years Year(43.6%) and nursing work experience were 6-10 years old(43.6%) in general(78.2%). Most of the subjects (81.8%) did not study time management books. (54.5%) did not attend management training courses, and management training courses(80%) were without time management content. Demographic variables based on chi-square test($P=0.716$), sex($P=0.647$), marital status($P=0.856$), education($P=1$), section type($P=0.82$), total records Nursing work($P=0.725$), total head work record($P=0.432$), all three dimensions

of time management study books($P=482$), participation in management training courses($P=0.702$) and with the content of management of time($P=0.815$) was not statistically significant between the two groups and they were identical. By adjusting the initial significant difference before intervention, there was no significant difference based on the results of covariance analysis for post intervention($P=0.267$). Also, there was no significant difference in the field of organization for the experimental and control groups before intervention based on the results of the Mann-Whitney test ($P=0.535$). There was a significant difference between the two groups after intervention ($P=0.333$)(Table 1). According to the results of t-test for the test group($P=0.06$) and control group ($P=0.206$), there was no statistically significant difference intra groups in both groups(Table 2). But in the two areas of time management mechanics and time control before intervention for both groups, based on the results of Wilcoxon test, there was no significant difference between the two groups($P=0.29$) and($P=0.641$), but after intervention, there was a

significant difference($P=0.009$) and($P=0.047$), respectively (Table 3). Comparison of research findings in the areas of goal setting and organization and performance of head nurses before and after intervention in both groups did not change ($P>0.05$).

Table 1. Comparison of mean and standard deviation in two areas of goal setting and prioritizing and organizing before and after intervention

	Group	Test	Control	P-value
	Time	SD±Mean	SD ±Mean	
Setting goals and prioritizing	Before intervention	26.3091±1.46	26.8545±1.47	0.331
	After intervention	28.2182±1.43	28.1091±1.54	0.267
Organizing	Before intervention	28.2182±1.61	28.0545±1.73	0.535
	After intervention	29.4909±1.19	29.1636±1.53	0.333

Table 2. Comparison of mean and standard deviation of head nurses' performance before and after intervention

Group	Test	Control	P-value
	SD±Mean	SD±Mean	
Before intervention	180.6000±13.52	179.0182±14.71	0.558
After intervention	183.1818±13.63	179.8727±15.17	0.232
P-value	0.06	0.206	

Table 3. Comparison of mean and standard deviation in two areas of time management mechanics and control over time before and after intervention

	Group	Test	Control	P-value
	Time	SD±Mean	SD±Mean	
Time management mechanics	Before intervention	24.5455±2.47	24.9636±2.38	0.29
	After intervention	29.9273±2.27	25.6727±2.42	0.009
Control on time	Before intervention	21.6364±2.05	21.4364±1.88	0.641
	After intervention	25.8727±2.26	23.1818±2.14	0.047

DISCUSSION

Findings of the research showed that time management training through promotion and empowerment of time management mechanics and time control has improved the skills of time management and performance in head nurses. The lack of effect of training on skill development goals and prioritization in this study can be recognize due to this fact, the above-mentioned skills were often taught during nursing education and nursing courses with special emphasis on the nursing process and as an integral part of the nursing skills ²¹. The results of various studies on the use of nurses from a limited time period can be mentioned, including Khodam and Kollagari (2009), showed that the application rate in the area of setting goals and prioritizing before training was 83.9% and after training increased to 91.8%, which indicates the lack of effect of time management training in this area before and after intervention²¹. Bahadori et al. study showed that the highest average of application time management skills was related to goal setting and prioritization with 1.79 points ²². The results of studies conducted by Hafezie et al. (2008) and Steiner et al. (2003) also show that nurses use several time management strategies, but setting their goals and their main priorities are the main ²³⁻²⁴. In the conducted study by Orpen, there was a significant difference between the use of skill development goals and prioritization of time management in the training group compared to the control group, which did not adhered to the results of this study ²⁵. A manager in such a situation and stress caused by that situation will not face with wasting of time ²⁰. So, it seems quite logical that for a head nurse in one part always everything are in their place, ordered and organized so that work can be done on time. Therefore, the ineffectiveness of educational intervention in the field of organization

seems quite logical. Hashemizadeh's study (2006) showed that head nurses in the level of organization and order are in a good level of 90%, which is consistent with the present study ²⁰. The limitation in the above study, ie, the study only before and after, and the lack of consideration of the intervention and control group, could be the reason for the difference in results with the present study. The study of Ziapour et al. (2015) suggests that nurses are well-organized in the organization with a mean of 4.24 ²⁶. In order to achieve the performance of head nurses with regard to the lack of change in the two stages before and after the intervention in the two groups, it should be noted that in the present study, performance measurement was performed one month after the intervention. Other studies, such as Boost, did not show a significant difference in the performance of medical students after completing a time management training program, and the results of the intervention were immediately evaluated after education, which is in line with the results of this study ²⁷. The study of El-Shaer (2015) indicates a significant improvement in head nurses' performance 3 months after the intervention from a mean score of 85.25 to 93.5. The reason for the differences in the findings of the above studies with the present study can be due to the difference between the intervention period and the performance evaluation.

CONCLUSION

The findings of this study indicate the promotion of performance and the empowerment of time management behaviors by training and improving the skills of time management mechanics and controlling time. Therefore, it is suggested that knowledge of nurses about managing their time through academic planning and in-service training will promote the principles of scientific management and performance among them.

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REFERENCES

1. Marquis BL, Huston CJ. Leadership roles and management function in nursing. Theory and application. 4th. Philadelphia: Wolters Kluwer Health/Lippincott Williams & Wilkins, 2003.
2. Ghaedmohammadi MJ. The important factors of students' time management among Islamic Azad University. Social Research. 2010;3:57-73.
3. Zampetakis LA, Bouranta N, Moustakis VS. On the relationship between individual creativity and time management. Thinking Skills and Creativity. 2010;5:23-32.
4. Claessens BJC, Van Eerde W, Rutte CG, Roe RA. A review of the time management literature. Personnel Review. 2007;36:255-76.
5. Nonis SA, Hudson GI. Academic Performance of College Students: Influence of Time Spent Studying and Working. Journal of Education for Business. 2006;81:151-59.
6. Abbasi KH. Evaluation of managerial skills Secondary School Principals city Education Department of Tehran Province. Research project. Education Organization Tehran province, 2004.
7. Arnold E, Pulich M. Improving productivity through more effective time management. Health Care Manag. 2004;23:65-70.
8. Sarp N, Yarpuzlu AA, Mostame F. Assessment of time management attitudes among health managers. Health Care Manag. 2005;24:228-32.
9. Hosseini MM. Fundamental of Nursing Management. 3rd ed Tehran: Hidji H: 2012:37-63.
10. Puetz BE. Management help line asked to speak? Accept invitations with care, RN, 1996.
11. Nemati M, Parsaei M. A Survey of correlation between Stress and time management skills. J Mazandaran Univ Med Sci. 2009; 19:84-5.
12. Orgenstern J. Time management from the inside out: New York: Hencry holt, 2000.
13. Trueman M, Hartley J. A Comparison Academic Performance of Mature and Traditional-Entry University Students. 1996. Higher Education. 2002;32:199-215.
14. Birkinshaw J, Caulkin S. How should managers spend their time?: finding more time for real management. Business Strategy Review. 2012;23:62-5.
15. Indreica ES, Cazan AM, Truta C. Effects of learning styles and time management on academic achievement. Procedia - Social and Behavioral Sciences. 2011;30:1096-102.
16. Mannion R, Goddard M. Impact of published clinical outcomes data: case study in NHS hospital trusts. British Medical Journal. 2001;323:260-63.
17. Zoghi L, Ajilchi B, Nobahar Z. The Relationship between Time Management with Job Stress among Managers and Employees of Police women. Research project. Quarterly Disciplinary Knowledge. 2013;15:141-65.
18. Maccan TH. Time management training: effects on time behaviors, attitudes, and job performance. The Journal of Psychology. 1996;130:229-36.
19. Van Eerde W. Procrastination at work and time management training. J Psychol. 2003;137:421-34.
20. Hashemizadeh H. The relationship between time management behavior and job stress in medical surgical unit' head nurses of Shahid- Beheshti Medical Sciences university. The quarterly Journal of Fundamentals of mental health. 2006;29-30:51-6.
21. Khodam H, Kollagari SH. Impact of workshop training of time management skills on its application by head nurses. IJNR. 2009;4:63-9.
22. Bahadori M, Raadabadi M, Salesi M, Ameryoun A, Hojati Dana A, Teymourzadeh E. The Study of Time Management Skills among Military and Civilian Hospitals' Managers. Journal of Military Medicine. Spring. 2016;1:347-53.
23. Hafezi S, Naghibi H, Naderi E, Najafi M, Mahmoudi H. The correlation between personal skill and organizational behavioral time management among educational administrators. Journal of Behavioral Sciences. 2008;2:183-92.

24. Steinert Y, Nasmith L, Daigle N. Executive skills for medical faculty: a workshop description and evaluation. *Med Teach.* 2003;25:666-68.
25. Orpen C. The effect of time management training on employee attitudes and behavior: a field experiment. *The Journal of Psychology.* 1994;128:393-96.
26. Ziapour A, Khatony A, Jafary F, Kianipour N. Evaluation of Time Management Behaviors and Its Related Factors in the Senior Nurse Managers, Kermanshah-Iran. *Global Journal of Health Science.* 2015;2:366-73.
27. Bost JM. Retaining students on academic Probation: effects of time management. *Journal of Learning Skills.* 1984;3: 38-43.

Analysis of Hard Dental Tissues and Bone Exposed to Concentrated Acids: An Observational Study

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ABSTRACT

Day by day the nature of crime is changed by using fire and acid attack or chemical attack as expert of witness for identification as forensic scientist is difficult because different nature of attack in the process of identification of persons. Teeth are also good reservoirs of for identification of individuals by morphological as well as identification extraction mitochondrial DNA. The present study was aimed to assess the morphological changes and duration of dissolution of teeth and bone immersed in different forms of concentrated acids. Materials and Methods: different grades of hydrochloric acid, nitric acid, and sulphuric acid were used for tooth and bone. **Results:** Hydrochloric acid and after this nitric acid has more destructive capacity compared to sulphuric acid. Conclusion: Sulphuric acid, nitric acid and hydrochloric acid criminal may used to destroy the persons identification still the individuals can identified by using teeth because it is strongest structure of human body and can preserve some structures even after exposing to the concentrated acids.

Keywords: Acid-immersed teeth, forensic odontology, forensic sciences, sulphuric acid, nitric acid, hydrochloric acid.

INTRODUCTION

Forensic odontology was defined as “that branch of forensic medicine which in the interest of justice deals with the proper handling and examination of dental evidence and with the proper evaluation and presentation of the dental findings.” Forensic science refers to areas of undertake that can be used in a judicial setting and accepted by the court and the general scientific committee to separate truth from untruth.^[1]

Now days’ criminals are using acids to destroy bodies in order to avoid any personal identification.

Destroying the human body partially or totally by immersing it in an acid and if so, how much time is necessary for its complete destruction the forensic scientist needs to know whether it is possible. Another important question is whether any measures of identifying the affected individual from the residual remains.^[2] Very few studies that have actually pointed on the chemical means of human body destruction and the issue of positive identification of persons after acid dissolution. There is a brief mention in the Italian journal *Archivio di Medicina Legale* of an experimental animal destruction in an acidic environment.^[3] The identification of dental hard tissues remain is of prime importance when the deceased person is, decomposed, burned, or dismembered.^[4,5] Since the natural teeth are the most durable and strongest of all tissues, they can retain their identity even after other skeletal structures have been destroyed by physical agents and also with chemical means. Further, it is now possible to extract DNA from tooth even decades after death. It is possible

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to employ these identification techniques until there has been complete destruction of the teeth.^[6,7]

The aim of this study was find out the and compare the approximate time taken for total destruction of a tooth and bone after immersion in different concentrated acids. The objective was to observe the morphological changes in natural human teeth and bone when they were kept immersed in different acids.

METHODOLOGY

A total 60 specimens containing 30 single rooted teeth and 30 of 1x1 cm bone specimens are used for the study. All teeth were non-carious and had been extracted because of periodontal reasons. Bone specimen from radius bone specimens from the archives of the Department of General Pathology. Acids were used in this study are 25 ml of Aqueous solution of hydrochloric acid (HCl), 25ml of Aqueous solution of nitric acid (HNO₃) and 25ml of Aqueous solution of sulfuric acid (H₂SO₄). 25 ml each for teeth and bone specimens. 10 Samples of teeth and bone were immersed in 25 ml of each acid solution and observed.

All specimens were immersed separately in different containers containing the three different acids. At various intervals the samples were taken out of the container and observed any morphological changes and noted changes and time of interval, they were then photographed and placed back in the containers. The specimens were under observation until they had completely dissolved or completely precipitated. Morphological changes were observed in the following points; Effervescence, colour alterations, transparency, disintegration, complete dissolution and precipitation. Each specimen's morphology based on macroscopic was noted at every time intervals.

RESULTS

Table 1 and Figure 1 and 2: For a tooth and bone placed in 37% HCl effervescence, colour change, Transparency and disintegration were observed at various intervals.

Table 2 and Figure 3 and 4: Tooth and bone placed in 65% HNO₃ yellowish discoloration, Transparency and disintegration were observed at various intervals.

Table 3 and Figure 5 and 6: In 96% H₂SO₄ Effervescence, discolouration, white precipitation with

fragmentation and complete dissolution observed.

DISCUSSION

Acids are known to be used in laboratory procedures and in some cases criminals are used to erase the personal identification. In such a case, Human dentition serves viable evidence in this scenario. Dental professionals have a major role to play in keeping accurate dental records and providing all necessary information so that legal authorities may recognize mal practice, negligence, fraud or abuse, and identity of unknown individuals.^[8] The present paper is summarize how teeth are strong enough to help in identifying the individuals even in acidic conditions. The aim of present study was to find out and compare the approximate time taken for total destruction of a hard tissues (teeth and bone) after immersion in an acids and observe the morphological changes in natural human teeth and bone when they were kept immersed in an acids.

In the present study shows the total destruction of tooth in 37% HCL was 14-16 hour, for 65% HNO₃ was 13-14 hours and for 95% H₂SO₄ was almost 120 hours for complete dissolution. Similarly for bone specimens 37% HCL was 8 hour, for 65% HNO₃ was 8 hours and for 95% H₂SO₄ was 9-10 hours. These results show that tooth is stronger than bone it can withstand for some hours even complete immersion of tooth specimen not only acid spill or splashing attack. These result concordance with the study conducted by Jadhav, *et al.*^[9] The use of dentition in forensic approach for identification of individuals and gender determination in this study the evidence that the natural teeth are the more durable than the bone. They can survive even after other skeletal structures of body have been destroyed by physical agents. Morphological changes and duration of tooth and bone with different concentrated acids have been summarised in Table1, 2 and 3.

Thus, different destructive capacities of the different acids in tooth and bone are clear and differences were observed in the present study. The information derived in this study on the change in the morphology of teeth and bone immersion in acid solution after particular periods [Table 1, 2 and 3] can be utilized for recognition of the acid used and to infer the approximate duration of immersion in the acid. Morphological changes may vary when the uses of different acids and different concentration are used in different tissues; however, it

must be noted that the concentrated acids that we have used are commonly available commercially. Some other factors have also to be considered. Minimum of 80–100 liters of acid is required for complete dissolution of a body.^[6] Criminals are always think in their choice by easily availability of the acid, cost, and effect. They will be more likely to use an acid that is easily available, cheap, and with the ability to destroy the body rapidly. Tooth is being hardest and chemically the most stable and durable tissue in the body, in forensic investigative teeth can be an important medium in both living and nonliving populations. Teeth are also good reservoirs of both cellular and mitochondrial DNA; however, the quality and quantity of DNA obtained varies according to the environment the tooth has been subjected to.^[10,11] Thus, based on these observational results, we conclude that commonly used acids like HCL, HNO₃ and H₂SO₄ that would be most likely used in such crimes. Morphological Recognizable appearances of teeth retained for 8 h in HCl, 10 h in HNO₃, and up to 85 h in H₂SO₄. Among the these three acids, dissolution of teeth was faster in concentrated hydrochloric acid than the nitric acid and followed by in sulfuric acid. Similar findings were found in studies conducted by Mazza *et al.*^[6] and Jadhav, *et al.*^[9] The duration for dissolution is different in these studies as the acids with different concentrations. Changes in the Morphology of teeth can help the forensic identification to deduce the acid used and the time taken since plunge of the body in the acid until it can be give support with other biochemical investigations. From the observation of the present study it is concluded that hard tissues like teeth and bone will not react in the same way with different acid environment. Soluble salts of calcium chloride and calcium nitrate are formed from tooth when placed in the HCl and HNO₃ respectively, dissolving them in toto. Insoluble calcium sulfate salt failing to dissolve completely forming an insoluble precipitate when tooth placed in conc.H₂SO₄.^[6,9] Hence, teeth can serve as important evidence when a person is affected with highly concentrated acids aiming at destruction of persons identification.

By the this observation a positive diagnosis can be made with a tooth, when a victim's body is treated with H₂SO₄ (80-100 hours). Comparatively if bodies are plunge in the conc. HCl and conc and HNO₃ (within 8-10 hours). Such kind of situations where it is impossible to identify the dental structures, other investigations can be considered, such as: DNA analysis (mitochondrial) of the residues.

Analysis of DNA has brought about a revolution in the field of forensic identification, including forensic odontology, anthropology, and archaeology, has made identification easier and more accurate.^[12]

Further studies should be conducted for the effects of acids surrounding structures of the tooth, restored tooth and prosthetic appliances have not been assessed. Realistically, the present study does not take into account the influences of all possible factors that may be present in real life conditions. For example, root portion of tooth is surrounded by the soft and hard tissues makes the root part more resistant to acid insults.

CONCLUSION

Hydrochloric acid is the most commonly used acid It can be used to destroy the human body completely. The crimes of this nature, changes in the morphology of tooth can help the forensic scientists to deduce the time elapsed since plunge of the body in the acid. By keeping in mind the likely choices of the criminal and by observing the changes morphology in the tooth, it may be possible to deduce which acid has been used to destroy the body and helpful in identification of individuals. However, the final decision can be made on which acid has been used on the bases of biochemical tests.

From this study we observed that sulphuric acid, nitric acid and hydrochloric acid criminal may used to destroy the persons identification still the individuals can identify by using teeth because it is strongest structure of human body and can preserve some structures even after exposing to the concentrated acids. Further studies can be performed such as to assess if DNA from the tooth pulp can be extracted in such teeth specimens.

RESULTS**Table 1: Sequential morphological changes along with Duration, in teeth and bone after the immersion of specimens in 37% HCL acid**

Morphological changes	Tooth	Bone
Effervescence seen	10 min 10/10 teeth 100%	5 min 8/10 bone specimens (80%)
Yellow-coloured residue deposited	No colour changes	1 h not very significant colour changes in bone 2/10 bone specimens (20%)
Transparency	2.5 h 4/10 teeth (40%)	Not seen in bone
	4 h All teeth shown transparency	Not seen in bone
Disintegration	6 h Disintegration from periphery surfaces 10/10 teeth (100%)	3 h Disintegration Started from periphery 10/10 bone specimens (100%)
	8 h Disintegration Extended to middle third 8/10 (80%)	5 h Extended to centre of bone
	10 h Extension of disintegration	
Dissolution	12 h 6/10 (60%) teeth were seen dissolving	8 -10 h Complete dissolution of bone
	14-16 h Near complete dissolution 8/10 (80%)	
	18-20h Complete dissolution 10/10 (100%)	

Table 2: Sequential morphological changes along with Duration, in teeth and bone after the immersion of specimens in 65% HNO₃ acid

Morphological changes	Tooth	Bone
Effervescence seen	Immediately 10/10 teeth 100%	Immediately min 8/10 bone specimens (80%)
yellow-coloured residue deposited	15 min Yellow discolouration seen 10/10 teeth (100%)	5 min Yellow discolouration seen 10/10 bone specimens (100%)
Transparency	1-2 h 4/10 teeth (40%)	Not seen in bone
	By the end of 4 h All teeth shown transparency	

Cont... Table 2: Sequential morphological changes along with Duration, in teeth and bone after the immersion of specimens in 65% HNO₃ acid

Disintegration	5 h Disintegration started 10/10 teeth (100%)	3 h Disintegration Started from periphery 10/10 bone specimens (100%)
	7-8 h Disintegration Extended to middle third 8/10 (80%)	5 h Extended to centre of bone
	By 10 h Breakage of tooth	No breakage in bone
Dissolution	12 h 6/10 (60%) teeth were seen dissolving	6 h Soft
	13-14 h Near complete dissolution 8/10 (80%)	8 h Complete dissolution of bone
	16 h Complete dissolution 10/10 (100%)	

Table 3: Sequential morphological changes along with Duration, in teeth and bone after the immersion of specimens in 95% H₂SO₄ acid

Morphological changes	Tooth	Bone
Effervescence seen	Immediately 10/10 teeth 100%	Immediately min 8/10 bone specimens (80%)
Colour changes	15 min brown discolouration seen 10/10 teeth (100%) After the colour change No changes seen till 4 h	5 min brown discolouration seen 10/10 bone specimens (100%) After the colour change No changes seen till 3 h
Transparency	Not seen teeth	Not seen in bone
White precipitate with fragmentation	White precipitation started at 5 hours 12 h Teeth in 4/20 (20%). Tooth was able to recognize 20 h - - White precipitate was increased in 10/20 teeth (50%), with splinter The tooth was Recognize able in 20/20 teeth (100%) 30 h - Increased white precipitate was in 16/20 teeth (80%), with splinter in 14/20 teeth (70%). The tooth was still recognize able in 10/10 cases (50%) 60 h – Increased white precipitate was in 16/20 teeth (80%), with splinter seen in 16/20 teeth (80%). Tooth was recognize able in 6/20 cases (30%) 130 h - Complete precipitate in 16/20 teeth (80%) Still some broken tooth fragments were intact	White precipitation started at 4 hours 8 h bone in 20/20 (100%). Bone was not able to recognize 14 h bone in 20/20 (100%). Bone was not able to recognize

Tooth With HCL

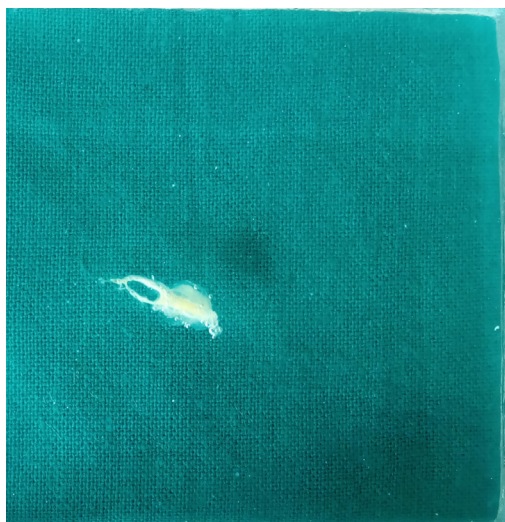


Figure. 1 Complete dissolution of tooth in HCL at 18 hours

Bone With HCL



Figure. 2 Disintegration of bone in HCL at 4 hours

Tooth With HNO₃

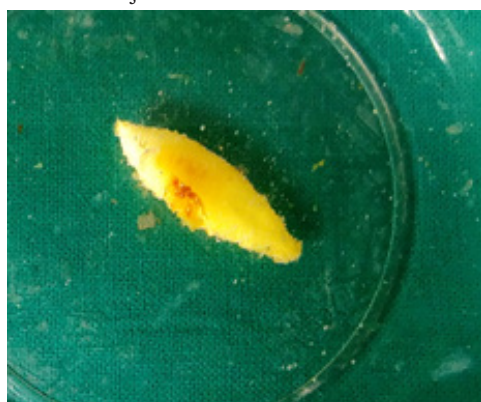


Figure.3 Yellow Discolouration of tooth in HNO₃ at 15 min

Bone With HNO₃



Figure. 4 Yellow Discolouration of bone in HNO₃ at within 5 min

Tooth With H₂SO₄

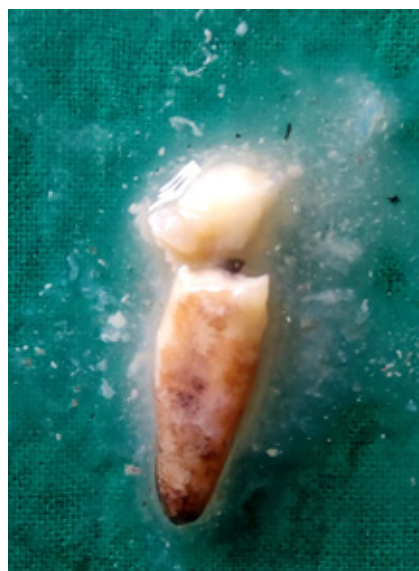


Figure 5. White precipitation and Fragmentation of tooth in H₂SO₄ at 20 hours

Bone With H₂SO₄



Figure. 6 White precipitation and Fragmentation of bone in H₂SO₄ at 8 hours

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REFERENCES

1. O'Shangnessy PE. Introduction to forensic science. Dent Clin North Am. 2001;45:217-27.
2. Raj M, Boaz K, Srikanth N. Are teeth evidence in acid environment. J Forensic Dent Sci 2013;5(1): 7-10.
3. Danesino P, Alonzo M, Carlesi G. Experimental evaluation of the biological samples dissolution performed by three different acids: preliminary results. Archivio di Medicina Legale 1998;1:23-6.
4. Avon SL. Forensic Odontology: The roles and responsibilities of the dentist. J Can Dent Assoc 2004;70:453-8.
5. Zappa J, Cieslik-Bielicka A, Adwent M, Cieslik T, Sabat D. Comparison of different decalcification methods to hard teeth tissues morphological analysis. Dent Med Probl 2005;42:21-6.
6. Mazza A, Meralati G, Savio C, Fassina G, Menaghini P, Danesino P. Observation of dental structure when placed in contact with acids: an experimental study. J Forensic Sci 2005;50:406-10.
7. Ginther C, Issel-Tarver L, King MC. Identification of DNA from human extracted teeth. Nature Genetics 1992;2:135-8.
8. Rothwell BR. Principles of dental identification. Dent Clin North Am 2001; 45: 253-69.
9. Jadhav K, Gupta N, Mujib BR, Amberkar VS. Effect of acids on the teeth and its relevance in postmortem identification. J Forensic Dent Sci. 2009;1:93-8.
10. Sowmya, K., Sudheendra, U., Khan, S., Nagpal, N., & Prathamesh, S. Assessment of morphological changes and DNA quantification: An in vitro study on acid-immersed teeth. Journal of Forensic Dental Sciences, 2013;5(1), 42-46.
11. Linjen I, Willems G. DNA research in forensic dentistry. Methods Find Exp Clin Pharmacol. 2001;23:1-7.
12. Presecki A, Brkic H, Primorac D, Drmic I. Methods of preparing the tooth for DNA isolation. Acta Stomatol Croat 2000;34:21-4.

Stability Enhancement Using Region based Certification Mechanism in Manet

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ABSTRACT

Clustering in mobile ad-hoc networks (MANETs) is one of the effective ways to organize a network according to the network topological changes. In this paper, we propose a Stability Enhancement using Region based certification Mechanism in MANET to improve scalability and stability of overall network. For proper use of resources and to reduce extra energy consumption, an algorithm is also proposed to handle the isolated nodes. Ad-hoc on-demand distance vector will be addressed by using cryptography technique for securing route discovery and data transmission. Simulation results using NS2 depict the improvement of packet delivery rate and network throughput.

Keywords: mobile ad-hoc networks, Stability Enhancement, route discovery, energy consumption, Simulation results.

INTRODUCTION

MANET has a significant potential in multiple fields with numerous applications. It is rapidly improving and evolving for the practical implementation in several civilian and military real time scenarios. MANET has a potential to act as a backup network to facilitate users in case of failure of other networks in any disaster. The feature of data transmission at multiple hops through nodes with large coverage area makes it an ideal choice to be used in natural disaster and emergency situations. Furthermore, MANETs consists of mobile nodes capable of creating a network topology with dynamic environment.

In MANETs, main challenges for clustering algorithms are optimal CH selection, network topology management and improvement of network performance in the presence of mobility along with minimization of energy consumption at every node. Selection criteria of a CH are unique in every category of clustering scheme. The decision regarding the selection of CH among all member nodes takes place on the basis of weight value of a node. A weight value of each node is calculated based on the combined value of node degree, node energy and relative speed of a node. Stability Enhancement using Region based Certification Mechanism (SERCM) is proposed in this paper.

The rest of this paper is proposed as follows: the related works is followed in the next section. Stability Enhancement using Region based Certification Mechanism is explained in the third section, followed by performance analysis and comparative evaluation. Finally, the conclusion is written in the last section.

RELATED WORKS

Cognitive radio (CR) is viewed as a promising innovation for giving a high ghastry effectiveness to portable clients by utilizing heterogeneous remote system structures and dynamic range get to strategies. Range administration capacities with self-organization highlights can be utilized to address these difficulties and understand this new system worldview. Basics of CR, including range detecting, range administration, range portability and range sharing, have been reviewed, with their ideal models of self-organization being underlined ^[1]. Smart and Balanced Clustering for MANETs (SALSA) presents another group adjusting instrument and a best clustering metric, expecting to give a lessened support overhead. SALSA was assessed and contrasted and the Novel Stable and Low-upkeep Clustering Scheme (NSLOC), highlighting topologies with up to 1000 hubs and speeds of 20 meters for each second ^[2].

Enhanced maximum stability weighted clustering algorithm (EMSWCA) was based on the WCA and the MSWCA algorithm. The EMSWCA explicitly identifies the maximum load parameters of clusters, accelerates the convergence speed, and provide a certain degree of Quality of Service (QoS) [3]. Bio-inspired self-organizing Low-Complexity Clustering (B-LCC) algorithm does not require sensor locations, time synchronization or any prior knowledge of the network. It is completely distributed and can achieve a well-distributed cluster heads. The processing time complexity of the B-LCC algorithm is $O(1)$ per cluster, which outperforms most of the existing clustering algorithms as they have processing time complexity of $O(n)$ per node in the worst case [4]. Additionally, the B-LCC algorithm has a stable performance in topology control and the formed topology is robust to node failure.

The main contributions include providing principles and optimization approaches of variant bio-inspired algorithms, surveying and comparing critical SON issues from the perspective of physical-layer, Media Access Control (MAC)-layer and network-layer operations, and discussing advantages, drawbacks and further design challenges of variant algorithms, and then identifying their new directions and applications [5]. Mobility prediction-based clustering (MPBC) scheme for ad hoc networks with high mobility nodes was developed, where a node may change the associated cluster head (CH) several times during the lifetime of its connection. The proposed clustering scheme includes an initial clustering stage and a cluster maintaining stage. The Doppler shifts associated with periodically exchanged Hello packets between neighbouring nodes are used to estimate their relative speeds, and the estimation results are utilized as the basic information in MPBC. In the initial clustering stage, the nodes having the smallest relative mobility in their neighbourhoods are selected as the CHs. In the cluster maintaining stage, mobility prediction strategies are introduced to handle the various problems caused by node movements, such as possible association losses to current CHs and CH role changes, for extending the connection lifetime and providing more stable clusters [6].

Three different clustering methods are applied to classify the RSSI and Link Quality Indicator (LQI) data recorded from the unknown wireless topology into a certain number of groups in order to determine the number of active sensor nodes in the unknown

wireless topology [7]. An Unobservable secure routing scheme offers complete unlinkability and content unobservability for all types of packets. This protocol is efficient as it uses a combination of group signature and ID based encryption for route discovery [8].

CBMD takes into consideration the parameters: connectivity (C), residual battery power (B), average mobility (M), and distance (D) of the nodes to choose locally optimal cluster heads [9]. The goals of this algorithm are maintaining stable clustering structure with a lowest number of clusters formed, to minimise the overhead for the clustering formation and maintenance and to maximise the lifespan of mobile nodes in the system. In Decentralized distributed Space Time Block Coding (Dis-STBC) system, the knowledge about the Channel State Information (CSI) is not available at the transmitter [10].

Stability Enhancement using Region based Certification Mechanism

In this paper, Stability Enhancement using Region based Certification Mechanism is proposed in MANETs. The proposed mechanism uses Route Request (RREQ), Route Reply (RREP) and Route Error (RRER) messages. A novel technique is proposed which secures not only the route discovery but also the transmission of data using cryptographic technique.

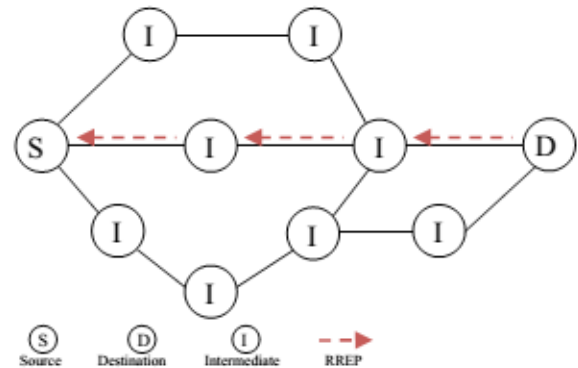


Figure 1 Unicasting RREP message

Figure 1 shows the unicasting RREP message. The novel ideas are as described as follows: The Certification Authority (CA) will be utilized to ask for destination public key by just source node. The idea of asymmetric cryptography will be utilized for the safe route discovery and exchange of session key. Symmetric cryptographic techniques such as Advance Encryption Standard (AES) are used for data encryption.

SERCM has source (S), destination (D), intermediate node (I), Source IP address (S_{IP}), Destination IP address (D_{IP}), public key of $x(K_{BX})$, private key of $x(K_{AX})$, where x denotes the source or destination, encryption key (E_k), decryption key (D_k) and session key (K_s).

It is expected that the source hub has effectively gotten the destination public key (K_{BD}), from CA. The originating node or source node creates a Route Request (RREQ), and appends its public key (K_{BS}) decrypted by destination public key (K_{BD}) from CA and is described in equation 1.

$$RREQ + E_{k_{BD}}(K_{BS}) \quad (1)$$

On reception of the $RREQ + E_{k_{BD}}(K_{BS})$ packet, the intermediate node checks the IP address of the destination in RREQ by checking this IP address in its routing table. The $RREQ + E_{k_{BD}}(K_{BS})$ packet will be forwarded with increasing hop count and one in RREQ if this node is not a destination. Typically, the $RREQ + E_{k_{BD}}(K_{BS})$ packet will be forwarded by the intermediate nodes until it reaches the destination without decrypting the source public key $E_{k_{BD}}(K_{BS})$.

The destination node gets the source public key (K_{BS}) after checking its IP address in RREQ by utilizing its private key (K_{AD}), to decrypt $E_{k_{BD}}(K_{BS})$ and is given in equation 2.

$$D_{k_{AD}}(E_{k_{BD}}(K_{BS})) \quad (2)$$

A session key (K_s) and RREP are generated by destination node and destination node uses the source public key (K_{BS}) to encrypt the session key (K_s) and destination IP address (D_{IP}) as shown in equation 3.

$$K_{BS}(k_s + D_{IP}) \quad (3)$$

For authentication, the destination node then encrypts $K_{BS}(k_s + D_{IP})$ with its private key (K_{AD}) as in equation 4.

$$E_{k_{AD}}(K_{BS}(k_s + D_{IP})) \quad (4)$$

The RREP attached is unicasted towards the source node along the route by the destination node as in equation 5.

$$RREQ + E_{k_{AD}}(K_{BS}(k_s + D_{IP})) \quad (5)$$

The originating node or source node receives two packets from its neighbours. The source node obtains the source and destination IP address from RREP. The source node confirms the authenticity of destination node by using the destination public key (K_{BD}) to decrypt destination private key (K_{AD}) as given in equation 6.

$$D_{k_{BD}}(E_{k_{AD}}(E_{K_{BS}}(k_s + D_{IP}))) \quad (6)$$

The source node decrypts $E_{K_{BS}}(k_s + D_{IP})$ from equation 6 by using the source private key (K_{AS}) for session key (K_s) and destination IP address (D_{IP}) as shown in equation 7.

$$D_{k_{AS}}(E_{K_{BS}}(k_s + D_{IP})) \quad (7)$$

The source node will verify whether the destination IP address are from RREP packet and its encrypted attachment $E_{k_{AD}}(E_{K_{BS}}(k_s + D_{IP}))$ are equal with high destination sequence number (D_{SEQ}) and Low hop count. Otherwise, the other received packet will be discarded by source node. The source node uses the session key (K_s) generated by destination node for secure data transmission between the source node and destination node in the communication network.

PERFORMANCE EVALUATION

The performance of the proposed scheme is analyzed by using the Network Simulator (NS2). The NS2 is an open source programming language written in C++ and OTCL (Object Oriented Tool Command Language). NS2 is a discrete event time driven simulator which is used to model the network protocols mainly. The nodes are distributed in the simulation environment. The parameters used for the simulation of the proposed scheme are tabulated in Table 1.

Table 1 Simulation Parameters of SERCM

Parameter	Value
Number of nodes	50
Routing scheme	SERCM and MPBC
Traffic model	Constant Bit Rate
Simulation Area	900×900 m ²
Channel	Wireless Channel
Transmission range	250m
Communication Protocol	UDP
Antenna	Omni Antenna

The simulation of the proposed scheme has 50 nodes deployed in the simulation area 900×900. The nodes are communicated with each other by using the communication protocol User Datagram Protocol (UDP). The traffic is handled using the traffic model Constant Bit Rate (CBR). The radio waves are propagated by using the propagation model two ray ground. All the nodes receive the signal from all direction by using the Omni directional antenna. The performance of the proposed scheme is evaluated by the parameters packet delivery rate, packet loss rate, average delay, throughput and residual energy.

Packet Delivery Rate

The Packet Delivery Rate (PDR) is the rate of the number of packets delivered to all receivers to the number of data packets sent by the source node. The PDR is calculated by equation 8.

$$PDR = \frac{\sum_0^n \text{Packets Received}}{\sum_0^n \text{Packets Sent}} \quad (8)$$

From Figure 2, the PDR of the proposed scheme is increased compared to the existing scheme MPBC. This is because of the QoS improved during the estimation of the connection density and residual energy parameters in the route selection process of the method proposed. The greater value of PDR means the better performance of the network protocol.

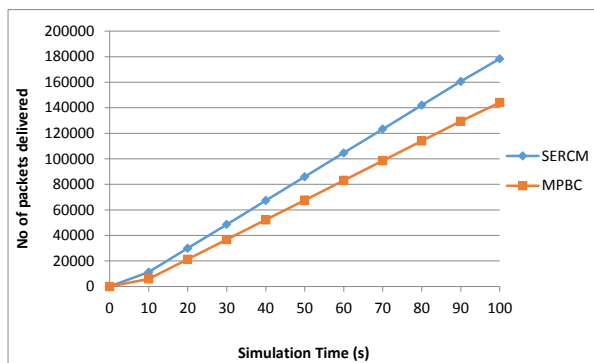


Figure 2 Packet delivery Rate

Packet Loss Rate

PLR is defined as the difference between the sent packets and received packets in the network per unit time as in equation 9.

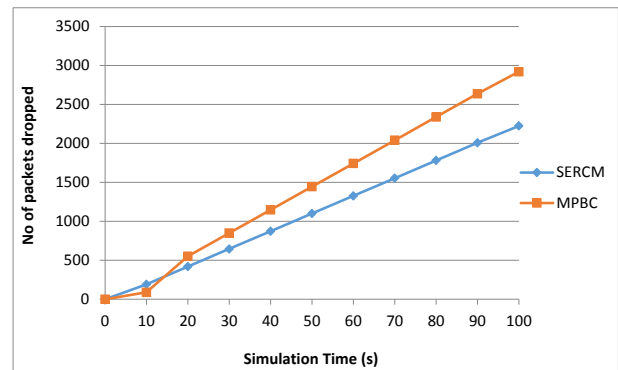


Figure 3 Packet Loss rate

$$PLR = \sum_0^n \frac{\text{Number of Packets dropped}}{\text{Number of Packets Sent}} \quad (9)$$

Figure 3 shows the PLR of MPBC is greater when compared to that of SERCM. The number of nodes is increased when the number of packets dropped is increased.

Average Delay

The average delay is defined as the time difference between the current packets received and the current packet sent. It is measured by equation 10.

$$\text{Average Delay} = \frac{1}{n} \left(\sum_0^n \text{Pkt Recvd Time} - \text{Pkt Sent Time} \right) \quad (10)$$

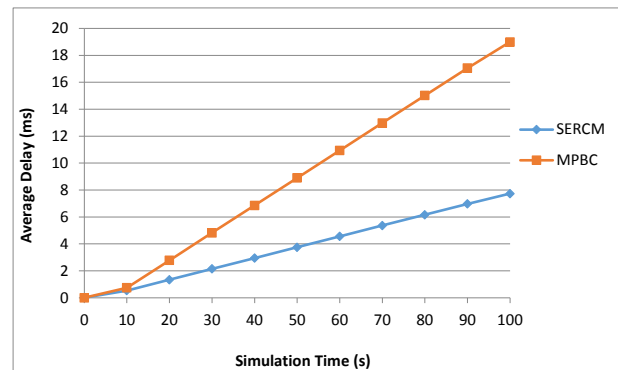


Figure 4 Average Delay

Figure 4 shows that the average delay is low by for the proposed scheme SERCM than the existing MPBC.

The minimum value of delay means produces the higher value of the throughput in the network. This graph justifies the fact that the hindrances in the communication are lesser among the nodes in the network, which shows a significant average delay.

Throughput

Throughput is defined as the data that can be transferred from source to the receiver in a given amount of time. Throughput is obtained using equation 11.

$$\text{Throughput} = \sum_0^n \frac{\text{Number of Packets Received}}{\text{Time Taken}} \quad (11)$$

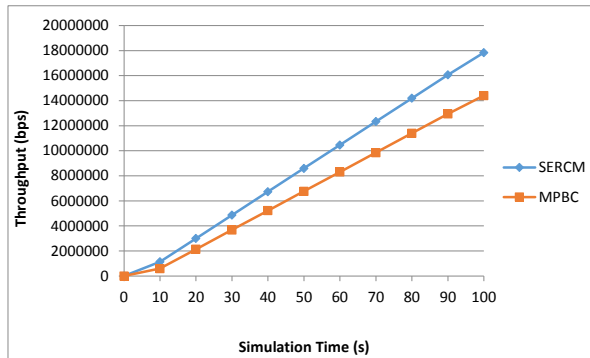


Figure 5 Throughput

It is observed from figure 5 that the number of packets received successfully for SERCM is greater compared to that of the MPBC.

Residual Energy

The amount of energy remaining in a node at the current instance of time is called as residual energy. A measure of the residual energy gives the rate at which energy is consumed by the network operations.

Figure 6 shows that the residual energy of the network is better for the proposed scheme SERCM when compared with the existing scheme MPBC.

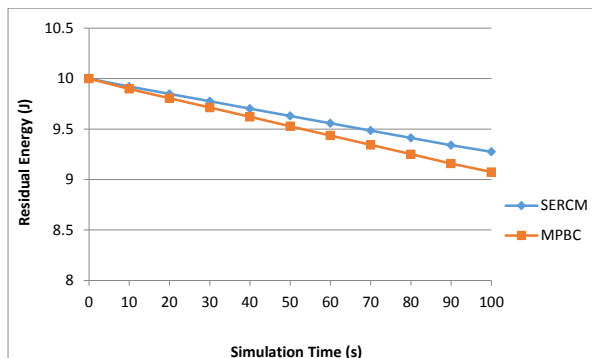


Figure 6 Residual Energy

CONCLUSION

Stability Enhancement using Region based certification Mechanism in MANET is proposed in this paper to improve scalability and stability of overall

network. A certificate mechanism is proposed to handle the isolated nodes for proper use of resources and to reduce extra energy consumption. Image result for AODV www.slideshare.net

Ad-hoc On-Demand Distance Vector (AODV) will be addressed by using cryptography technique for securing route discovery and data transmission. Simulation results using NS2 depict the improvement of packet delivery rate and network throughput in the communication network.

Ethical Clearance- St. Peter's Institute of Higher Education and Research, Chennai

Source of Funding- Self

Conflict of Interest - Nil

REFERENCES

- [1] Xu, X., Xiaomeng, C., & Zhongshan, Z. (2014). Self-organization approaches for optimization in cognitive radio networks. *China Communications*, 11(4), 121-129.
- [2] Conceição, L., & Curado, M. (2011, July). Smart and balanced clustering for MANETs. In *International Conference on Ad-Hoc Networks and Wireless* (pp. 234-247). Springer, Berlin, Heidelberg.
- [3] Tao, Y., Wang, J., Wang, Y. L., & Sun, T. (2008, October). An enhanced maximum stability weighted clustering algorithm in ad hoc network. In *Wireless Communications, Networking and Mobile Computing, 2008. WiCOM'08. 4th International Conference on* (pp. 1-4). IEEE.
- [4] Zhang, Q., Jacobsen, R. H., & Toftegaard, T. S. (2012, December). Bio-inspired low-complexity clustering in large-scale dense wireless sensor networks. In *Global Communications Conference (GLOBECOM), 2012 IEEE* (pp. 658-663). IEEE.
- [5] Zhang, Z., Long, K., Wang, J., & Dressler, F. (2014). On swarm intelligence inspired self-organized networking: its bionic mechanisms, designing principles and optimization approaches. *IEEE Communications Surveys & Tutorials*, 16(1), 513-537.
- [6] Ni, M., Zhong, Z., & Zhao, D. (2011). MPBC: A mobility prediction-based clustering scheme for ad hoc networks. *IEEE Transactions on Vehicular*

Technology, 60(9), 4549-4559.

- [7] Wang, Y., Guardiola, I. G., & Wu, X. (2014). RSSI and LQI data clustering techniques to determine the number of nodes in wireless sensor networks. *International Journal of distributed sensor networks*, 10(5), 380526.
- [8] Pravin, R.A & Mageswari, U. Preserving Privacy Using an Unobservable Secure Routing Protocol for MANETs, *International Journal of MC Square Scientific Research* Vol.5, No.1 Nov 2013.
- [9] Hussein, A., Yousef, S., Al-Khayatt, S., & Arabeyyat, O. S. (2010, November). An efficient weighted distributed clustering algorithm for mobile ad hoc networks. In *Computer Engineering and Systems (ICCES), 2010 International Conference on* (pp. 221-228). IEEE.
- [10] Pravin, R.A & Dani, D.D.K. Allocating power efficiently for Decentralized Distributed Space-Time Block Coding, *International Journal of MC Square Scientific Research* Vol.3, No.1 Nov 2011.

Determination of High Density Impact for Cognitive Variations from Brain MRI Analysis

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ABSTRACT

Medical analysis improvised day-by-day processing huge amount of data related to brain MRI (Magnetic Resonance Imaging) reports which ensures gray matter stability in human through various cognitive performances. Epidemiological includes distribution and control of disease, to view genetic variation which symbolizes and characterize the detailed molecular and cellular mechanisms that forwards via actively and privately relevant to check brain function. Also, this information features the immense capability of non-human primate models in propelling our comprehension of human hereditary variety affecting conduct and neuropsychiatric illness risk. In the paper, to enhance the performance and decrease the complexity includes in the medicinal picture segmentation process. Brain tumor segmentation process depends on Berkeley wavelet transform (BWT) mechanism. The Support Vector Machine (SVM) based classifier utilized to enhance the accurateness and quality rate and related features are extricated from every fragmented tissue. The proposed framework accomplished for recognizing normal and abnormal tissues from cerebrum MRI pictures. It estimated and verified for performance and quality investigation on magnetic resonance cerebrum pictures. Based on Experimental evaluations, proposed algorithm enhances sensitivity 2.6%, specificity 14.46%, and accuracy 6.47% of the proposed framework contrasted than previous classifiers.

Keywords:- Neural system, cognitive analysis, risk factors, genetic variations, human brain, MRI (Magnetic Resonance Imaging) analysis, Berkeley wavelet change (BWT), Support Vector Machine (SVM), accuracy, specificity and sensitivity.

INTRODUCTION

A typical utilitarian hereditary polymorphism accepted to affect serotonin flagging has been the concentration of much enthusiasm for endeavors to comprehend fundamental organic instruments of individual contrasts in complex behavioral procedures and related hazard for neuropsychiatric clutters. In particular, in contrast with the Long allele of an addition/cancellation variation in the promoter area of the human serotonin transporter quality, the Short allele has been connected to generally expanded hazard for the advancement of depressive issue and liquor abuse, particularly with regards to ecological misfortune and

stress. A human imaging hereditary quality ponders show this expanded hazard for neuropsychiatric disarranges might be intervened by expanded amygdale reactivity in S allele bearers. All the more as of late, allelic status at this quality connected polymorphic district has been appeared to influence subjective capacity in people. In particular, S allele transporter's display enhanced execution on errands including visual wordy memory, set-moving, and probabilistic reward learning. The enhanced subjective execution is steady with improved execution checking action in the front cingulate cortex of S allele bearers.

Cerebral age related white issue changes are every now and again depicted on brain imaging in maniacal and non-psychotic elderly subjects. Some statistic and vascular hazard factors are related with a higher danger of creating, with real accentuation on age, hypertension and stroke. Then again, late epidemiological

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confirmation shows that vascular hazard factors assume a part in the advancement of intellectual disability and dementia, including degenerative dementia, can be a go between vascular hazard factors and psychological decrease, while some statistic qualities can contribute towards securing subjective capacity. Notwithstanding, extra research is essential before the utility of this model for illuminating human brain capacity and conduct can be completely deciphered. In particular, the potential effect on subjective capacity, brain morphology, and flagging pathways ought to be set up. On the off chance that parallel neurobiological impacts are recognized between the human and rhesus then extra examinations just possible in non-human primate models can be attempted to distinguish particular atomic instruments intervening the impacts of the hereditary variations on brain capacity and conduct and in addition intense reactivity to ecological control.

Related Work

Dodge et al ^[1] discussed a nutrient biomarkers selected a priori capitalizing on existing knowledge of an association with neuro degeneration, but this may not reflect the ideal set, cross-sectional design was not suited for inferring any causal association since the temporal relationship is unattainable. Duning et al ^[2] illustrated the phenomenon of cognitive aging characterized by deficits in executive functions, information processing speed, and attention. The similarity in functional and structural effects of increased serum CRP and aging, CRP might contribute to the process of cognitive aging, particularly as aging was directly associated with increased inflammatory activity. Ferris et al ^[3] used active electrodes for this study that passed high-level signals through the electrode cables. Undoubtedly, passive electrodes would be more prone to movement artifacts arising from cable sway. The artifact removal method proposed here should be re-evaluated using wireless electrodes. Fukushima et al ^[4] discussed the difference between pre- and post-test measures were used as dependent variables and the pretest scores were used as covariates to exclude the possibility that any pre-existing difference in measurement between the groups affected the result of each measure. Frodl et al. ^[5] discussed age- and gender-matched subjects were in line with two of three volumetric MRI learning's. It manually assessed the globus pallidus and reduced the volumes in kids with ADHD contrasted with healthy kids.

Morris et al ^[6] investigated a VBM and fMRI used to determine the impact of the NOS1 variant rs6490121 on brain structure and function in healthy controls. In a select range of areas in prefrontal and parietal cortices, including BA10/vmPFC, risk carriers exhibited a load-independent increase in activity compared to homozygous non-risk individuals. Wallace et al ^[7] developed a neural circuitry and it altering connections among disparate brain factors of the active areas of neuro-imaging study utilizing graph theory to calculate such as small network properties of the cerebrum. Cools et al ^[8] presented a task-phase-dependent genotype effects might help to resolve some apparently conflicting results from recent genetic imaging studies that focused on polymorphisms in the gene coding for the dopamine D2 receptor (DRD2). Swanson et al ^[9] designed a 'Ex-Gaussian' model accounts for the empirical distribution of RTs based on an assumption of two underlying processes, with one generating a normal ('Gaussian') distribution of RTs described by the parameters μ (mu; mean) and σ (sigma; standard deviation) and the other generating an exponential ('Ex') distribution of infrequent long response described by a parameter τ (tau; the tail of the empirical distribution). Willeit et al ^[10] introduced the reduction in radiology and binding is indirectly proportional to the amount of dopamine released into the extracellular space, competition experiments allow for an estimate of relative changes in extracellular dopamine levels in the living human brain.

Proposed System

The source of brain MRI dataset, and the classifier utilized to perform cerebrum MRI tissue segmentation. The proposed BWT+SVM strategy is applied to brain tumor dataset containing brain MRI of 512×512 pixel size and changed over into grayscale before additionally processing. Figure.1 demonstrates the architecture diagram.

Preprocessing

The preprocessing is an essential task to enhance the quality of the MRIs and create it in processing by human or machine vision framework. The preprocessing supported to enhance certain aspects of MRIs, for instance, the visual appearance of MRI, enhancing the signal-to-noise ratio, removing the unrelated noise, improving and undesired parts, smoothing is piece of the region, and saving its edges. It enhancing the signal-

to-noise proportion and the lucidity of the crude MRIs and connected adaptive density upgrade depends on modified sigmoid function.

Skull Stripping

One of the essential procedures of skull stripping in biomedical picture investigation, and it is necessitated for the viable investigation of cerebrum tumor from the MRIs. It is removing all non cerebrum tissues in the cerebrum pictures. It is conceivable to eliminate extra brainy tissues, for example, fat, skin, and skull in the cerebrum pictures. It is accessing some procedures of prominent frameworks of automatic skull stripping and it utilizing picture shape. The picture shape depends on segmentation and morphological activity. It also depends on histogram investigation or a threshold value. Utilizing threshold value in skull stripping strategy depends on a threshold activity to eliminate skull tissues.

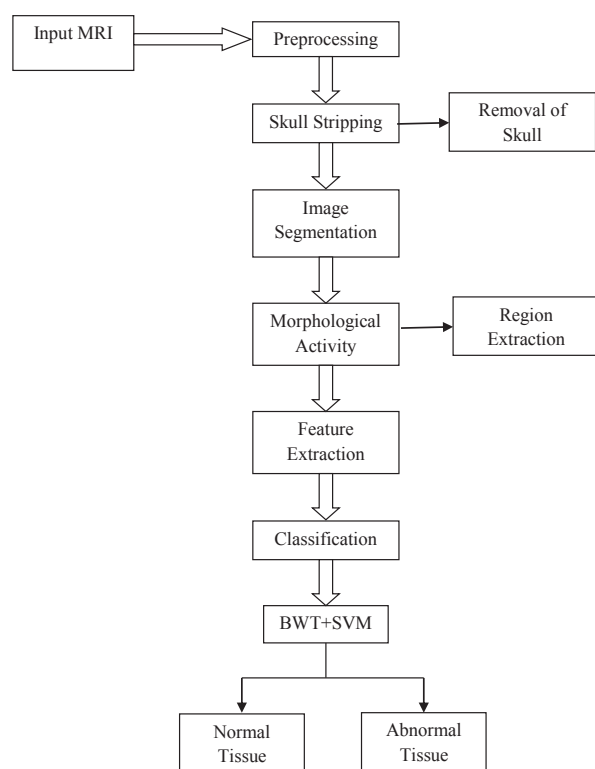


Figure.1 Architecture Diagram

Figure.1 Architecture Diagram

Image Segmentation and Morphological Process

The contaminated cerebrum MRI regions of segmentation are accomplished through the subsequent stages such as changing the preprocessed cerebrum MRI into a binary picture with a threshold for the cut-off of

128 being chosen. The pixel values prominent than chosen threshold values are mapped to white and others are fixed as dark. The diverse regions are conformed to the contaminated tumor tissues and it is edited out. Next, an erosion activity of morphology is utilized to remove white pixel. Lastly, the original picture and the eroded region are splits into two equivalent areas and the erode task separated the dark pixel area is considered a cerebrum MRI cover. In the examination, Berkeley wavelet transform is utilized for efficient segmentation of brain MRI.

Feature Extraction

It is the way of gathering higher level data of a picture, for example, shape, surface, shading, and differentiation. An essential feature of surface investigation is human visual observation and machine learning framework. It utilized to enhance the accurateness of analysis framework efficiently by choosing unmistakable constraints. It mainly utilized picture investigation applications of Gray Level Co-event Matrix (GLCM) and surface element. It follows two stages for feature extraction from the therapeutic pictures. First, estimating the GLCM and the second stage, computing the surface features depends on the GLCM. Because of the complex structure of enhanced tissues, for example, white matter, gray matter, and cerebrospinal fluid in the cerebrum MRIs, extraction of related features is an important operation. Textural discoveries and investigation could enhance the analysis, diverse phases of the (tumor organizing), and treatment reaction evaluation.

Classification

The features identification creates on SVM the default decision for classification of a cerebrum tumor. Assessing the SVM algorithm's performance is sensitivity, specificity and accuracy. In terms of the confusion grid is characterizing the True Positive (TP), True Negative (TN), False Positive (FP), and False Negative (FN) from the normal result and ground truth outcome for the computation of sensitivity, specificity and accuracy. Where the quantity of true positives is called TP and it is effectively classified to specify the aggregate amount of abnormal cases. The quantity of true negatives is called TN and it is accurately classified to evaluated outcome cases. The quantity of false positive is called FP, and it is specifying incorrectly identified

or classified abnormal cases. The quantity of false negatives is called normal cases and FN; it is utilized to specify incorrectly classified or identified normal cases. When they are abnormal cases, the result variables are computed utilizing the aggregate number of samples analyzed for the identification of the tumor. An extent of aggregate accurately classified cases is called quality rate constraint accurateness. The aggregate number of cases classified abnormally is called abnormal and classified normally is called ordinary.

Result and Discussion

The proposed classifier done utilizing Matlab 7.12.0 (R2011a) and it keeps running on the Windows 8 OS and it has an Intel core i3 processor and a 4 GB RAM. To verify the performance of our classifier utilized two benchmark datasets. The Digital Imaging and Communications in Medicine (DICOM) dataset is primary dataset. DICOM dataset contained are tumor-contaminated brain tissues. The Brain Web dataset is secondary data set and it comprises of full three-dimensional recreated brain MRI information utilizing sequences of modalities such as T1-weighted MRI, T2-weighted MRI, and proton thickness weighted MRI.

The proposed BWT+SVM classifier discovers the evaluation parameters such as specificity, sensitivity and accuracy to estimate effectiveness of the proposed classifier and defeat the previous classifiers in brain tumor detection. In the classifier improves brain tumor detection extraction and classification. The methodology estimates the specificity, sensitivity and accuracy.

Accuracy

Accuracy is the popular of common evaluation method to estimate the performance of the classifiers. Accuracy has been estimated depends on the amount of correctly classified normal/abnormal pictures to estimate the effectiveness and robustness of the classifier. The evaluation metric is as follows:

$$\text{Accuracy}(\%) = \frac{\text{Total number of correct classification}}{\text{Total number of tested pattern}} \times 100$$

Sensitivity

The sensitivity computed to ensure the test ability of the classifier. It is estimated in the same way as the categorization accuracy. The sensitivity considers only positive cases, for instance, it can be utilized to find brain tumor with observed final analysis. The sensitivity

estimated as a quantity of true positive decisions over a quantity of actual positive cases. It can be illustrated as follows:

$$\text{Sensitivity} = \frac{P}{(P + N)}$$

Where TP = True Positive cases and FN = False Negative cases.

Specificity

The specificity can be computed as the quantity of true negative decisions over quantity of actual negative cases. It can be illustrated as follows:

$$\text{Specificity} = \frac{N}{(P + N)}$$

Where TN = True Negative cases and FP = False Positive cases.

Table 1 demonstrates the specificity, sensitivity and accuracy for input parameter with previous classifiers. Table 1 shows the average value of all evaluation metrics with input parameter. The proposed BWT+SVM framework is evaluated with following previous classifiers such as An Adaptive Fuzzy Inference System (ANFIS) and K-Nearest Neighbor (KNN) classifiers. Along with Table 1, it noticed that BWT+SVM algorithm has the best score on each particular parameter for classification.

Table.1 Comparison of Sensitivity, Specificity and Accuracy

Classifiers	Sensitivity (%)	Specificity (%)	Accuracy (%)
KNN	93.33	77.77	87.06
ANFIS	95.12	79.74	90.04
SVM	97.72	94.2	96.51

Along with Table 1 clarifications, it examined that the proposed BWT+SVM classifier is estimated depends on specificity, sensitivity and accuracy. Proposed BWT+SVM are computed with An Adaptive Fuzzy Inference System (ANFIS) and K-Nearest Neighbor (KNN) classifiers behalf of specificity, sensitivity and accuracy. ANFIS is the nearest challenger. It improves the classification problem of brain tumor classification. However, ANFIS is provided with the less accuracy. A BWT+SVM classifier improves the brain tumor

classification with sensitivity 2.6%, specificity 14.46%, and accuracy 6.47%. Finally, the paper announces the proposed BWT+SVM methodology is best on all several parameters.

CONCLUSION

In the paper, developing a medical decision support system with normal and finding two certain abnormalities. The preprocessing is utilized to eliminate the unwanted noise and improving the signal-to-noise ratio. It used is to improve the skull stripping performance utilizing the threshold technique called skull stripping algorithm. Segmenting the images utilizing the Berkeley wavelet transforms mechanism and to classify the tumor stage utilizing support vector machine by analyzing feature vectors and area of the tumor. It helped to get promising outcomes in classifying the normal images, images with tumor and image of multiple sclerosis. The proposed approach can aid in the accurate and timely detection of brain tumor along with the identification of its exact location and it significant for brain tumor detection from MRIs. A BWT+SVM classifier enhances the brain tumor classification with sensitivity 2.6%, specificity 14.46%, and accuracy 6.47%. Finally, the paper announces the proposed BWT+SVM methodology is best on all several parameters.

Ethical Clearance- Presidency College

Source of Funding- Self

Conflict of Interest - Nil

REFERENCES

1. Bowman, G. L., Silbert, L. C., Howieson, D., Dodge, H. H., Traber, M. G., Frei, B., & Quinn, J. F., "Nutrient biomarker patterns, cognitive function, and MRI measures of brain aging", *Neurology*, Vol. 78, No. 4, pp. 241-249, 2012.
2. Wersching, H., Duning, T., Lohmann, H., Mohammadi, S., Stehling, C., Fobker, M., & Deppe, M., "Serum C-reactive protein is linked to cerebral micro-structural integrity and cognitive function", *Neurology*, Vol. 74, No. 13, pp. 1022-1029, 2010.
3. Gwin, J. T., Gramann, K., Makeig, S., & Ferris, D. P., "Removal of movement artifact from high-density EEG recorded during walking and running", *Journal of neurophysiology*, Vol. 103, No. 6, pp. 3526-3534, 2010.
4. Takeuchi, H., Taki, Y., Sassa, Y., Hashizume, H., Sekiguchi, A., Fukushima, A., & Kawashima, R., "Working memory training using mental calculation impacts regional gray matter of the frontal and parietal regions", *PLoS One*, Vol. 6, No. 8, e23175, pp. 1-12, 2011.
5. Frodl, T., & Skokauskas, N., "Meta-analysis of structural MRI studies in children and adults with attention deficit hyperactivity disorder indicates treatment effects", *Acta Psychiatrica Scandinavica*, Vol. 125, No. 2, pp. 114-126, 2012.
6. Rose, E. J., Greene, C., Kelly, S., Morris, D. W., Robertson, I. H., Fahey, C., & Bokde, A., "The NOS1 variant rs6490121 is associated with variation in prefrontal function and grey matter density in healthy individuals", *Neuroimage*, Vol. 60, No. 1, pp. 614-622, 2012.
7. Giedd, J. N., Stockman, M., Weddle, C., Liverpool, M., Alexander-Bloch, A., Wallace, G. L., & Lenroot, R. K., "Anatomic magnetic resonance imaging of the developing child and adolescent brain and effects of genetic variation", *Neuropsychology review*, Vol. 20, No. 4, pp. 349-361, 2010.
8. Aarts, E., Roelofs, A., Franke, B., Rijpkema, M., Fernández, G., Helmich, R. C., & Cools, R., "Striatal dopamine mediates the interface between motivational and cognitive control in humans: evidence from genetic imaging", *Neuropsychopharmacology*, Vol. 35, No. 9, pp. 1943, 2010.
9. Swanson, J., Baler, R. D., & Volkow, N. D. (2011). Understanding the effects of stimulant medications on cognition in individuals with attention-deficit hyperactivity disorder: a decade of progress. *Neuropsychopharmacology*, 36(1), 207.
10. Willeit, M., & Praschak-Rieder, N. (2010). Imaging the effects of genetic polymorphisms on radioligand binding in the living human brain: a review on genetic neuroreceptor imaging of monoaminergic systems in psychiatry. *Neuroimage*, 53(3), 878-892.

Determination Breast Cancer Accuracy Using Data Mining

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ABSTRACT

Breast cancer disease is the world's second leading killers among cancer causing death in women. Regardless of the fact that cancer is curable and preventable in early stages, still there are patients who have been diagnosed in later stages. The proposing paper corroborates several detecting and diagnosing methods of cancer, although fully depended on medical technicians and with medical image supporting technique one can detect the cancer causing symptoms in all the stages specifically on later stages. The work's objective is to establish the features and possibilities to achieve accuracies in the breast cancer as either benign or malignant. The work, explores decision trees applicability in predicting the occurrence of breast cancer. Finally performance evaluation analysis is made on several conventional learning algorithms viz. SMO (Sequential Minimal Optimization), Random Forests, J48, Random tree and Naive Bayes. The Investigations and Experiments proved that SMO placed top most with higher accuracy. Based on Experimental evaluations, SMO classifier enhances accuracy 2%, precision 0.018, recall 0.014 and F-measure 0.08 of the proposed classifier compared than previous classifiers.

Keywords: Accuracy, Breast Cancer, Random forest, Sequential Minimal Optimization (SMO), Random Tree, J48, Naive Bayes

INTRODUCTION

In current world's scenario, there are more than 600000 malignancies passing every year in Africa. By 2020, 70% of the 15 million new yearly disease cases will be in creating nations. In South Africa bosom disease is the most widely recognized growth in ladies. The lifetime danger of creating bosom disease is 1 of every 26 ladies over all populace gatherings. Every year more than 3000 ladies pass on from bosom growth in South Africa. Over 60% of ladies give privately propelled bosom disease. It has been estimated that the absence of early tumor detection is the primary reason that took dominant part of ladies introducing at a late, symptomatic stage when cure is inconceivable.

The work discovers that other bosom masses like fibro-adenoma (54.8%) and fibrocystic

changes (17%) were regular in young people in an investigation done on an African populace. The early determination and administration of bosom masses is along these lines imperative to diminish mortality. The set up administration of substantial bosom injuries incorporates the triple appraisal of physical examination, mammography and percutaneous biopsy. Without substantial bosom masses, mammography is regularly done even in symptomatic ladies underneath 30 years to avoid a mysterious injury, despite the fact that ultrasound is the methodology of decision.

A mammography is considered as negative for bosom growth when grouped into BI-RADS classifications 1, 2 and 3, and positive in the rest of the classes. At classification 1, there is no huge finding the bosoms are symmetrical, without any calcifications, masses, asymmetries, and central twists or different modifications. At class 2, certainly amiable discoveries are depicted, and at classification 3 discoveries with < 2% shot of harm are portrayed, with suggestion of a six-month follow-up assessment. Class 0 relates to an

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inadequate investigation, requiring a reciprocal imaging study or even correlation with past pictures. It is quite often suggested in a screening circumstance. The precision of bosom imaging studies might be influenced by various components, for example, specialized angles, contrasts identified with the qualities of the populace under investigation, patient's age, radiologist encounter, utilization of twofold perusing method or PC supported location frameworks – CADs), and the fluctuation in the understanding by the radiologist using the BI-RADS.

Related Work

Delen et al. ^[1] provided an analysis on predicting the breast cancer patient's survivability rate with support of data mining. It utilized SEER Public-Use Data which is around 151,886 records, along with 16 fields which belongs to SEER database. Delen further investigated data mining techniques: the back- propagated neural network, the Naive Bayes, and C4.5 decision tree algorithms. With the experiment results from these algorithms, the prediction performances compared to the conventional techniques. Hence the result suggested that C4.5 algorithms provided the better performance than the two alternative techniques. Safavi et al. ^[2] investigated the efficient and suitable networks for the breast cancer information collection from that of the collected clinical data sets. The results provided the guidance in choosing the appropriate treatment for the patients. For those investigations, there evaluated several neural networks. The performance evaluations of the several neural networks like Radial Basis Function network (RBF), Self Organizing Map (SOM), Probabilistic Neural Network (PNN) and General Regression Neural Network (GRNN) are compared and tested on both Shiraz Namazi Hospital breast cancer data (NHBCD) and Wisconsin Breast Cancer Data (WBCD). It overcame the dilemma of high dimensions that exists on the data sets and realizing the associated nature of the data. With the help of principle component techniques the dimension of appropriate data is been reduced and the appropriate networks are founded.

Lin et al. ^[3] described the SVM (Support Vector Machine) a popular pattern classification method with those diverse applications. While discovering a subset features, it concurrently demonstrated the parameter values, which is provided without reducing SVM classification accuracies. A Particle Swarm Optimization (PSO) based technique determined the parameter and

selection feature of the SVM, the termed PSO with that of SVM was developed. Gupta ^[4] elucidated the curing process of breast cancer and prognosis was the challenging medical applications for the researchers. Breast cancer diagnosis differentiates the benign from that of the malignant breast lumps. The breast cancer Prognosis predicts the occurrence of cancer causing cells in the patients. Antonie et al. ^[5] developed tumor detection through digital mammography. It investigated the data mining techniques usage capabilities, neural networking and association rule mining for the purpose of anomaly detection and classifications. The results shown that the approaches performed well, obtained a classification of 70% over accuracy in both techniques.

Chen et al. ^[6] designed a SA-SVM method and a number of datasets in UCI machine learning repository utilized to compute the classification accuracy rate. It described the approach that is compared with a conventional grid search method performing bound settings, and also various other methods. Fisher et al. ^[7] illustrated the agreement percentage of principle diagnosis of the re-abstracted record and the actual hospital record, when analyzed on the 3rd digit, enhanced from 73.2% to 78.2% in the years 1977 to 1985 respectively. On the other hand, 1985 analyzed data illustrated the accuracy of the diagnosis and procedure coding which varies substantially on several conditions. Sousa et al. ^[8] extracted the concept that data was sourced and utilized in tentative testing which are most commonly used and considered as the de facto standard in the reliability ranking in rule discovery algorithms. The results generated in these domains seemed to indicate those Particle Swarm Data Mining Algorithms which highly competitive, rather only with evolutionary techniques, also along with industry standard algorithms like J48 type of algorithm, and can also be applied to severe domain problems.

Proposed System

The work focuses on data mining techniques which are applied to predict the breast cancer in Wisconsin data set. The model estimates following accuracy constraints such as Accuracy, Precision, Recall, and F-measure. To obtain the accuracy constraints the supervised learning algorithms are used, viz. Random forest, SMO (Sequential Minimal Optimization), Random tree, J48 and Naive Bayes. Those algorithms try to improve the classification issues of breast cancer identification.

The research is made on different supervised learning algorithms that are contrasted to predict the best classifier. Breast cancer in a human being are said to occur when a malignant tumor produced in the breasts. The occurrence happens both in men and women. In broad-spectrum cancers is one of life-threatening malignancies that occur in one or in both breasts. The interior tissue of a human breast is usually made up of fatty or fibrous connective tissues. Breast cancer is not meant to occur only in women, it affects both men and women. But, it is less possible to occur in men. The objective of those predictions is to assign patients either a “benign” or “malignant” that is non-cancerous and cancerous respectively. Figure.1 demonstrates the process flow diagram of breast cancer prediction.

Preprocessing

The fundamental objective of the pre-processing is to enhance the picture quality to create it prepared to additionally processing by removing or lessening the unrelated and surplus components in the background of the mammogram pictures. Mammograms are therapeutic pictures that complex to translate. Pre-processing is basic to enhance the quality. It will prepare the mammogram for the following two-process segmentation and feature extraction. The noise and high recurrence factors are removed by filters. The collected information was preprocessed to add value to that of information. The raw information includes various missing values. Linear Interpolation technique is used to deal with the missing values.

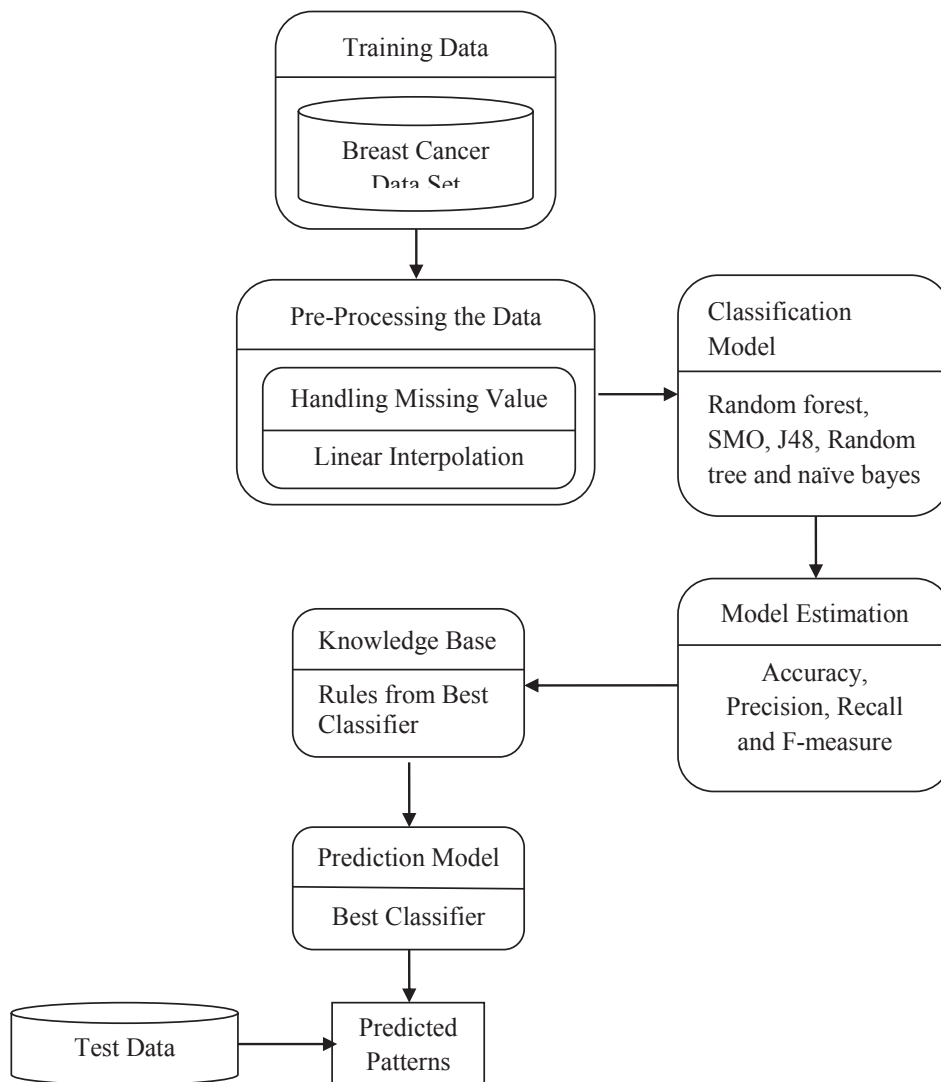


Figure.1 Process Flow Diagram of Breast Cancer Prediction

Segmentation

Picture segmentation implies separating the picture into comparable essential components, containing recognizing and partitioning regions of interests. Segmentation is an imperative part and the fundamental stage in picture preparing, which must be effectively taken before consequent assignments, for example, include extraction and classification. In the strategy is imperative in breast applications, for example, restricting suspicious regions, giving aim quantitative appraisal and observing of the beginning and movement of breast illnesses, and also investigate the anatomical structures.

Feature Extraction

Feature extraction strategy is another region in which it is necessitated to have proficient method in order to acquire enhanced recognition accurateness. Utilizing features of a picture segmented picture is characterized into three sorts, for example, ordinary, benign, and malignant. The features utilized to remove the malignancy are mean, fluctuation, relationship, differentiate, and so forth, tumor picture segmentation utilizing surface technique segmentation is done depends on the quantity of pixels. In the approach distinguished abnormal mass recognition on the clinical database. It decreases the consistency on stricture to create our strategy adaptive to poles separated pictures.

Classification

In the phase, a proficient classification approach depends on supervised learning algorithms viz. Random forest, SMO (Sequential Minimal Optimization), Random tree, J48 and Naive Bayes are built. Prior to the development of supervised learning algorithms, the element vector is shaped by integrating attributes of each band for the classification and stored in the database. In supervised learning algorithms, attribute or information is illustrated by a various leveled information structure through a divide and conquer procedure. It is communicated regarding cyclic separation of attribute space. Supervised learning algorithms comprise of various hubs based on the feature space. It begins with the primary hub called as root, and the remaining is called as leaves. For a given preparing dataset or samples, best supervised learning algorithms are developed with the goal that the mistake is insignificant. The cost function is optimized in supervised learning

techniques with the goal that supervised learning methods are built. By utilizing different classifiers the dataset was investigated. The accuracy measures, like Precision, Recall and F-measure are made purposeful to estimate the execution of the classifiers.

RESULT AND DISCUSSION

Wisconsin Breast Cancer dataset is the set of data, that are collected from university of wisconsin hospitals. The datasets included around 699 cases along with 10 features. The class is framed as Benign and malignant. There was around 1 dependent variable and that of 9 independent variables with the values for independent variables ranging from 1-10 and for those class variable 2 as Benign and 4 for malignant cancer. The possibility to occur breast cancer in human being ranges from 1 as least and 10 as highest.

The section illustrates the mathematical evaluation constraints to measure the accuracy of supervised learning algorithms. The supervised learning algorithms are determined to calculate the accuracy utilizing Wisconsin Breast cancer data set. It estimates following accuracy constraints such as Accuracy, Precision and Recall, F-measure.

Accuracy

Accuracy is described as the sum of the true predictions such as divided by the entire amount of malignant and benign predictions. True positives and true negatives are illustrated as the number of breast cancer dataset correctly estimated as positive and negative. False positives and false negatives are described as the number of malignant and benign data incorrectly computed as positive and negative.

Precision

$$Accuracy = \frac{True\ Positives + True\ Negatives}{True\ Positives + True\ Negatives + False\ Positives + False\ Negatives}$$

Precision is illustrated as the ratio of breast cancer data set is correctly predicted positives divided by total cancer data set are correctly and incorrectly predicted positives.

$$Precision = \frac{True\ Positives}{True\ Positives + False\ Positives}$$

Recall

The recall is described as the ratio of breast cancer data set correctly predicted as positives divided by the sum of breast cancer data set is correctly predicted as positives and breast cancer data set are incorrectly predicted as negatives.

$$\text{Recall} = \frac{\text{True Positives}}{\text{True Positives} + \text{False Negatives}}$$

F-measure

F-measure can be said as those weighted harmonic mean of precision and recall. The F1 measure communicates the balance between the precision and the recall.

$$F - \text{measure} = \frac{2 * \text{Precision} * \text{Recall}}{\text{Precision} + \text{Recall}}$$

Table 1 illustrates the Accuracy, Precision, Recall and F-measure for several input constraints with some supervised learning techniques. It verified on numerous kinds of algorithms like Random forest, SMO (Sequential Minimal Optimization), Random tree, J48 and Naive Bayes methodologies. Depends on tabular result clarification some supervised learning algorithms perform well in breast cancer data set.

Table 1: Comparison of Accuracy, Precision, Recall, and F-measure

Algorithm	Accuracy	Precision	Recall	F-measure
Random tree	95.13	0.952	0.942	0.951
J48	95.135	0.919	0.956	0.930
Random Forest	95.42	0.943	0.954	0.948
Naïve Bayes	95.99	0.962	0.965	0.969
SMO	97.99	0.980	0.979	0.977

According to Table 1 clarifications, it monitored that the supervised learning techniques are estimated based on accuracy, precision, recall, and F-measure. It estimated with Random forest, SMO (Sequential Minimal Optimization), Random tree, J48 and Naive Bayes methodologies behalf of accuracy, precision, recall and F-measure. Naïve Bayes is the closest competitor.

It improves the classification issues of breast cancer identification. However, Naïve Bayes is offered with the less accuracy. A SMO algorithm enhances the breast cancer feature extraction and classification accuracy 2%, precision 0.018, recall 0.014 and F-measure 0.08. Thus it concludes that the projected SMO algorithm is best on all several constraints.

CONCLUSION

In the research different supervised learning algorithms are contrasted to predict the best classifier. In areas where mammography isn't open or outstandingly expensive especially in making groups, ultrasound may be utilized as a fundamental approach to survey a discernable breast mass and for ultrasound guided frameworks. An investigational result demonstrates the viability of the proposed technique. Model is assessed utilizing accuracy, precision, recall and F-measure. There occurs the discoveries of several different categorization techniques that random tree outperforms of every other methodologies at higher accuracy rates. A well proficient classifier is been renowned to fix on the decision making process of detecting the type of disease which is meant to be known as essential in the clinical research of affected sickened breast malignancy. The SMO classification type improves the detection, extraction and other features of breast cancer and classification accuracies around 2%, precision around 0.018, recall around 0.014 and finally F-measure is around 0.08. Thus, the work concludes that SMO classifier is said to be the best among the other constraints.

Ethical Clearance- Mother Teresa Women's University

Source of Funding- Self

Conflict of Interest - Nil

REFERENCES

- [1] Delen D., Walker G., and Kadam A., "Predicting breast cancer survivability: a comparison of three data mining methods", Artificial intelligence in medicine, Vol. 34, No. 2, pp. 113-127, 2005.
- [2] Sarvestani A. S., Safavi A. A., Parandeh N. M., and Salehi M., "Predicting breast cancer survivability using data mining techniques", In Software technology and Engineering (ICSTE), 2010 2nd international Conference on IEEE, Vol. 2, pp. V2-

227, 2010.

- [3] Lin S. W., Ying K. C., Chen S. C., and Lee Z. J., "Particle swarm optimization for parameter determination and feature selection of support vector machines", *Expert systems with applications*, Vol. 35, No.4, pp. 1817-1824, 2008
- [4] Gupta S., Kumar D., and Sharma A, "Data mining classification techniques applied for breast cancer diagnosis and prognosis" *Indian Journal of Computer Science and Engineering (IJCSE)*, Vol. 2, No.2, pp. 188-195, 2011.
- [5] Antonie M. L., Zaiane O. R., and Coman A, "Application of data mining techniques for medical image classification", In *Proceedings of the Second International Conference on Multimedia Data Mining*, pp. 94-101, Springer-Verlag, 2001.
- [6] Chen S. C., Lin S. W., Lee Z. J., and Tseng T. Y., "Parameter determination of support vector machine and feature selection using simulated annealing approach" *Applied soft computing*, Vol.8, No.4, pp. 1505-1512, 2008.
- [7] Fisher E. S., Whaley F. S., Krushat W. M., Malenka D. J., Fleming C., Baron J. A., and Hsia D. C., "The accuracy of Medicare's hospital claims data: progress has been made, but problems remain", *American journal of public health*, Vol. 82, No.2, pp. 243-248, 1992.
- [8] Sousa T., Silva A., and Neves A., "Particle swarm based data mining algorithms for classification tasks", *Parallel Computing*, Vol. 30, No.5, pp. 767-783, 2004.

Determination of Breast Cancer Using Data Mining Techniques

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ABSTRACT

Breast cancer emerged quickly to women above 40 years which cause death. Whereas other cancers has less compared with breast cancer, similarly it spreads among rural and urban areas. Smoking women's affect more than 30-40%, long-term smokers has increase in risk factor on the other side. The utilization of machine learning and data mining approach's has changed the entire procedure of breast malignancy verdict and prediction. Breast Cancer verdict recognizes kindhearted from dangerous breast knots and Breast Cancer diagnosis predicts when Breast Cancer is probably going to repeat in patients that have had their tumors extracted. The proposal is to compare a better solution for analyzing breast cancer using data mining techniques and which ensures high accuracy. The disclosure of the endurance rate or survivability of a specific disease is conceivable by extricating the information from the information identified with that disease. Measurable learning and data mining, can build up the relationship of the factors to the result. The major aim of this research is to discover the overview of the present research being approved out utilizing the data mining techniques to improve the breast cancer determination. Mostly, it discusses about the performance of conventional the classification strategies C4.5, ID3, C5.0, Apriori, and Naive Bayes in breast cancer investigation. The classification process begins with statistical data fetched from healthcares, utilizes Weka software to analyze results and predicting endurance rate of breast cancer patients. Based on Experimental evaluations, C5.0 classifier enhances accuracy 4.56%, and reduced the Mean Absolute Error (MAE) 0.141 and Root Mean Squared Error (RMSE) 0.155 of the proposed C5.0 classifier compared than existing classifiers.

Keywords: Data mining techniques, breast cancer, classification, Weka software, diagnosis and prediction, C5.0, ID3, APRIORI, C4.5, and Naive Bayes.

INTRODUCTION

The rising breast disease rate and mortality speak to a huge and developing risk for the creating scene. Breast malignancy is on the ascent crosswise over creating countries, for the most part because of the expansion in future and way of life changes by hormonal intercession and post-menopausal hormonal treatment. In these locales, death rates are intensified by the later stage at which the illness is analyzed, and in addition constrained access to treatment, displaying a 'ticking time bomb' which wellbeing frameworks and approach producers in

these nations need to endeavor to defuse. The forecast issue is the long haul standpoint for the sickness for patients whose growth has been surgically expelled. In the issue a patient is named a 'repeat' if the infection is seen at some ensuing time to tumor extraction and a patient for whom growth has not repeated and may never repeat. The target of these forecasts is to deal with cases for which malignancy has not repeated and in addition case for which growth has repeated at a particular time.

In the way, breast disease analytic and prognostic issues are for the most part in the extent of the broadly talked about grouping issues. These issues have pulled in numerous analysts in computational knowledge, information mining, and insights fields. Disease look into is by and large clinical as well as organic in

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nature, information driven factual research has turned into a typical supplement. Anticipating the result of an infection is a standout amongst the most fascinating and testing undertakings where to create information mining applications. As the utilization of PCs fueled with robotized apparatuses, substantial volumes of medicinal information are being gathered and made accessible to the therapeutic research gatherings. Subsequently, Knowledge Discovery in Databases incorporates data mining strategies and it has turned into a known research instrument for therapeutic forecasters to identify and misuse examples and connections among substantial quantity of aspects, and made it ready to predict the result is difficult to utilize the chronicled cases stored inside datasets.

Related Work

Demirel et al.^[1] suggested treatment type according to pathology result of cancer tissue biopsy and patient's demographic data was found using Weka data mining tool classes. Yoon et al.^[2] discussed the malignant and benign tumor patterns, several symbolic tumors have been formed in both the malignant and benign data sets. Zeid et al.^[3] introduced effectiveness of the classification method was computed the quantity of correctly and incorrectly classification in every probable value of the variable being categorized in the confusion matrix. Jacob et al.^[4] elaborated the target attribute and all other attributes were forecaster attributes whose values resolve the outcome. The breast cancer cases in the Prognostic Breast Cancer dataset utilizing numerous classification strategies. Rani^[5] discussed the classification problems solved by neural network techniques are construction, training and testing. Pollard et al. ^[6] illustrated an experiments indicated that CCL2 synthesized by metastatic tumor cells and the target site tissue stroma was critical for recruitment of a sub-population of CCR2 expressed monocytes that enhanced the subsequent extravasations of the tumor cells. Lee et al. ^[7] described a low positive predictive value of breast biopsy resulting from mammogram interpretation leads to approximately 70% unnecessary biopsies with benign outcomes.

Gandhi et al.^[8] discussed the intention enforced competition between particles by making successful particles repel their neighbors. Shah et al.^[9] executed inbuilt algorithm of WEKA tool and measure various types of parameter, and based on different parameter's value, deciding which one was best algorithm

for prediction. Kalakech et al.^[10] introduced the effectiveness of one technique over another and the model produced by the supervised technique RBF (Radial Basis Function) and it was a successful method for the identification and classification of some breast cancers. Mohanty et al. ^[11] discussed the cancer values and the normality values change extensively, which leads to more overlapping between the normal cluster space and the cancerous cluster space. Ilayaraja & Meyyappan ^[12] collected data from Hospital Information System (HIS) which had the sufficient details of patient including patient's name, age, disease, location, district, date from laboratories which keeps on growing year after year. Napoleon & Pavalakodi ^[13] eliminated the weaker components from this PC set and calculated the corresponding variance, percentage of variance and cumulative variances in percentage. Gupta et al. ^[14] suggested a high value of accuracy rate and low value of error rate for a classification technique applied on a dataset and show that the dataset was highly correctly classified by the obtained classifier. Jacob & Ramani ^[15] developed a Random Tree algorithm and it generated best accuracy and absolute precision in classifying the breast tissue dataset.

Proposed Work

One of the main concerns in data mining function is Classification. The main purpose of classification is to identify the target class for all case in the information. Classification is utilized to categorize the data items into classifications. Many scholars are applying different strategies to support health care specialists with improved accurateness in the identification of breast malignancy. In the paper explored data mining methods such as C5.0, ID3, APRIORI, C4.5, and Naive Bayes to identify the repeat of breast tumor from breast malignancy data collection. It utilized Weka machine learning tool for every one of our classifications. Collection of machine learning strategies for data mining operations is called WEKA. It utilized Weka for all our preprocessing and classifying. It maintains a reasonable measure of the performance of the classifier and utilized 10 fold cross verification system for each of the data mining algorithms. Figure.1 demonstrates the work process of determination of breast cancer.

Preprocessing

Picture pre-processing frameworks are significant to

discover the orientation of the mammogram. It utilized to remove the noise and to enhance the quality of the picture. All pictures processing strategy can be applied in mammogram preprocessing steps and it significant to restrain the search for variations without unnecessary impact from background of the mammogram. Computerized mammograms are therapeutic pictures

that are hard to be translated, subsequently a preparation stage is required to enhance the picture quality and create the segmentation results more exact. The major objective of the procedure is to enhance the quality of the picture to create it prepared to handling by removing the irrelevant and surplus parts in the back ground of the mammogram.

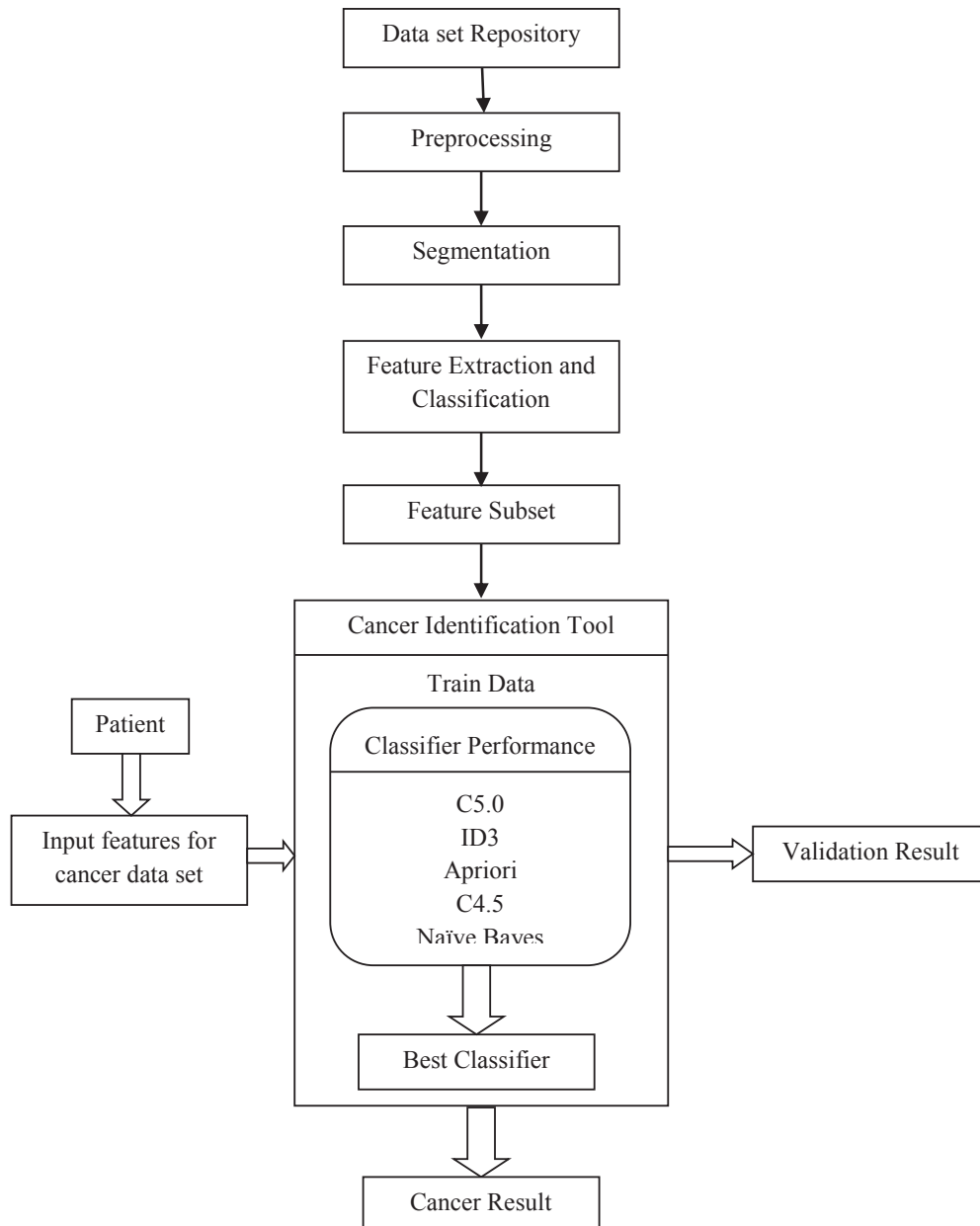


Figure.1 Determination of Breast Cancer Work Process

Image Segmentation

Picture segmentation is described as the essential picture processing that subdivides a computerized picture into its continuous, detach and nonempty subset, which gives expediency to extraction of property. Image segmentation range from filtering of noisy pictures, restorative applications (Locate cancers and different pathologies, Calculate tissue volumes, Computer guided surgery, Diagnosis, Treatment planning, investigation of anatomical structure), Locate entities in satellite pictures (streets, forests, and so forth.), Face Recognition, Finger print Recognition, and so on. Numerous segmentation techniques have been applied in the literature.

Feature Extraction & Classification

In data mining field, an attribute extraction and classification strategies can benefit fundamentally from utilizing significant information in learning performance and educated outcomes, for example, enhanced comprehensibility. Attribute is utilized to signify a part of data which is significant for illuminating the computational operation identified with a specific application. Features can refer to the consequence of a common neighborhood task (attribute extractor or feature identifier) connected to the picture. Particular structures in the picture itself, extending from simple structures, for example, indicates or edges more compound structures, for example, entities. Feature determination is a broadly connected strategy for identifying important information through removing disconnected and repetitive information. There are numerous features to fabricate the connection between breast disease and its attributes, important attributes should be picked out to be utilized as a part of the classification technique. The separated features are input to the classifier. Here, it contrasts the performance estimation of C5.0, ID3, APRIORI, C4.5, and Naive Bayes Classifiers. By applying different classifiers the dataset is investigated and compute the accurateness.

RESULT AND DISCUSSION

Investigate the breast Cancer information accessible from the Wisconsin dataset from UCI machine learning with the objective of designing accurateness identification models for breast malignancy utilizing data mining methods. The information utilized as a part of this examination are given by the UC Irvine machine learning repository located in breast –tumor

Wisconsin sub-index, filenames root: breast tumor Wisconsin having 699 instances, 2 classes (malignant and benign), and 9 integer number esteemed features. It removed the 16 instances with missing values from the dataset to build new dataset with 683 instances. It utilized the Weka toolbox to experiment with these data mining classifiers. All investigations depicted in the paper were performed utilizing libraries from Weka machine learning condition. The WEKA was used as a data mining tool to compute the performance and adequacy of the breast malignancy identification models constructed from a few methods.

The section defines the mathematical estimation constraints to calculate the accuracy of data mining algorithms. The data mining algorithms to compute the accuracy utilizing Breast cancer data set. It evaluates following constraints such as Accuracy, Root Mean Squared Error (RMSE) and Mean Absolute Error (MAE).

Accuracy

Accuracy is illustrated as the sum of the true predictions such as divided by the entire amount of malignant and benign predictions. True positives and true negatives are illustrated as the number of breast cancer dataset correctly estimated as positive and negative. False positives and false negatives are described as the number of malignant and benign data incorrectly computed as positive and negative.

$$Accuracy = \frac{True\ Positives + True\ Negatives}{True\ Positives + True\ Negatives + False\ Positives + False\ Negatives}$$

Mean Absolute Error (MAE)

MAE defined as the average over the validation sample of the absolute values of the contrasts among forecast and the corresponding observation. It is a linear score and it means all the individual dissimilarities are weighted equally in the average.

$$MAE = \sum (|f(x_i) - y_i|) / N$$

Where x_i is an actual known value and y_i is an identified value.

Root Mean Squared Error (RMSE)

It is a quadratic scoring imperative and it computes the average magnitude of the fault. The differentiation

among forecast and corresponding observed values are every squared and then averaged over the sample. Lastly, the square root of the average is acquired. The faults are squared before averaged; the RMSE offers a relatively high weight to huge faults. It means the RMSE is mainly useful when huge faults are particularly undesirable.

$$RMSE = \sqrt{\sum (F(x_i) - y_i)^2 / N}$$

Where x_i is an actual known value and y_i is an identified value.

Table 1 demonstrates the Accuracy, Root Mean Squared Error (RMSE) and Mean Absolute Error (MAE) for numerous input parameters with some data mining techniques. It validated on numerous types of algorithms like C5.0, ID3, APRIORI, C4.5 and Naïve Bayes classifiers. Depends on tabular result clarification some data mining algorithms perform well in breast cancer analysis. Table 1 demonstrates the average value of all evaluation parameters with input parameter. Along with Table 1, it noticed C5.0 algorithm has the best score on each particular constraint for classification.

Table 1: Comparison of Accuracy, Root Mean Squared Error (RMSE) and Mean Absolute Error (MAE)

Algorithm	Accuracy	Mean Absolute Error (MAE)	Root Mean Squared Error (RMSE)
C4.5	75.15	0.361	0.436
ID3	77.56	0.326	0.422
APRIORI	79.16	0.312	0.413
Naïve Bayes	90.69	0.215	0.339
C5.0	95.25	0.074	0.184

According to Table 1 clarifications, it monitored that the data mining algorithms are computed depends on Accuracy, Root Mean Squared Error (RMSE) and Mean Absolute Error (MAE). It evaluated with C5.0, ID3, APRIORI, C4.5 and Naïve Bayes algorithms behalf of Accuracy, Root Mean Squared Error (RMSE) and Mean Absolute Error (MAE). Naïve Bayes is the nearest challenger. It enhances the classification problems of breast cancer detection. However, Naïve Bayes is offered with the less accuracy. A C5.0 algorithm improves the breast cancer feature extraction and classification with

accuracy 4.56%, and reduced the Mean Absolute Error (MAE) 0.141 and Root Mean Squared Error (RMSE) 0.155. Finally, the paper declares the proposed C5.0 algorithm is best on all some parameters.

CONCLUSION

Data mining techniques investigates the different specialized and breast cancer disease finding and anticipation issues that offer incredible guarantee to reveal designs covered up in the information that can help the clinicians in basic leadership. From the above examination it is watched that the accuracy, MAE and RMSE for the conclusion investigation of different connected data mining arrangement strategies is profoundly worthy and can help the restorative experts in basic leadership for early determination and to evade biopsy. The analytical issue is primarily analyzed under C5.0 and its accuracy came higher in contrast with other classification algorithms connected for the same. The exactness of order methods is assessed based on the C5.0 algorithm computation, recommended for determination of Breast Cancer based classification to show signs of enhancement about with accuracy, low Root Mean Squared Error mistake rate and Mean Absolute Error. A C5.0 algorithm improves the accuracy 4.56%, and reduced the Root Mean Squared Error (RMSE) 0.155 and Mean Absolute Error (MAE) 0.141. Finally, the paper declares the proposed C5.0 algorithm is best on all some parameters.

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REFERENCES

1. Çakır, A., & Demirel, B., "A software tool for determination of breast cancer treatment methods using data mining approach", Journal of medical systems, Vol. 35, No. 6, pp. 1503-1511, 2011.
2. Zheng, B., Yoon, S. W., & Lam, S. S., "Breast cancer diagnosis based on feature extraction using a hybrid of K-means and support vector machine algorithms", Expert Systems with Applications, Vol.41, No.4, pp. 1476-1482, 2014.
3. Salama, G. I., Abdelhalim, M., & Zeid, M. A. E., "Breast cancer diagnosis on three different datasets

- using multi-classifiers”, *Breast Cancer (WDBC)*, Vol. 32, No. 569, pp.36-43, 2012.
4. Jacob, S. G., & Ramani, R. G., “Efficient classifier for classification of prognostic breast cancer data through data mining techniques”, In *Proceedings of the World Congress on Engineering and Computer Science*, Vol. 1, pp. 24-26, 2012.
5. Rani, K. U., “Parallel approach for diagnosis of breast cancer using neural network technique”, *International Journal of Computer Applications*, Vol. 10, No. 3, pp. 1-5, 2010.
6. Qian, B. Z., Li, J., Zhang, H., Kitamura, T., Zhang, J., Campion, L. R., & Pollard, J. W., “CCL2 recruits inflammatory monocytes to facilitate breast tumor metastasis” *Nature*, Vol. 475, No. 7355, pp. 222-236, 2011.
7. Huang, M. L., Hung, Y. H., Lee, W. M., Li, R. K., & Wang, T. H., “Usage of case-based reasoning, neural network and adaptive neuro-fuzzy inference system classification techniques in breast cancer dataset classification diagnosis”, *Journal of medical systems*, Vol. 36, No. 2, pp. 407-414, 2012.
8. Gandhi, K. R., Karnan, M., & Kannan, S., “Classification rule construction using particle swarm optimization algorithm for breast cancer data sets”, In *Signal Acquisition and Processing, 2010, ICSAP’10. International Conference on IEEE*, pp. 233-237, 2010.
9. Shah, C., & Jivani, A. G., “Comparison of data mining classification algorithms for breast cancer prediction”, In *Computing, Communications and Networking Technologies (ICCCNT), 2013 Fourth International Conference on IEEE*, pp. 1-4, 2013.
10. Raad, A., Kalakech, A., & Ayache, M., “Breast cancer classification using neural network approach: MLP and RBF”, *Networks*, Vol. 7, No. 8, pp. 9-14, 2012.
11. Mohanty, A. K., Senapati, M. R., & Lenka, S. K., “RETRACTED ARTICLE: An improved data mining technique for classification and detection of breast cancer from mammograms”, *Neural Computing and Applications*, Vol. 22, No. 1, pp. 303-310, 2013.
12. Ilayaraja, M., & Meyyappan, T., “Mining medical data to identify frequent diseases using Apriori algorithm”, In *Pattern Recognition, Informatics and Mobile Engineering (PRIME), 2013 International Conference on IEEE*, pp. 194-199, 2013.
13. Napoleon, D., & Pavalakodi, S., “A new method for dimensionality reduction using K-means clustering algorithm for high dimensional data set”, *International Journal of Computer Applications*, Vol. 13, No.7, pp. 41-46, 2011.
14. Gupta, S., Kumar, D., & Sharma, A., “Performance analysis of various data mining classification techniques on healthcare data”, *International journal of computer science & Information Technology (IJCSIT)*, Vol. 3, No. 4, pp. 155-169, 2011.
15. Jacob, S. G., & Ramani, R. G., “Discovery of knowledge patterns in clinical data through data mining algorithms: Multi-class categorization of breast tissue data”, *International Journal of Computer Applications (IJCA)*, Vol. 32, No. 7, pp. 46-53, 2011.

Determination of Cognitive Variations Using Classification Techniques

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ABSTRACT

Cognitive variation is concerned about the improvement of instructional strategies which proficiently utilize individuals', restricted from subjective preparing ability to fortify their capacity that applies obtained learning and aptitudes to new circumstances, psychological design comprises a constrained working memory, with incompletely free handling units for visual/spatial and sound-related/verbal data, which connects with a relatively boundless long harvest memory. A computer aided classification technique integrating conventional Magnetic Resonance Imaging (MRI) and perfusion MRI is designed and utilized for differential analysis. The classification depends on Classification and Regression Trees (CART) and Pitteway-Watkinson Algorithm (PWA) proposed to dark pixel based picture segmentation and it functions are actuated to cerebrum picture classification. In the proposed work CART+PWA strategy for automatic classification of the Magnetic Resonance Imaging (MRI) cerebrum pictures as normal variation or irregular variation. The proposed strategy comprises of numerous stages, such as picture acquisition, segmentation, feature extraction, and classification. To changing pictures into set of regions for segmentation phase, an input of feature extraction phase is the output of segmentation phase. The feature extraction phase multi extracted surface features utilizing Pitteway-Watkinson calculation (PWA) and these features are utilized in classification phase. Based on Experimental evaluations, proposed algorithm improves accuracy 15.05%, precision 13.7%, recall 15.59% and F-measure 15.07% of the proposed system compared than existing methodologies.

Keywords:- *Classification, data mining, cognitive variations, cognitive science, cognitive classification technique and individual psychology.*

INTRODUCTION

Vital psychological examination is the idea of working memory engineering and its restrictions ought to be a significant thought when planning guideline. The most vital learning forms for building up the capacity to exchange gained information and abilities are outline development and computerization. As indicated by Cognitive investigation, various components of data can be pieced as single components in subjective mappings, which can be robotized to a vast degree.

Almost, they can sidestep working memory of mental preparing accordingly departing around the

confinements of working memory. The prime objectives of guideline are the development and mechanization of mappings. Before, the data can be moved in schematic shape of long harvest memory; it must be removed and controlled in working memory. Exertion within the Cognitive system has focused on the plan of imaginative instructional strategies that effectively utilize the working memory limit. General assessments are not sufficient for correlation among analysis since examining accomplices which may differ in their age structures. Although, ordering remotely detected information into a topical guide remains a test of the fact for many essentials, the intricacy of the scene in an investigation range, chose remotely detected information, and image-processing and collection approaches, may influence the achievement of a characterization. Constant rise of new grouping calculations and strategies lately requires such an audit, which will be extremely significant for

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controlling or choosing a reasonable characterization strategy for a particular report.

Related Work:-

Duval ^[1] investigated the threshold of mathematical comprehension for learners at each stage of the curriculum. Liu ^[2] represented the difference in the complexity of cognitive analyses involved in collocation learning, a teacher should be prepared to provide appropriate assistance to the students, based on the level of the difficulty of the collocations being learned. Cellard et al.^[3] discovered the essential elements of successful treatment; researchers need to begin to identify key issues for therapy implementation, such as acceptability. Van Der Spek et al.^[4] predicted that instruction with serious games yields a higher level of retention than training with conventional instructional methods. Williams-Gray et al.^[5] described a proportion of patients with MCI was similar to the results of the main analysis, suggesting that the use of different dementia criteria did not meaningfully influence the results. Simmons et al.^[6] the accuracies for correctly classifying MCI subjects as AD like at baseline using the follow-up diagnosis at 24 months and 36 months were 75.4% and 68.0% respectively. Ward et al.^[7] discussed a classification with LSN investigation and it depends on the intrinsic spontaneous BOLD signal acquired in the resting state and several technologic issues need to be addressed. Tanner et al. ^[8] illustrated the integration of multiple indices with diffusion together with fiber count measures provided Wee and colleagues with an “enriched” classifier. It produced an accuracy of 88% for control and MCI classification and it comparable to the accuracy.

Rodrigo et al.^[9] suggested boredom and it was the main cognitive-affective state which interactive learning infrastructures should focus on identifying and speedily responding. Betts et al.^[10] designed the robustness of this observation diminished by the small numbers in the two groups, reflected in the wide 95% confidence intervals, indicating that this result needs to be validated by further research. Papageorgiou^[11] explored the fuzzy rule based decision support system in the education process provides a more useful environment for the physicians and students than huge, hard covered materials. Insel et al.^[12] assumed the data from genetics and clinical neuroscience and it yield bio-signatures that was augmented clinical

symptoms and signs for clinical organization. Setz et al. ^[13] illustrated the classifiers perform better with non-relative features. Relative features were utilized that means the estimation of the baseline features was not required, and no calibration procedure would be necessitated for a realistic framework. Hernández et al ^[14] discussed the use of two MR sequences reduces problems due to movement and field heterogeneity during scan acquisition, and the lengthy processing times and computational requirements of traditional methods. Kelly et al ^[15] evaluated the brain’s functional organization toward understanding how inter-individual variation in brain organization and function underlie normal and abnormal variation in cognition, emotion and behavior.

Proposed System

The proposed classification framework is utilizing a digital image as input of the brain with some format. In segmentation stage is passing every image by utilizing weighted k-means methodology. An input of features extraction stage is the output of segmentation stage and this stage set of features extraction from pictures by utilizing PWA methodology. Lastly, the CART classifier is utilized in classification stage for decision making and it is most commonly utilized methods for cognitive variations such as usual variation or unusual variation detections. Figure.1 shows the block diagram of brain MRI classification.

Image Acquisition Stage

To enhance the quality of pictures utilizing the preprocessing or acquisition phase. A various kinds of noises corrupted the medicinal pictures. It is essential for exact perceptions having good quality of pictures for the provided application. Set of cerebrum MRIs are gathering and it will be changed into some picture format.

Segmentation Stage

Procedure of segmentation is partitions a picture into constituent regions or entities. In image processing, the main complicated task is segmenting unimportant pictures. Segmentation accurateness decides the expected achievement or disappointment of mechanized investigation strategy. Two fundamental properties depend on segmentation algorithms such as intensity values discontinuity and similarity. Initial type, the

sudden modification doing to segment a picture in intensity, for instance, edges in a picture. Second type, the picture is dividing into regions that are comparable as per predefined criteria. In the phase is utilizing the Histogram thresholding mechanism. Gray Pixel utilized over Histogram is developed by dividing the scope of the information into equalized containers (called classes). For every container, the quantity of points from the informational index that fall into every container is calculated.

Feature Extraction Stage

The procedure of features extraction is investigating and measuring the surface inside a picture. It extracts the unmistakable features in investigated pictures that are illustrative of the different classes of entities. Features are utilized as inputs to classifier that allocate to the class. In the feature extraction framework is provided a various surface qualities in statistical measure which actualize the features of a MRI cerebrum pictures.

Classification Stage

Classification method is identifying usual variation and unusual variations of MRI cerebrum picture. CART utilizing to enhance precision rate and reduces mistake rate of MRI brain tumor classification. The classification procedures depend on Classification and Regression Trees (CART) and histogram based picture segmentation and it arranged with applied to cerebrum picture classification. CART framework enhances exactness rate and decreases mistake rate of MRI cerebrum tumor classification.

RESULT AND DISCUSSION

Image segmentation and classification approach investigates the performance utilized three benchmark data sets. The first data set is BRAT. It comprises of 142 pictures and includes cerebrum tumors tests images. All BRAT picture tests documents are in Gray Images exchange linguistic structure with PWA expansion. The Brain set is a second dataset. It includes simulated cerebrum MRI information depends on two anatomical approaches: complete dimensional information volumes have been reproduced utilizing three successions and an assortment of slice thicknesses, noise levels, and levels of intensity non-consistency. The picture formats included in this data set have expansion of PWA.

The proposed PWA + CART technique discovers the estimation constraints such as accuracy and error rate to compute efficiency of the proposed PWA+CART classifier and beat the earlier classifiers in brain variations. In the classifier improves brain tumor variation detection and classification. The classifier evaluates the accuracy and error rate.

Accuracy

Accuracy is estimated based on the amount of correctly classified usual/unusual variations to compute the efficiency and robustness of the classifier. The evaluation metric is as follows:

$$Accuracy(\%) = \frac{\text{Total number of correct classification}}{\text{Total number of tested pattern}} \times 100$$

Error Rate

Error rate describes mathematical model for wrongly predicted classified data. It computes the brain variation classified data with respect of total brain variations. Error Rate (ER) is computed as:

Table 1 demonstrates the accuracy and error rate for input constraints with earlier classifiers. Table 1 shows the average value of all computation metrics with input constraints. The proposed PWA + CART framework is computed with following earlier techniques such as Generative Model (GM) and Hierarchal-SVM (HSVM) classifiers. Along with Table1, it noticed that PWA + CART algorithm has the best score on every specific constraint for classification.

Table 1: Comparison of Sensitivity, Specificity and Accuracy

Classifiers	Accuracy (%)	Error Rate
GM	88.16	11.84
HSVM	90.56	9.44
PWA+CART	98.72	1.28

Along with Table 1 clarifications, it observed that the proposed PWA+CART technique is computed depends on accuracy and error rate. Proposed PWA+CART are computed with Generative Model (GM) and Hierarchal-SVM (HSVM) techniques behalf of accuracy and error rate. HSVM is the nearest competitor. It enhances the classification problem of brain tumor variation classification. However, HSVM is offered with the less accuracy. A PWA+CART mechanism enhances the

brain tumor usual and unusual variations with accuracy 8.16% and error rate 8.16. Lastly, the paper declares the proposed PWA+CART mechanism is best on all several constraints.

CONCLUSION

The CART+PWA strategy for automatic classification of the Magnetic Resonance Imaging (MRI) cerebrum pictures as normal variation or irregular variation. Brain tumor variations are initiated by irregular with discarded designed of inside and outside the cerebrum. Cure of a brain tumor relies upon its measurement and position. In the paper classification mechanisms depends on CART are proposed and connected to cerebrum picture classification. The proposed cerebrum tumor variation picture segmentation depends on CART overall pixel Histogram thresholding. A PWA+CART technique improves the brain tumor usual and unusual variations with accuracy 8.16% and error rate 8.16. Lastly, the paper declares the proposed PWA+CART methodology is best on all several parameters.

Ethical Clearance- Mother Teresa Women's University

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REFERENCES

1. Duval, R., "A cognitive analysis of problems of comprehension in a learning of mathematics", *Educational studies in mathematics*, Vol. 61, No. 1, pp. 103-131, 2006.
2. Liu, D., "Going beyond patterns: Involving cognitive analysis in the learning of collocations", *TESOL Quarterly*, Vol. 44, No. 1, pp. 4-30, 2010.
3. Wykes, T., Huddy, V., Cellard, C., McGurk, S. R., & Czobor, P., "A meta-analysis of cognitive remediation for schizophrenia: methodology and effect sizes", *American Journal of Psychiatry*, Vol. 168, No. 5, pp. 472-485, 2011.
4. Wouters, P., Van Nimwegen, C., Van Oostendorp, H., & Van Der Spek, E. D., "A meta-analysis of the cognitive and motivational effects of serious games", Vol. 105, No. 2, 249-267, 2013.
5. Aarsland, D., Bronnick, K., Williams-Gray, C., Weintraub, D., Marder, K., Kulisevsky, J., & Santangelo, G., "Mild cognitive impairment in Parkinson disease a multicenter pooled analysis", *Neurology*, Vol. 75, No. 12, pp. 1062-1069, 2010.
6. Westman, E., Muehlboeck, J. S., & Simmons, A., "Combining MRI and CSF measures for classification of Alzheimer's disease and prediction of mild cognitive impairment conversion", *Neuroimage*, Vol. 62, No. 1, pp. 229-238, 2012.
7. Chen, G., Ward, B. D., Xie, C., Li, W., Wu, Z., Jones, J. L., & Li, S. J., "Classification of Alzheimer disease, mild cognitive impairment, and normal cognitive status with large-scale network analysis based on resting-state functional MR imaging", *Radiology*, Vol. 259, No. 1, pp. 213-221, 2011.
8. O'Dwyer, L., Lamberton, F., Bokde, A. L., Ewers, M., Faluy, Y. O., Tanner, C., & Coughlan, T., "Using support vector machines with multiple indices of diffusion for automated classification of mild cognitive impairment", *PloS one*, Vol. 7, No. 2, pp. 1-11, e32441, 2012.
9. Baker, R. S., D'Mello, S. K., Rodrigo, M. M. T., & Graesser, A. C., "Better to be frustrated than bored: The incidence, persistence, and impact of learners' cognitive-affective states during interactions with three different computer-based learning environments", *International Journal of Human-Computer Studies*, Vol. 68, No. 4, pp. 223-241, 2010.
10. Taylor, P. J., Betts, G. A., Maroulis, S., Gilissen, C., Pedersen, R. L., Mowat, D. R., & Buckley, M. F., "Dystrophin gene mutation location and the risk of cognitive impairment in Duchenne muscular dystrophy", *PloS one*, Vol. 5, No. 1, pp. 1-9, e8803, 2010.
11. Papageorgiou, E. I., "A new methodology for decisions in medical informatics using fuzzy cognitive maps based on fuzzy rule-extraction techniques", *Applied Soft Computing*, Vol. 11, No. 1, pp. 500-513, 2011.
12. Insel, T., Cuthbert, B., Garvey, M., Heinssen, R., Pine, D. S., Quinn, K., & Wang, P., "Research domain criteria (RDoC): toward a new classification framework for research on mental disorders", 2010.
13. Setz, C., Arnrich, B., Schumm, J., La Marca, R., Tröster, G., & Ehlert, U., "Discriminating stress from cognitive load using a wearable EDA device", *IEEE Transactions on information technology in*

biomedicine, Vol. 14, No. 2, pp. 410-417, 2010.

14. Hernández, M. D. C. V., Ferguson, K. J., Chappell, F. M., & Wardlaw, J. M., "New multispectral MRI data fusion technique for white matter lesion segmentation: method and comparison with thresholding in FLAIR images", *European radiology*, Vol. 20, No. 7, pp. 1684-1691, 2010.
15. Kelly, C., Biswal, B. B., Craddock, R. C., Castellanos, F. X., & Milham, M. P. Characterizing variation in the functional connectome: promise and pitfalls. *Trends in cognitive sciences*, Vol. 16, No. 3, pp. 181-188, 2012.

Analysis of Hospital's Financial Liquidity Using the Linear Regression Model: A Panel Data Study in Ahvaz Teaching Hospitals

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ABSTRACT

Liquidity refers to an organization's ability to pay off their debts. The main objective of this study was to determine the factors affecting the hospital's financial liquidity in selected teaching hospital in Ahvaz, Iran. The present research was a cross-sectional and panel data study which was conducted using econometric methods. The statistical population consisted of all teaching hospitals of Ahwaz, southwest of Iran (N=6). The data obtained on variables such as hospital size, profit rate, debts, and ratios of current liquidity, quasi-liquidity, and liquidity were statistically analyzed using the linear regression analysis in Eviews-8. The results of Vale ridge test and data panel test showed that there is a significant relationship between the studied financial indicators and liquidity of hospital. The results also indicated that, based on the 5-year mean values, current liquidity (0.036), quasi-liquidity (0.086), profitability (0.218), debts (0.344), and liquidity (0.453) had the highest to the lowest impact on the liquidity of studied hospital, respectively. According to the study findings, it can be concluded that hospital can raise their liquidity by increasing their size, improving their performance in line with the optimal utilization of assets using optimal methods to provide capital structure, and promoting their service delivery.

Keywords: Hospital liquidity; Profitability; Capital structure; Financial indicator; Regression model.

INTRODUCTION

Nowadays, hospitals are considered enterprises which need a strong economic structure. A proper financial structure is the most important factor affecting valuation and orientation in different markets such as the health market.^[1] In countries where the government owns the healthcare sector, less attention is paid to the financial management of hospitals. Some researchers have studied the issue of profitability in hospitals but most of them have focused on budget deficit rather

than financial management and investment. Zeiliet *et al.* (1996) introduced six areas of financial management in hospitals which included profitability, fixed assets, capital structure, fixed asset life, impact investment, and liquidity.^[2] Liquidity is one of the key financial indicators in this regard,^[3] which is related to other financial indicators. Studies have shown that hospitals with a higher profitability rate are more able to pay off their debts.^[4] Liquidity was first introduced by Keynes as one of the determinants of return on assets (ROA). He stated that an asset is more liquid than others when it can be exchanged in the shortest time possible without any loss. Fernandez (1999) argued that liquidity cannot be measured by an absolute criterion, but it should be evaluated on a scale that incorporates the key elements of liquidity, such as volume, time, and transaction costs. Given the importance of liquidity, it would be helpful to identify and understand the factors affecting it. Profitability cannot be the main goal of a public hospital.

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[5] Goals and missions of public hospitals involve decisions on maintaining the health and increasing the longevity of patients. [6] However, hospitals should establish a balance between their income and expenses, as the income should not completely go for current costs but it should be also spent on the development of equipment before they become obsolete. [7] Maintaining financial liquidity is a prerequisite to achieving these goals. Nowadays, health systems make up one of the largest sectors of the world's economy. Global healthcare costs account for roughly 8% of GDP. In most developed countries, about 5-10% of government spending is allocated to the health sector. [7] Among all health-related entities, hospitals alone account for about 50-80% of the total health budget and a large share of trained and specialized staff, the main part of which is funded by the public sector. [8] Formerly, the performance of healthcare organizations used to be assessed through therapeutic indices. Nowadays, these organizations are complex and require the strong support of management for the evaluation of economic performance.[9] The economic-financial analysis provides a logical and specific framework for the evaluation of major issues in the healthcare sector. [10] Since resource management is not properly done in hospitals, it is necessary for hospitals to manage more economically. Improvement of financial management in hospitals will increase their efficiency and productivity. [11] Hence, the present study aims to analyze the factors affecting the liquidity of teaching hospitals in Ahwaz.

MATERIALS AND METHOD

The present research was a cross-sectional and panel data study which was conducted using econometric methods. The statistical population consisted of all teaching hospitals of Ahwaz (N=6). In this study, variables such as hospital size, profit rate, debts, and ratios of current liquidity, quasi-liquidity, and liquidity were measured to determine the financial liquidity of hospitals. The required data were extracted from the hospital information systems and the accrual accounting software in the period 2012-2016. The obtained data were analyzed by descriptive and inferential statistics in Excel and Eviews-8. The normal data panel was used for testing the hypotheses. In addition, the models were described using the linear regression analysis as follows:

$$\text{Cliq} = \beta_0 + \beta_1 \text{ size } ijt + \beta_1 \text{ prof } ijt + \beta_1 \text{ debt } ijt + \beta_1 \text{ serijteit}$$

Where, β_0 , liq it, size it, prof it, debt it, and ser it represent the intercept, the current liquidity of Hospital i in the year t , the size of Hospital i in the year t , the profitability of Hospital i in the year t , debts of Hospital i in the year t , and the severity of health services provided in Hospital i in the year t , respectively.

$$\text{Hliq} = \beta_0 + \beta_1 \text{ size } ijt + \beta_1 \text{ prof } ijt + \beta_1 \text{ debt } ijt + \beta_1 \text{ serijteit}$$

Where, β_0 , liq it, size it, prof it, debt it, and ser it represent the intercept, the quasi-liquidity of Hospital i in the year t , the size of Hospital i in the year t , the profitability of Hospital i in the year t , debts of Hospital i in the year t , and the severity of health services provided in Hospital i in the year t , respectively.

$$\text{Liq} = \beta_0 + \beta_1 \text{ size } ijt + \beta_1 \text{ prof } ijt + \beta_1 \text{ debt } ijt + \beta_1 \text{ serijteit}$$

Where, β_0 , liq it, size it, prof it, debt it, and ser it represent the intercept, the current liquidity of Hospital i in the year t , the size of Hospital i in the year t , the profitability of Hospital i in the year t , debts of Hospital i in the year t , and the severity of health services provided in Hospital i in the year t , respectively.

RESULTS

The findings of this study are presented in two parts of descriptive and analytical. In descriptive findings sections, the performance indicators of the studied hospitals and financial indicators related to each are explained. In addition, the mean and standard deviation of the data of these 6 hospitals in a 5-year period will be presented. Table 1 shows general information of studied hospitals during the period 2012-2016. As it can be observed, the occupancy rate has increased considering the increase in the number of beds over these years, patient stay duration has remained almost unchanged, and the number of beds (hospital size) has increased. The significance of these differences will be described in the inferential results. According to table 2, liquidity, current liquidity, quasi-liquidity, profitability, and debts have slightly increased during the study period. The results also indicate that the highest and the lowest values are related to current liquidity and liquidity, respectively. In table 3, mean values were presented based on the 5-years period. Current liquidity (0.036), quasi-liquidity (0.086), profitability (0.218), debts (0.344), and liquidity (0.453) had the highest to the lowest impact on the

liquidity of studied hospital, respectively. According to table 4, F-value (54.99) and significance level (0.001) confirm the significance of the model for the test. The results of the Valeridge test also demonstrate that there is no autocorrelation between the sentences. Adjusted coefficient of determination was equal to 0.21. The severity of health services delivery, profitability, debts, and hospital size were the independent variables and current liquidity was considered the dependent variable of this research. Given the significance level in the table below, independent variables have a direct and positive relationship with the current liquidity of hospitals. Therefore, the first model for testing the hypotheses is acceptable. The results of table 5 also show that the model is optimal for testing the hypothesis. F-value (78.34) and significance level (0.001) corroborate the significance of the model for testing the hypotheses. The results of the Valeridge test also demonstrate that there

is no autocorrelation between the sentences. Adjusted coefficient of determination was equal to 0.27. The severity of health services delivery, profitability, debts, and hospital size were the independent variables and quasi-liquidity was considered the dependent variable of this research. Given the significance level in the table below, independent variables have a direct and positive relationship with the quasi-liquidity of hospitals. Therefore, the second model for testing the hypotheses is also acceptable. The results of table 6 indicate that the model is optimal for testing the hypothesis, considering the F-value (91.37) and significance level (0.001). The results of the Valeridge test also demonstrate that there is no autocorrelation between the sentences. Given the significance level in the table below, independent variables have a direct and positive relationship with the liquidity of hospitals. Therefore, the third model for testing the hypotheses is also acceptable.

Table 1. The performance indicators of the studied hospitals during 2012-2016

Hospitals	Length of stay (LOS)					Total mean	Bed occupancy rate (BOR)					Total mean	The number of beds
	2012	2013	2014	2015	2016		2012	2013	2014	2015	2016		
GH1	3.4	3.4	3.3	3.2	3.3	3.32	80.49	70.16	82.3	87.8	87.3	81.61	199
GH2	3.8	3.9	3.8	4	4.2	3.94	75.45	74.86	74.9	81.4	84.6	78.24	594
GH3	7.5	5.7	6.1	6.1	5.8	6.24	70.74	72.47	78.6	78.2	77.4	75.48	544
SH4	5.1	4.3	4.1	3.8	3.7	4.2	59.6	67.95	75.2	87.1	82.6	74.49	151
SH5	8.4	6.4	5.5	5.1	4.8	6.04	70.65	58.5	61.2	62.1	66.7	63.83	90
SH6	4.9	5.3	5.2	5.4	5.6	5.28	77.16	82.48	98.3	93.2	88.5	87.92	162

*GH: general hospital; SH: specialty hospital

Table 2. Financial indicators of the studied hospital during 2012-2016

Abbreviation	Variable	Std. dev.	Mean	Max	Min	year
liq	liquidity	0.103	0.111	0.375	0.017	2012
cliq	current liquidity	0.044	0.06	0.0977	0.004	
qliq	quasi-liquidity	0.101	0.087	0.107	0.009	
prof	profitability	0.12	0.25	0.58	0.16	
debt	debts	0.19	0.35	0.69	0.19	

Cont... Table 2. Financial indicators of the studied hospital during 2012-2016

liq	liquidity	0.17	0.105	0.41	0.02	2013
cliq	current liquidity	0.08	0.05	0.18	0.007	
hliq	quasi-liquidity	0.11	0.091	0.23	0.013	
prof	profitability	0.11	0.23	0.57	0.15	
debt	debts	0.19	0.35	0.69	0.19	
liq	liquidity	0.15	0.102	0.37	0.01	2014
cliq	current liquidity	0.06	0.04	0.0975	0.001	
hliq	quasi-liquidity	0.101	0.087	0.107	0.009	
prof	profitability	0.11	0.23	0.57	0.15	
debt	debts	0.18	0.33	0.69	0.19	
liq	liquidity	0.101	0.98	0.35	0.01	2015
cliq	current liquidity	0.03	0.02	0.0877	0.005	
hliq	quasi-liquidity	0.101	0.087	0.107	0.009	
prof	profitability	0.9	0.19	0.48	0.13	
debt	debts	0.19	0.35	0.69	0.19	
liq	liquidity	0.99	0.97	0.37	0.01	2016
cliq	current liquidity	0.02	0.01	0.0976	0.004	
hliq	quasi-liquidity	0.101	0.087	0.107	0.009	
prof	profitability	/09	0.19	0.48	0.13	
debt	debts	0.18	0.34	0.69	0.19	

Table 3. The mean financial indicators of the studied hospital during 2012-2016

Indicators	Mean
Liquidity	0.453
Current liquidity	0.036
Quasi-liquidity	0.086
Profitability	0.218
Debts	0.344

Table 4. The regression model of the effect of indicators on current liquidity

Variable	Abbrev	Significance level	T value	coefficient
Hospital size	size	0.001	3.28	0.13
Profitability	Prof	0.031	2.39	0.047
Debt	debt	0.001	4.45-	0.29-
Hospital services delivery	ser	0.015	2.64	0.15
Intercept	β_0	0.001	3.09	0.14
Adjusted coefficient of determination	-	0.21	F value= 54.99	
P value <0.001				

Table 5. The regression model of the effect of indicators on quasi-liquidity

Variable	Abbrev	Significance level	T value	coefficient
Hospital size	size	0.001	3.87	0.29
Profitability	Prof	0.004	2.99	0.27
Debt	debt	0.001	4.17-	0.54-
Hospital services delivery	ser	0.001	3.25	0.39
Intercept	${}_0\beta$	0.241	1.16	0.04
Adjusted coefficient of determination	-	0.27	F value =78.34	
P value <0.001				

Table 6. The regression model of the effect of indicators on liquidity

Variable	Abbrev	Significance level	T value	coefficient
Hospital size	size	0.005	2.96	0.17
Profitability	Prof	0.014	2.69	0.24
Debt	debt	0.001	-3.82	-0.34
Hospital services delivery	ser	0.009	2.87	0.45
Intercept	${}_0\beta$	0.263	1.04	0.08
Adjusted coefficient of determination	-	0.34	F value= 91.37	
P value <0.001				

DISCUSSION

The present study aimed to determine the liquidity of teaching hospitals in Ahwaz based on financial indicators. Many studies have been conducted to identify, design, and use financial indicators for hospitals around the world, in which financial indicators were selected with regard to unique features of each hospital. This is due to the difference between hospitals in terms of mission and objectives, financing methods, the needs of the population under coverage, reimbursement strategies of insurance companies, ownership type, etc. [12] Generally, each of the new methods for evaluating financial performance has been developed in order to improve and remove the problems of previous ones. Lowe *et al.* and Pink *et al.*, respectively, proposed 13 and 6 indicators as the most important financial indicators for decision-makers in the healthcare sector. [13] Generally, 9 indicators in 5 functional dimensions have been introduced as key indicators for acute care hospitals. [14] In a study conducted by Watson, the

Management Information System (MIS) of Canada was accepted as a data source for calculating and comparing financial indicators in acute care hospitals of Manitoba State. They showed accrual and cash ratios for the evaluation of organizational performance by reviewing the increasing informational content. [15] In another study to achieve the real value of each indicator in teaching hospitals affiliated with Tabriz University of Medical Sciences, the “New Financial System” was used as the data source in each hospital. [12] The results of multivariate regression test and panel data test also indicated that hospital liquidity has a significant and positive relationship with hospital size (number of beds), profitability, debts, and the severity of health services delivery. These are consistent with the findings of Zeileret *al.* using the proposed model and learning the measures and indicators of financial performance evaluation, managers and policymakers of hospitals can increase the productivity of their hospital by focusing on outcomes and pave the way for the establishment of

a dynamically-managed health care system. Moreover, according to the first research hypothesis,

CONCLUSIONS

The results of study showed that liquidity of hospitals can be increased by increasing their size and creating more spaces. This can lead to the improved structure of capital and financing in hospitals. The study findings also suggest that improved performance of hospitals can be followed by the optimal use of assets and increased liquidity of them. This can be later utilized in the line with the development and progress of hospitals. In addition, hospitals can use the issuance of the new stock to provide their capital structure and increase their liquidity by improving the quantity and quality of their health care services. It is also recommended that hospitals take advantage of new software applications in order to correct hospital depreciation and increase their liquidity.

Ethical Clearance: This research project was approved by the ethics committee of Islamic Azad University of Shushtar.

Source of Funding: Islamic Azad University of Shushtar.

Conflict of Interest: None

REFERENCES

- 1- Nelson Ec, Splain, ME, Batalen PB. Building measurement and data collection into medical practice. *Ann intern Med.* 1998;128(6):460-66.
- 2- Zeller TL, Stanko, BB, Cleverey WO. A revised classification pattern of hospital financial ratios. *Journal of Accounting and Public Policy.* 1996; 15(2):161-81.
- 3- Cleverley W, Harvey R. Does hospital financial performance measure up? Cleverley WO& Harvey, RK. Does hospital financial performance measure up?. *Healthcare financial management.* 1992;46(5):20-6.
- 4- Rauscher S, Wheeler J. The importance of working capital management for hospital profitability: evidence from bond-issuing, not-for-profit U.S. hospitals. *Health Care Management Review* 2012;37(4):339-46.
- 5- Nowicki M. The Financial Management of Hospitals and Healthcare Organization IL; Health Organization Press, 2008.
- 6- Kachniarz M. Commercialization of an independent public health care facility. The key conditions for Success, 2008.
- 7- Rój J, Sobiech J. Financial management of the hospital. Warsaw: Wolters Kluwer ABC Publishing House, 2006.
- 8- Rezapour A, Arabloo J, Soleimani MJ, EbadiFardAzar F, Safari H. Microeconomic Analysis of Healthcare Services in Bou Ali Sina University Hospital. *International Journal of Hospital Research.* 2012;1(1):41-50.
- 9- Smith PC, Elias Mossialos E, Papanicolas I. Principles of performance measurement. *Euro Observer.* 2008;10(1):1-4.
- 10- Rezapur, ah and ghost, h. Performance of Production Inputs in Public Hospitals of the University of Medical Sciences Iran. *Journal of Shahrekord University of Medical Sciences.* 2006;10(1):109-14.
- 11- Tavakoli G, Mahdavi S, Shokrolahzadeh M. The Comparative Survey on Deductions Applied by Khadamat-eDarman Insurance Company on Patients' Bills at teaching hospital of Kerman in the first quarter of 2001. *Proceedings of the 1st National Conference on Resource Management in Hospital;* 2003 Jan: 8-9; Tehran, Iran, 2003.
- 12- Janati A, Valizadeh S, Asghari-Jafarabadi M. Development of Financial Indicators of Hospital Performance. *Journal of Clinical Research & Governance.* 2014;3(2):92-8.
- 13- Love D, Revere L, Black K. A Current Look at the Key Performance Measures Considered Critical by Health Care Leaders. *JOURNAL OF HEALTH CARE FINANCE.* 2008;34(3):19-33.
- 14- Pink GH, Holmes GM, D'Alpe C, Strunk LA, McGee P, Slifkin RT. Financial indicators for critical access hospitals. *Journal of Rural Health.* 2006;22(3):229-36.
- 15- Barak AZ. Cash Flow Ratios vs. Accruals Ratios: Empirical Research on Incremental Information Content. *The Business Review.* 2010;15(3):206-13.

A Prospective Study of the Correlation between Non – Fatal Road Traffic Accidents and Age of Victims

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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 non – fatal RTA and age of victims brought to Mahatma Gandhi Medical College & Research Institute, Pondicherry.

Materials and Method: The prospective study was jointly conducted by the Department of Forensic Medicine & Toxicology and Department of Emergency Medicine, Mahatma Gandhi Medical College & Research Institute, Pondicherry. It was done from November 2012 to May 2014 and a total of 186 cases were studied. RTA cases admitted in the hospital were only 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: Most victims (61 or 32.8%) belonged to the age group of 21- 30 years. Next common age group was the 31 – 40 years group with 37 victims (19.9%). Least common group to be affected was the 1 - 10 years group with 7 victims (3.8%).

Discussion : Incidences of RTA are increasing by leaps and bounds in India. India has to take concrete steps to bring down 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 and implemented successfully so that the coming years see a decline in the incidences of these cases.

Keywords: Accidents, age, Pondicherry

INTRODUCTION

As per WHO, Road Traffic Accidents (RTA) are one of the leading causes of death and disability globally. Every year, they account for about 20 to 50 million non – fatal injuries worldwide.¹ It is projected that by 2020, non – fatal RTA will be the third leading cause of disability – adjusted life years (DALYs) lost.² The incidences of these events are on an increasing

trend every year and can be attributed to rapid economic growth and resultant motorization.^{3,4}

This situation is of major concern in developing economies like India where sales and purchase of vehicles peaks up every year but development of infrastructure like road ways has not been able to keep pace with it.⁵ As of now, in India, the accident rate of 35 per 1000 vehicles is one of the highest in the world.⁶

In this article, the authors attempt to study the correlation between non – fatal road traffic accidents and age of victims brought for treatment to Mahatma Gandhi Medical College & Research Institute, Pondicherry between November 2012 to May 2014. Presently, there is limited study available from this area on this topic. The authors hope that the data retrieved in this study

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will be of help to the policy makers and decision takers so that these incidences can be reasonably contained in the time to come.

MATERIALS AND METHOD

This study was conducted by the Department of Forensic Medicine & Toxicology and Department of Emergency Medicine, Mahatma Gandhi Medical College & Research Institute, Pondicherry. Time period taken was for one and half years from November 2012 to May 2014. A total of 186 cases were studied and analysed.

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 at least 100 cases of RTA. Data was obtained by interviewing the victims or the accompanying persons in cases where the victims were unable to communicate. Informed written consent was taken and a pretested proforma was used for this purpose. Medicolegal records, case sheets and lab or radiological reports were used for collecting additional information. All findings were recorded in the proforma and the parameters were charted in diagrams. SPSS program was used for this purpose.

RESULTS

From this study, it is concluded that most of the victims of RTA (61 or 32.8%) belong to the age group of 21- 30 years (Table 1). Next common age group to be affected is the 31 – 40 years group with 37 victims (19.9%). Least common group to be affected is the age group of 1 - 10 years with 7 victims (3.8%).

Table 1: Distribution of cases of RTA according to age of victims.

Age of victims	Number of cases	%
1 - 10 years	7	3.8

11 -20 years	17	9.1
21- 30 years	61	32.8
31 to 40 years	37	19.9
41 to 50 years	35	18.8
51 to 60 years	14	7.5
>61 years	15	8.1
Total	186	100.0

DISCUSSION

Rapid industrialization with increased motorization and scant regard to legal, healthcare and safety reforms has led to a surge of incidences of RTA in developing countries.⁷ Globally, it is the eight-leading cause of death and the most important cause of death in the productive age group of 15 – 29 years.⁸

Among all nations, India has the highest number of casualties due to RTA, with a quantum 17.6% increase in number of deaths in between 2008 to 2012. India spends about 12.5 billion dollars every year for prehospital care, emergency care, and rehabilitation of victims of RTA. It is equivalent to 3% of the national GDP.⁹ This estimate is exclusive of the economic burden on accident survivors with permanent disabilities.¹⁰ Thus the socio economic and financial implications of RTA are colossal for a developing country like India. If the number of cases keep on increasing every year, as predicted by several studies, the economical burden will increase simultaneously and is likely to affect the financial stability and hamper growth and development.^{11, 12}

Risk factors for RTA are broadly classified as human and environmental factors. Age of victims fall under the realm of human factors.¹³

In our study, most of the victims (61 or 32.8%) belonged to the age group of 21 – 30 years. Other studies also noted similar results.^{13,14,15} The reason may be that people in this age group are more inclined to disobey traffic rules and regulations and also limit their use of safety equipments like helmets, seatbelts, gloves, protective jackets etc. Other contributing factors are a poor sense of judgement, risk – taking aptitude, sense of invulnerability and inexperience.

In our study, the least affected group was children from 1 to 10 years of age. The reason may be their limited time spent on travelling on the road. Moreover, the fact that this group does not drive makes incidence of such cases less in number.

The socio – economic burden of RTA is increasing year after year and India can no longer afford to turn a blind eye to this problem. 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.¹⁵ Considering the scenario here, certain steps may be taken. Potholes, road erosion, traffic signals have to be mended on a war footing. Protective devices like suitable sign – ages, markings etc should be installed. Rules like lawful limit of speed, use of breath analyzers to detect alcohol consumption at check points, imposing fines for not wearing helmet, banning cellphones during driving or wearing seat belts have to be strictly implemented by the concerned authorities.¹⁶

As a long-felt need, the government has initiated certain steps to improve road safety in India. National Road Safety Policy has been implemented and a National Road Safety Council is in the offing. Tamilnadu has started a Road Accident Data Management System. Many states across the country have shown interest in the system and are eager to implement it.¹⁷ Amendments have been brought to existing laws concerning road safety. However, implementation of these laws is still a matter of anguish. It augurs well if people are ardently sensitized to the different rules and regulations concerning the road safety. To decrease mortality and morbidity, interested volunteers must be trained on at least basic first aid management skills. More number of adequately staffed clinics, both government and private, with requisite infrastructure are an absolute must, especially in the remote and not – so – accessible areas. People of this country should whole heartedly cooperate with the government for implementation of the laws and schemes concerning road safety so that incidences of RTA can be gradually reined in within an appropriate time period.

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REFERENCES:

1. World Health Organization. Global status report on road safety: time for action [internet]. Geneva: World Health Organization, 2009 [cited 2017 Sept 22]. Available from: http://www.who.int/violence_injury_prevention/road_safety_status/2009.
2. Nantulya VM, Reich MR. The neglected epidemic: road traffic injuries in developing countries. *BMJ* 2002; 324: 1139 – 41.
3. Garg N, Hyder AA. Road traffic injuries in India: a review of literature. *Scan J Public Health* 2006; 34: 100 – 9.
4. Moniruzzaman S, Andersson R. Economic development as a determinant of injury mortality – a longitudinal approach. *Soc Sci Med* 2008; 66: 1699 – 708.
5. Garg N, Hyder AA. Exploring the relationship between development and road traffic injuries: a case study from India. *Eur J Pub Health* 2006; 16: 487 – 91.
6. Dandona R, Kumar GA, Ameer MA, Ahmed GM, Dandona L. Incidence and burden of road traffic injuries in urban India. *Inj Prev* 2008; 14: 354 – 9.
7. Agarwal D, Ahmed S, Khan S et al. Outcome of 2068 patients of head injury: Experience at level 1 trauma Centre in India. *Asian Journal of Neurosurgery* 2016; 11 (2): 143 – 45.
8. World Health Organization. Road Traffic Injuries [internet]. Fact Sheet. 2013 [cited 2017 Sept 23]. Available from: <http://www.who.int/mediacentre/factsheets/fs358/en/>
9. World Health Organization. Supporting a Decade of Action. Geneva: World Health Organization; 2013 [internet]. Global Status Report on Road Safety; 2013 [cited 2017 Sept 23]. Available from: http://www.who.int/publications/2009/9789241563840_eng.pdf.

10. Government of India. Ministry of Home Affairs. National Crime Records Bureau. Accidental Deaths and Suicides in India. 2012 [internet]. [Cited 2017 Sept 23]. Available from: <http://www.ncrb.gov.in/CD-ADSI-2012/ADSI2012.pdf>.
11. McGee K, Sethi D, Peden M, Habibula S. Guidelines for conducting community surveys on injuries and violence. *Injury Control and Safety Promotion* 2004; 11:303-6
12. Peden M, McGee K., Sharma G. The injury chart book. A graphical overview of global burden of injuries. Geneva. World Health Organization 2002.
13. Annadurai K, Mani G, Danasekaran R. Recurring tragedy of road traffic accidents in India: Challenges and opportunities. *Indian J Crit Care Med* 2015 Jul; 19(7): 434–435.
14. Singh A, Bhardwaj A, Pathak R, Ahluwalia SK. An epidemiological study of road traffic accident cases at a tertiary care hospital in rural Haryana. *Indian Journal of Community Health* 2011 July-Dec; 23(2): 53 – 55.
15. Tripathi M, Tewari MK, Mukherjee KK, Mathuriya SN. Profile of patients with head injury among vehicular accidents: An experience from a tertiary care centre of India. *Neurology India* Nov-Dec 2014; 62(6): 610 – 17.
16. Joshi AK, Joshi C, Singh M, Singh V. Road traffic accidents in hilly regions of northern India: What has to be done? *World J Emerg Med* 2014; 5(2): 112 – 15.
17. Singh V.P., Banerji A.K. Head injury due to vehicular accidents. *Neurology India*. Nov-Dec 2014; 62(6): 585 – 87.

Effectiveness of Ergonomic Gymnastics on Decreasing Blood Pressure in Patients with Stage One Hypertension, Indonesia

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ABSTRACT

Background: Increased age is one factor causing the occurrence of hypertension, this is due to the increasing age of organ function decreased marked by decreased elasticity of the arteries and stiffness occurs blood vessels so vulnerable to an increase in blood pressure. This ergonomic gymnastics is a physical activity that can to smooth blood circulation and increase pulse and can burn fat. This study aims to determine the effectiveness of ergonomic exercise in lowering blood pressure in patients with hypertension after intervention. The effectiveness of the intervention can be known by looking at the results of pre-test and post-test blood pressure of hypertensive patients. Material and Methods: The type of research is quasi experimental with *nonequivalent* control group design. Sample in this research is patient of hypertension stage one that is 33 people. Data analysis was performed by using Wilcoxon test with $\alpha = 0.05$. Results. The result of this study showed that ergonomic gymnastics experiments group one times a week p –value on systolic blood pressure was $0.317 > 0.05$, p-value diastolic $0.216 > 0.05$, ergonomic gymnastics group two times a week p –value on systolic blood pressure was $0.043 < 0.05$ p-value diastolic $0.078 > 0.05$, ergonomic gymnastic group three times a week systolic blood pressure was $0.043 < 0.05$ p-value diastolic $0.144 > 0.05$. Data analysis was performed using Kruskal Wallis test explains that pre post- test systolic blood pressure after ergonomic exercise in the experimental group 1, 2 and 3 times a week p-value $0.019 < 0.05$ means that there is a systolic blood pressure difference before ergonomic exercise, whereas diastolic pre post-test after ergonomic exercises p-value $0.465 > 0.005$ means there is no difference in diastolic blood pressure. Conclusion. The conclusion of the research results is the intervention with two time ergonomic gymnastics in a week more effective for lowering blood pressure in people with hypertension. It is therefore advisable for patients with hypertension stage 1 to always perform physical activities such as ergonomic exercise and check blood pressure to health workers on a regular basis so that blood pressure can be controlled.

Keywords: Hypertension, Blood Pressure, ergonomic, gymnastics, physical activities

INTRODUCTION

Increased age is one factor causing the occurrence of hypertension, this is due to the increasing age of organ function decreased marked by decreased elasticity of the arteries and stiffness occurs blood vessels so vulnerable to an increase in blood pressure. Hypertension is one of the many degenerative diseases occur and have a fairly high mortality rate and affects the quality of life and a

people productivity. Hypertension, a major risk factor for cardiovascular disease, is also a leading cause of premature death and a third cause of disability. It affects 1 billion people worldwide, leading to heart attacks, strokes, and kidney failure. [2], [3], [4], [5], [6]

The total number of people with hypertension is expected to increase to 1.56 billion by 2025. [7] Therefore, a prevention approach that focuses on modifying risk factors for hypertension is essential to control this growing epidemic. Over the last 4 to 5 decades, data collection has resulted in consistent findings on the protective effects of physical activity in preventing hypertension. [8], [9], [10], [11]

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A recent systematic review of a prospective cohort study showed an inverse relationship between physical activity and incident hypertension. One activity that can lower blood pressure is ergonomic exercise. This ergonomic gymnastics is a physical activity that can to smooth blood circulation and increase pulse and can burn fat. This study aims to determine the effectiveness of ergonomic exercise in lowering blood pressure.

MATERIAL AND METHOD

This study was conducted on April 2st - June 9th, 2018. The type of this study was quasi experimental with nonequivalent control group design. The sample in this study was the first stage hypertension patient, 33 people consisting of 3 experimental groups and 3 control

groups. Each experimental group consisted of 5 people who were given ergonomic gymnastics interventions 1 time a week, 2 times a week, and 3 times a week, while each control group consisted of 6 people who were not intervened. Data analysis was performed by using Wilcoxon and Kruskal wallis test with $\alpha = 0.05$. The population and sample of the study were all first stage hypertension patients of 100 people. This research uses purposive sampling technique.

RESULTS

Total sample that would be analyzed in this study was 33 samples. Based on bivariate analysis in the Table 1, analysis of ergonomic gymnastic with blood pressure drop (p value < 0.005).

Table 1. Analysis Wilcoxon of Ergonomic Gymnastic Effectiveness once a Week, Twice Weekly and Three Times a Week on Decreasing Blood Pressure in Patients with Stage One Hypertension

	Systolic_After Systolic_Before	Diastolic_Aftre Diastolic_Before
Group gymnastics 1 times a week p-value	-1.000 .317	-1.236 .216
Control group 1 p-value	-1.414 .157	-.1095 .273
Group gymnastics 2 times a week p-value	-2.023 .043	-1.761 .078
Control group 2 p-value	-1.633 .102	-.000 .1000
Group gymnastics 3 times a week p-value	-2.032 .043	-1.461 .144
Control group 3 p-value	-1.414 .157	-1.633 .102

Table 2. Analysis Kruskal wallis test Systolic and Diastolic Blood Pressure before and after Ergonomic Exercise on Decreasing Blood Pressure in Patients with Stage One Hypertension (experimental group)

	Week	Frek	Mean Rank	<i>p-value</i>
Systolic pre-test	Intervention 1 time a week	5	9	0.707
	Intervention 2 time a week	5	7.8	
	Intervention 3 time a week	5	7.2	
Systolic post-test	Intervention 1 time a week	5	12.5	0.019
	Intervention 2 time a week	5	6.3	
	Intervention 3 time a week	5	5.2	
Diastolic pre-test	Intervention 1 time a week	5	9.6	0.321
	Intervention 2 time a week	5	8.8	
	Intervention 3 time a week	5	5.6	
Diastolic post-test	Intervention 1 time a week	5	9.9	0.019
	Intervention 2 time a week	5	7.6	
	Intervention 3 time a week	5	6.5	

Table 3. Analysis Kruskal wallis test Systolic and Diastolic Blood Pressure before and after Ergonomic Exercise on Decreasing Blood Pressure in Patients with Stage One Hypertension (control group)

	Week	Frek	Mean Rank	<i>p-value</i>
Systolic pre-test	Intervention 1 time a week	6	10	0.368
	Intervention 2 time a week	6	8.5	
	Intervention 3 time a week	6	10	
Systolic post-test	Intervention 1 time a week	6	10.33	0.08
	Intervention 2 time a week	6	7.83	
	Intervention 3 time a week	6	10.33	
Diastolic pre-test	Intervention 1 time a week	6	8.92	0.558
	Intervention 2 time a week	6	5.75	
	Intervention 3 time a week	6	13.83	
Diastolic post-test	Intervention 1 time a week	6	10	0.514
	Intervention 2 time a week	6	7.58	
	Intervention 3 time a week	6	10.92	

DISCUSSION

Table 1. shows that the experimental group of one systolic blood pressure before and after the intervention has $p\text{-value } 0.317 > 0.05$ meaning there is no significant drop in blood pressure, whereas the diastolic blood pressure before and after intervention $p\text{-value } 0.216 > 0.05$ means there is no pressure drop significant blood.

Decrease in systolic and diastolic blood pressure in patients with stage 1 hypertension with 1 week gym intervention for 3 weeks in a row still need to increase regularly to normalize blood pressure, physical activity like ergonomic gymnastics is one factor that very important role to decrease risk of atherosclerosis with strengthen the heart and reduce the work of the heart. Physical exercise like regular exercise also helps prevent chronic conditions or illness, such as high blood pressure. ^[12]

Rizqiyatiningsih, S (2014) explains that ergonomic gymnastics is able to restore the position and flexibility of the nervous system and blood flow, maximize the supply of oxygen to the brain, able to maintain the body's freshness system and negative energy exhaust system from the body. In addition ergonomic Gymnastics can also increase muscle strength and the effectiveness of heart function, prevent hardening of arteries as well as

launching the respiratory system. Ergonomic gymnastics can be done by all ages. Gymnastics ergonomics consists of movements that resemble the movement of prayers so that the elderly easy to apply the movement of the gymnastics. ^[12]

The results of statistical test analysis using Wilcoxon test in Table 1. Show that group 2 got systolic before and after intervention $p\text{-value } 0.043 < 0.05$ means there is a significant decrease in blood pressure, while diastolic signification value before and after $p\text{-value } 0.078 > 0.05$ means there is a decrease in blood pressure significant.

Samples with systolic blood pressure dropped nearly half of the sample as they actively followed gymnastics and followed proper ergonomic exercise procedures on a continuous basis warm up exercises, core exercises as well as cooling or closing exercises. Samples whose blood pressure remained and increased because of excess body weight and gymnastics were not done continuously. Ergonomic gymnastics is a fairly difficult exercise to do perfectly because there are several movements such as sitting motion while sitting and sitting resigned that is difficult to do perfectly affecting systolic blood pressure and diastolic.

Ergonomic gymnastics is one type of exercise combined with muscle movement and breathing techniques. Respiratory technique is done consciously and using a diaphragm, so the abdomen is lifted slowly and chest fully inflate. This breathing technique provides a heart massage, opens blockages and smooths blood flow to the heart and increases blood flow throughout the body. ^[13]

The statistic test using Wilcoxon test in Table 1 explains that group 3 obtained systolic before and after p-value 0.043 < 0.05 means there is a significant decrease in blood pressure, while diastolic significance value before and after p-value 0.144 > 0.05 means no decrease in blood pressure which is significant.

Samples with systolic blood pressure decreased by almost half of the sample because they were actively following gymnastics and following correct ergonomic gymnastics procedures for continuous warming exercises, core exercises and cooling exercises or closing exercises. Samples whose blood pressure is fixed and their blood pressure has increased because they are starting to look lazy in doing gymnastics movements like joking, not doing the movement perfectly because ergonomic exercises done in 3 times a week make the sample bored and anxious and there are some who think work at home so as not can achieve optimal calm in following ergonomic gymnastic activities.

Table 2 explains that pre-test systolic blood pressure after ergonomic exercise in the experimental group of 1, 2 and 3 times a week p-value 0.019 < 0.05 means that there is a systolic blood pressure difference before ergonomic exercise, whereas pre-post-test ergonomic exercise diastolic p-value 0.019 > 0.005 means there is diastolic difference. The results of the study with the theory of Tangkudung (2004) and Revision of Prime Mission (2014) which explains that there are ergonomic exercises that can lower blood in hypertensive patients. ^{[14], [15]} Ergonomic gymnastics is a fundamental gymnastics movement in accordance with the order and physiological body. The body is automatically preserved homeostatisnya (regularity and balance) State in a fit state. ^[16] Movement in ergonomic gym consists of 5 basic movements and 1 cover motion. Basic ergonomic gymnastics movement consists of a broad movement of chest, thanksgiving dance, sitting mighty, sitting fire and wild resigned. Movement cover ergonomic gymnastics is a movement of energy called

the movement of energy. Each movement includes the usual benefits in disease prevention and health care. ^[17]

Table 3 explains that pre post-test systolic blood pressure in the control group 1, 2 and 3 times a week p-value 0.080 > 0.005 means no difference in systolic blood pressure, whereas diastolic blood pressure pre post p-value 0.514 > 0.005 means there is no difference in diastolic blood pressure in the control group. One effort that can be done to stabilize and lower blood pressure in people with hypertension and prevent complications that is by doing ergonomic gymnastics. Ergonomic gymnastics can be applied both in experiment and control group with frequency 2 times a week done regularly, regularly and continuously in order to get bigger benefit.

Ergonomic gymnastics is a technique of exercise and breathing to restore or improve the position of flexibility of the nervous system and blood flow. If the flexibility of blood flow is good it will allow the blood vessels to relax quickly as the heart pumps blood. In the less elastic or rigid blood vessels can complicate the sagging blood vessels quickly as the heart pumps, resulting in increased blood pressure as the heart contracts. Ergonomic gymnastics also maximize the supply of oxygen to the brain, so the brain is not lack of oxygen and nutrients and avoid the damage of blood vessels in the brain. Ergonomic gymnastics can also maximize the combustion system one of which burning cholesterol. Burning cholesterol will affect the level of LDL (*low density lipoprotein*) in the blood and increase HDL (*high density lipoprotein*) which will reduce the atherosclerosis that inhibits blood flow. Movement contained in ergonomic gymnastics is a very effective, efficient and logical movement because it is a series of movements performed by humans from the beginning until now. ^[18]

The results of the statistical test using Kruskal wellis were obtained before the ergonomic exercise p-value 0.322 > 0.05 and after the p-value 0.465 mean that there was no difference in systolic blood pressure in the experimental group as well as the control group with p-value 0.514 > 0.05. Samples that do not decrease blood pressure because the movement of gymnastics is not continuity. The more frequent ergonomic gymnastics performed causing the respondents to start saturated and bored so that the exercises do not mean it. In addition, long term research factors, lack of seriousness

in gymnastics, movements not in accordance with the tempo and the movement has not been done correctly as taught.

The results of this study are consistent with the research conducted by Zulaikha (2016) explaining that $p\text{-value } 0.376 > 0.05$, meaning there is no difference in diastolic blood pressure in the three study groups (experimental group 1 with elderly gymnastics 2 times a week, experimental group 2 with gymnastics elderly gymnastics 3 times a week and group 3 without intervention) in elderly hypertension in Bulu community health service center working Area. Each group conducted a study with the same period of 2 weeks. ^[19]

CONCLUSION

The conclusion of the research results is the intervention with two time ergonomic gymnastics in a week more effective for lowering blood pressure in people with hypertension. It is therefore advisable for patients with hypertension stage 1 to always perform physical activities such as ergonomic exercise and check blood pressure to health workers on a regular basis so that blood pressure can be controlled.

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Ethical considerations: Ethical clearance was obtained from Institute of Health Science “Maluku Husada”, Ambon, Indonesia; with number” RK.03/KEPK/STIK/I/2018. Just before the interview, written (or thumb impression) consent was obtained from each participant in Institute of Health Science Ambon guidelines.

Conflicts of Interest : The authors alone are responsible for the views expressed in this article and they do not necessarily represent the views, decisions, or policies of the institutions with which they are affiliated.

REFERENCES

- [1] Masriadi, Azis R, Sumantri E, Mallongi A. Effectiveness of non-pharmacologic therapy through surveillance approach to blood pressure degradation in primary hypertension patients, Indonesia. *Indian Journal of Public Health Research & Development*. 2018; 9 (4): 249-255.
- [2] Global Public Health Crisis [internet]. World Health Day, 2013. [Cited 2018 June 19]. Available from: <http://www.who.int>.
- [3] Cao X. A call for global research on non-communicable diseases. *Lancet*. 2015; 385:e5–e6.
- [4] Mozaffarian D, Benjamin EJ, Go AS, Arnett DK, Blaha MJ, Cushman M, Das SR, Ferranti SD, Després JP, Fullerton HJ. Heart disease and stroke statistics-2016 update: a report from the American Heart Association. *Circulation*. 2015; 133:e38–e360.
- [5] Murray CJ, Lopez AD. Measuring the global burden of disease. *N Engl J Med*. 2013; 369 (5): 448-57.
- [6] Masriadi, Mega Ermasari. The Relationship of family history, usage of wasted cooking oil, alcohol consumption, smoking habit the incidence of essential hypertension at two areas of health Center of North Buton Regency, Province of South East Sulawesi. *Journal of Sciences: Basic and Applied Research (IJSBAR)*, 2015; 24 (1): 146-155
- [7] Xuejiao Liu, D.Z., Yu Liu, Xizhuo Sun, Chengyi Han, Bingyuan Wang, Yongcheng Ren, Junmei Zhou, Yang Zhao, Yuanyuan Shi, Dongsheng Hu, Ming Zhang. Dose–response association between physical activity and incident hypertension. *Hypertension*. 2017; 69(10): 1-48.
- [8] White DK, Gabriel KP, Kim Y, Lewis CE, Sternfeld B. Do short spurts of physical activity benefit cardiovascular health? The cardia study. *Med Sci Sports Exerc*. 2015; 47(11):2353-8.
- [9] Jackson C, Herber G GC, Brown W. Joint effects of physical activity and BMI on risk of hypertension in women: a longitudinal study. *J Obes*. 2014; 271532: 1-7.
- [10] Williams PT, Thompson PD. Walking versus running for hypertension, cholesterol, and diabetes mellitus risk reduction. *Arterioscler Thromb Vasc Biol*. 2013; 33: 1085–1091.
- [11] Huai P, Xun H, Reilly KH, Wang Y, Ma W, Xi B. Physical activity and risk of hypertension: a meta-analysis of prospective cohort studies. *Hypertension*. 2013; 62:1021–6.
- [12] Rizqiyatiningsih, S, The influence of ergonomic gymnastics on decreasing blood pressure with degree 1 hypertension in Lansia in Wironustom

- Village Gatak Sukoharjo District. Scientific writing strata one, University of Muhammadiyah Surakarta. 2014.
- [13] Prime, R.M., Effectiveness of ergonomic gymnastics with aerobic low impact gymnastics on blood pressure levels in hypertensive elderly. *Critical, Medical & Surgical Nursing Journal*. 2014; 2 (2): 2014-04
- [14] Tangkudung, James. Smart and fit with gymnastics. 2004. Jakarta: Gramedia.
- [15] Revision of the First Mission. Ergonomic ergonomic effectiveness with aerobic low impact against level of blood pressure in [Cited 2018 June 19]. Available from: <http://eprints.ums.ac.id>
- [16] Sagiran. Miracle Movement of Prayer, 2013. Jakarta: Qultum Media.
- [17] Wratsongko. Guidelines for healthy without drugs. Ergonomic gymnastics, 2006. Jakarta: Gramedia.
- [18] Syahrani, The influence of ergonomic gymnastics on systolic blood pressure in elderly with hypertension in Social Institution Tresna Werdha Budi Mulya 3 Margaguna Jakarta Selatan.2, Syarif Hidayatullah State Islamic University Jakarta, 2017.
- [19] Zulaikha, I., Effectiveness of elderly gymnastics against blood pressure lowering hypertensive elderly in Work Area of Bulu Community Health Service Center Sukoharjo District. Thesis. Faculty of Health Sciences University of Muhammadiyah Surakarta, 2016.

Effect of Cold and Hot natured Diet on Level of Thyroid Hormones, Epinephrine, Norepinephrine, Cortisol, Testosterone and LH in Human

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ABSTRACT

Introduction: Based on Iranian traditional medicine, foods are classified under two groups: hot-natured and cold-natured. The present study, therefore, undertakes to determine the effects of hot- and cold-natured foods on the amount of thyroid hormones, epinephrine, norepinephrine, cortisol, testosterone and LH in the human.

Method: The study was quasi-experimental and the participants in the experiment were 60 students, in Gonabad University of Medical Sciences, who had, during summer semester, been selected and depending on their temperament placed into three sample groups at duration 3 weeks, each of them having their own dietary program: one to be served with hot-natured foods for their meals, one with cold-natured foods, and the one as reference group with mixed undifferentiated foods. The thyroid hormones, epinephrine, norepinephrine, cortisol, testosterone and LH were measured pre- and post-intervention. Due to the normality of the data distribution, the gathered data were analyzed using SPSS software program (Ver. 19) and paired t-test and ANOVA in a meaningful level of $p < 0.05$.

Results: According to ANOVA ($P > 0.05$), the students of the three groups showed no significant differences in demographic characteristics and medical examinations pre- and post-intervention. The amount of T4, T3, cortisol, testosterone and LH in blood and cortisol, VMA and Normetanephrine in urine no significant differences between the three groups pre- and post-intervention ($p > 0.05$).

Conclusion: The results of this study showed that dietary intake of normal nature, hot or cold for 3 weeks there was no significant difference in the amount of thyroid hormones, cortisol, testosterone, LH, cortisol, VMA and Normetanephrine.

Keywords: Hot- and cold-natured foods; hormones; Human

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INTRODUCTION

Complementary and alternative medicine is increasingly used in different countries; this is due to the proven effectiveness of many of these substances in scientific communities and its acceptability in most human societies.^{1,2} One of the beliefs of traditional

Iranian medicine is that some foods are hot and, in contrast, others are cold natured. Excessive partake of cold or hot foods can be harmful.³⁻⁵

The health is a state of equilibrium between hot and cold elements in the body. A disease develops when the body imbalances in excessive hotness or coldness. However, the balance can be regained through food treatment.⁶ The notion of hotness and coldness is accepted not only in traditional medicine of Iran but also in traditional medicine of India, Europe, Arabia, Romania, Greece and China.^{4,7} According to traditional Iranian medicine, main elements of living organisms are fire, air, water and soil. Hotness, coldness, wetness and drought are basic qualities; each of the above elements is composed of two qualities. Fire is hot and dry, air is hot and wet, water is cold and wet, and soil is cold and dry. In each individual, one or two states are dominant; this dominant state is called temperament.^{8,9}

In traditional medicine, foods like human body are made up of substances which make them hot or cold, wet or dry. Humans need to keep their temper at moderate levels in order to avoid diseases.⁸ In the Encyclopedia of Foods, Wood states that hot and cold nature of foods has been noted in the ancient literature of Iran, China and India.¹⁰ Foods which cause or exacerbate symptoms such as weakness, drowsiness, impatience are called cold-natured foods. Foods which cause symptoms such as faster than usual movements, restlessness, disturbance and insomnia are called hot-natured foods.^{2,3,9}

Thyroid stimulating hormone (TSH) stimulates the production of thyroid hormones from follicular cells of the thyroid.¹¹ Thyroxine (T₄) and triiodothyronine (T₃) are two main thyroid gland hormones which greatly increase metabolic rate of the body. Luteinizing hormone (LH) is secreted from the anterior pituitary gland and it stimulates testicular leydig cells to secrete testosterone. Testosterone is secreted by testicular leydig cells; it is responsible for male sexual traits in the body and increases muscle mass. Cortisol secreted from glomerular region of the adrenal gland cortex. Cortisol increases glucose, amino acids and free fatty acids of the blood.¹²

If effect of hot and cold diet on function of these glands is proven, it can be a harmless, low-cost alternative with less psychological and physical complications than medications (8). Therefore, this study examined the

effects of cold and hot-natured foods on level of thyroid hormones, epinephrine, norepinephrine, cortisol, testosterone and LH in students.

Materials and Methods

This was a quasi-experimental study on 60 healthy male students (18-22 years) at Gonabad University of Medical Sciences. After filling the consent form, students underwent a medical examination.

Temperament of students was determined based on their self-declaration. Hot-tempered students were placed in the cold diet group, cold-tempered students were placed in the hot diet group and students who did not know their temperament were placed in the normal diet group for three weeks.

Hot food items included saffron, walnuts, dates, grape juice, honey, banana, apricots, flixweed, garlic, onions, shallot, peppermint, pastries, raisins, coconut, rock candy, melons, pears, zinger, cinnamon, cardamom, pepper, lamb, cocoa, sesame, eggs, peas, butter, cumin, fig, almonds, celery, chives, quince, carrot, pistachio, black olives, hazelnuts, rooster meat, peanuts, mangoes, pennyroyal, horseradish, parsley, tea, persimmons, basil, yellow chubs, fenugreek, leeks and ostrich meat. Cold foods also included rice, yogurt, dough, milk, cucumber, tomato, pickles, cherries, peaches, watermelons, potatoes, veal, lemons, verjuice, pomegranates, sumac, barberry, spinach, lettuce, pumpkin, cabbage, whey, mushrooms, chicken, cheese, prunes, sour apple, rice milk, sea-buckthorn, beans, lentils, broad bean, mung bean, fish meat, goat meat, starch, barley bread, barley soup, animal brain, eyes, rumen, gizzard, vinegar, qaraqrot, citron, pumpkin seeds, corn, rhubarb, chicory and coriander. Normal food items included wheat bread, kofta, kookoo sabzi, partridges, porridge, beet leaves, coffee, jujube, and a balanced blend of some hot and cold foods.^{3,13}

It was tended to avoid significant difference in mean energy and protein, carbohydrate and fat macronutrients between three groups which were measured by using Food Processor II software.

TSH, T₃, T₄, cortisol, testosterone and blood LH and 24-hour urine cortisol were measured at the beginning and the end of the intervention. Metabolites of catecholamines including vanillylmandelic acid (VMA) and normetanephrine of 24-hour urine were measured at

the beginning and the end of the intervention.

Normetanephrine was measured by ELISA method with HUMAN device, and using the LDN kit, Germany. VMA was measured by chromatography with a Biosystem kit, Spain. The rest of hormones were measured by using fully automated Bellini device, the tka model, Italy, and by using monobind kits.

Data was inserted in SPSS (Ver. 19). Analysis was done by using pairwise t-test and one-way analysis of variance as well as analysis of variance of repetitive observations ($P < 0.05$).

RESULTS

The demographic characteristics and pre-interventional medical examinations are listed in Table 1.

Table 1: comparison of mean of age, BMI and vital signs in 3 groups before the intervention

Variable	Normal diet	Hot diet	Cold diet	p-value
Age(y)	20.62±1.32	20.85±1.49	20.55±1.46	0.786
BMI(kg/m ²)	22.18±3.09	21.81±2.74	22.05±2.93	0.218
Temperature(°C)	36.89±0.175	36.75±0.394	36.86±0.340	0.336
Systolic BP (mmHg)	115.10±8.61	119.30±7.65	113.25±8.92	0.075
Diastolic BP (mmHg)	75.95±5.83	78.00±5.29	74.45±5.14	0.126
HR(per min)	71.52±6.83	70.25±5.04	74.95±11.60	0.187
RR(per min)	18.05±1.85	17.80±1.73	17.70±1.30	0.786

In terms of age, BMI and vital signs, ANOVA showed no significant difference between three groups before and after the intervention ($P > 0.05$).

Table 2: comparison of mean of the measured hormones in 3 groups before the intervention

Variable	Normal diet	Hot diet	Cold diet	p-value
T4 (µg/ml)	9.92±1.51	9.07±1.26	9.14±1.27	0.089
T3 (ng/dl)	162.38±31.76	152.50±40.50	156.50±23.00	0.622
TSH (U/L)	1.49±0.80	1.62±0.88	1.44±0.65	0.753
LH (mu/L)	1.92±0.49	1.90±0.70	1.65±0.61	0.298
Cortisol in blood (nmol/L)	413.83±191.11	426.11±94.87	487.00±153.68	0.585
Cortisol in urine (nmol/L)	103.42±21.29	107.45±29.19	105.70±29.20	0.890
Testosterone (ng/dl)	391.90±126.00	364.00±62.51	362.00±131.97	0.632
VMA (mg/day)	5.26±1.91	5.31±2.45	5.28±2.94	0.998
Normetanephrine (µg/day)	189.52±113.81	192.50±90.06	193.15±99.07	0.993

ANOVA was used.

In terms of thyroid hormones, cortisol, testosterone and blood LH and cortisol, urine VMA and normetanephrine, ANOVA showed no significant difference between three groups before the intervention ($P > 0.05$).

Table 3: comparison of mean of the measured hormones in 3 groups after the intervention

Variable	Normal diet	Hot diet	Cold diet	p-value
T4($\mu\text{g/ml}$)	11.19 $\pm$ 2.43	10.97 $\pm$ 2.36	10.84 $\pm$ 2.24	0.892
T3(ng/dl)	152.85 $\pm$ 35.93	143.00 $\pm$ 40.53	139.50 $\pm$ 30.51	0.469
TSH(U/L)	2.39 $\pm$ 1.15	2.35 $\pm$ 0.93	2.56 $\pm$ 1.44	0.838
LH($\mu\text{u/L}$)	2.54 $\pm$ 1.19	1.89 $\pm$ 0.90	1.97 $\pm$ 1.04	0.106
Cortisol in blood(nmol/L)	407.33 $\pm$ 134.53	480.00 $\pm$ 122.66	499.00 $\pm$ 111.44	0.371
Cortisol in urine(nmol/L)	79.85 $\pm$ 26.48	83.40 $\pm$ 27.04	75.60 $\pm$ 32.27	0.692
Testosterone(ng/dl)	390.00 $\pm$ 141.27	366.00 $\pm$ 81.58	361.50 $\pm$ 137.39	0.729
VMA(mg/day)	4.85 $\pm$ 1.48	4.59 $\pm$ 1.92	4.35 $\pm$ 1.74	0.648
Normetanephrine($\mu\text{g/day}$)	153.90 $\pm$ 72.37	165.90 $\pm$ 78.26	155.70 $\pm$ 75.17	0.861

ANOVA was used.

In terms of thyroid hormones, cortisol, testosterone and blood LH and cortisol, urine VMA and normetanephrine, ANOVA showed no significant difference between three groups after the intervention ($P > 0.05$).

DISCUSSION

The results showed that hot, cold and normal foods consumed by three groups did not have a significant difference in levels of thyroid hormones, epinephrine, norepinephrine, cortisol, testosterone and LH. These findings were inconsistent with Shahabi et al.⁴ The reason for the difference between results of this study and the present study is that they classified samples based on temperament and there was no intervention, while the present study performed food intervention after grouping based on self-reported type of temperament.

Findings showed that T4 significantly increased after intervention, while there was no significant difference between the three groups before and after the intervention. There was a significant decrease in T3 after intervention, while there was no significant difference between the three groups before and after the intervention. There was a significant increase in TSH level after the intervention, while there was no significant difference between three groups before and after the intervention. However, all three hormone levels were normal before and after the intervention. The active hormone of thyroid gland is T₃, which is derived from conversion of T₄ to T₃.¹⁴

Thyroid hormones increase metabolic activity of all tissues of the body. When a large amount of thyroid hormone is secreted, the base metabolism can increase to 60 to 100% higher than normal; this increases the

amount of food used to generate energy. Thyroid hormones increase active transfer of ions from cell membranes. Activity of the enzyme Na⁺, K⁺-ATPase increases in response to thyroid hormones. This enzyme increases transfer of both sodium and potassium ions from the cell membrane of some tissues. Since this process increases the heat produced by the body due to energy consumption, it is believed that this process may be one of the mechanisms of thyroid hormone effect in increasing metabolism in the body.¹⁵ Thyroid hormones stimulate glucose uptake, glycolysis exacerbation, gluconeogenesis, and increased absorption from digestive tract and even increased insulin secretion by its secondary effect on carbohydrate metabolism.¹⁶ Normal sexual function requires normal secretion of thyroid hormones. Probably, deficiency of thyroid hormones in men may reduce sexual desire.¹⁵

In this study, there was no significant difference in post- and pre-interventional blood cortisol levels. Blood cortisol level was not different before and after the intervention in three groups. Post-interventional and pre-interventional urinary cortisol levels were significantly different; urinary cortisol level was not different before and after the intervention in three groups. The most famous metabolic action of cortisol and other glucocorticoids is their ability to stimulate gluconeogenesis by liver, which often increases it by 6 to 10 times and ultimately increases blood glucose.¹⁵ Cortisol naturally exists early in the morning at the

highest level and in the evening and at night at the lowest level. Therefore, it is essential to state the time to measure cortisol levels.¹⁷

In this study, there was no significant difference in post- and pre-interventional blood testosterone levels. Blood testosterone level was not different before and after the intervention in three groups. Testosterone also increases base metabolism. Administration of large amounts of testosterone can increase basal metabolic rate by up to 15%. Even secretion of usual levels of testosterone from the testes during adolescence and early adulthood also increases base metabolism by 5 to 10% compared with that in which testicles are not active. This increase in metabolism is probably the indirect result of testosterone effect on protein anabolism, because increased value of proteins increases the activity of all cells.¹⁸

The results showed that post-interventional LH level was significantly different from pre-interventional LH level only in the normal diet group, while LH level was not different in three groups before and after the intervention. LH is secreted from an anterior pituitary cell called gonadotroph, which affects the target tissues in testicles mainly by activating cyclic adenosine monophosphate (cAMP) system. This, in turn, activates certain enzyme systems in target cells. Value of testosterone secreted is approximately directly proportional to available LH.¹⁵

In this study, there was no significant difference in post- and pre-interventional urine VMA. Urine VMA was not different before and after the intervention in three groups. There was a significant difference in post- and pre- interventional urine epinephrine, while urine norepinephrine was not different before and after the intervention in three groups. Circulating norepinephrine causes contraction of most blood vessels. This hormone increases heart activity, inhibits digestive system, dilates pupil eyes, and so on. Epinephrine causes approximately the same effects as norepinephrine, while epinephrine is more effective in stimulating the heart due to its stronger effect on stimulation of beta receptors than norepinephrine.¹⁹ Epinephrine increase total body metabolism by up to 100% of normal levels, thereby increase activity and excitability of the body.¹⁵ Adrenal glands make large amounts of catecholamine in response to stress. The main catecholamines are epinephrine, norepinephrine and dopamine. Catecholamines break

down into VMA, norepinephrine and normetanephrine.²⁰

This study only examined the qualified students in three weeks. Since it was summer semester, quantitative measurement of hot-natured and cold-natured foods and temperament of samples were based on self-reported data. In addition, the number of interventional studies conducted in this area is very limited, which limits comparability of the results.

CONCLUSION

Based on results of this study, consumption of normal, hot or cold natured diet for 3 weeks did not significantly influence the levels of thyroid hormones, cortisol, testosterone, blood LH and cortisol, urine VMA and normetanephrine.

Conflict of Interests: Nil

Ethical Considerations: Ethical matters e.g. plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc. have been totally observed by the authors.

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Ethics Clearance: Not required as it is a review article.

REFERENCES

1. Miller KL, Liebowitz RS, Newby LK. Complementary and alternative medicine in cardiovascular disease: a review of biologically based approaches. *American heart journal*. 2004; 147(3):401-11.
2. Azaizeh H, Saad B, Cooper E, Said O. Traditional Arabic and Islamic medicine, a re-emerging health aid. *Evidence-Based Complementary and Alternative Medicine*. 2010; 7(4):419-24.
3. Kianmehr M, Tavakolizadeh J, Akbari A, Heydari ST, Masoumzadeh M, Rasekhi H, et al. The Effect of Consuming Food With "Warm" or "Cold" Temperaments on Students' Mental Health and Aggression. *Shiraz E-Medical Journal*. 2014; 15(1).
4. Shahabi S, Hassan ZM, Mahdavi M, Dezfouli M, Rahvar MT, Naseri M, et al. Hot and Cold natures and some parameters of neuroendocrine and

- immune systems in traditional Iranian medicine: a preliminary study. *The Journal of Alternative and Complementary Medicine*. 2008; 14(2):147-56.
5. Nasser M, Tibi A, Savage-Smith E. Ibn Sina's Canon of Medicine: 11th century rules for assessing the effects of drugs. *Journal of the Royal society of Medicine*. 2009;102(2):78-80.
6. Weller S. New data on intracultural variability: the hot-cold concept of medicine and illness. *Human Organization*. 1983; 42(3):249-57.
7. Wu DYH. Traditional Chinese concepts of food and medicine in Singapore: Institute of Southeast Asian Studies; 1979.
8. Parvinroo S, Zahediasl S, Sabetkasaei M, Kamalinejad M, Naghibi F. The effects of selected hot and cold temperament herbs based on Iranian traditional medicine on some metabolic parameters in normal rats. *Iranian journal of pharmaceutical research: IJPR*. 2014; 13(Suppl):177.
9. Faridi P, Zarshenas MM, Abolhassanzadeh Z, Mohagheghzadeh A. Collection and storage of medicinal plants in The Canon of Medicine. *Pharmacognosy Journal*. 2010; 2(8):216-8.
10. Wood RT, Pitchford P. new whole foods encyclopedia: Penguin Books; 2010.
11. Sarapura VD, Samuels M, Ridgway C. Thyroid stimulating hormone. *The Pituitary*. 1995:187-229.
12. Hall JE. Guyton and Hall textbook of medical physiology: Elsevier Health Sciences; 2015.
13. Avicenna. Canon of Medicine. Reprinted by the Institute of Medical History: Islamic and Complementary Medicine Publication; 2004.
14. Gardas A. [Laboratory tests: level of T3, T4, TSH and antithyroid gland autoantibodies in the Polish population]. *Endokrynologia Polska*. 1990; 42(2):353-8.
15. Longo DL, Fauci AS, Kasper DL, Hauser SL, Jameson JL, Loscalzo J. Harrison's Principles of Internal Medicine 18E Vol 2 EB: McGraw Hill Professional; 2012.
16. Brenta G. Diabetes and thyroid disorders. *The British Journal of Diabetes & Vascular Disease*. 2010; 10(4):172-7.
17. Findling JW, Raff H. Diagnosis and differential diagnosis of Cushing's syndrome. *Endocrinology and metabolism clinics of North America*. 2001; 30(3):729-47.
18. Simon D, Nahoul K, Charles MA. Sex hormones, aging, ethnicity and insulin sensitivity in men: an overview of the TELECOM study. *Androgens and the Aging Male*, Parthenon Publishing, New York. 1996:85-102.
19. Krakoff LR, Dziedzic S, Mann SJ, Felton K, Yeager K. Plasma epinephrine concentration in healthy men: correlation with systolic pressure and rate-pressure product. *Journal of the American College of Cardiology*. 1985; 5(2):352-6.
20. Ali S, Kiefer S. Semantic Coordination of Ambient Intelligent Medical Devices in Future Laboratories. *MASAUM Journal of Basic and Applied Sciences (MJBAS)*. 2009; 1(2).

A Review of the Risk Factors, Diagnosis and Treatment of Colorectal Cancer in Patients with Chronic Diseases in Iran

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ABSTRACT

Introduction: Colorectal cancer is one of the wide-spread diseases in many human societies and numerous factors like inflammations, oxidants and chronic diseases are major risk factors for this disease. Investigation about it is important as a general hygiene issue.

Analysis method: In this reviewresearch, information related to colorectal cancer, the risk factors, treatment and related prevention wayswere extracted and studied by searching key words like: colorectal cancer, chronic diseases, chronic diseases and colorectal cancer and risk factors of colorectal cancer, among published articles in databanks such as Iranmedex, Web of science, Pubmed, Science Direct, SID, Ebsco, Google scholar and Magiran.

Results: Generally age, diet, colon polyps, positive family history for colorectal cancer, some underlying diseases such as ulcerative colitis, history of cancer in the person, lack of physical activity, obesity, diabetes, metabolic syndrome, smoking and alcohol are effective factors in colorectal cancer incidence. On the other hand, in spite of taken actions, different reports show that the rate of colorectal cancer is on the risein Iran.

Conclusion: Proper nutritional habits, physical activity suitable to each patient's ability, attending muscular relaxation plan for diabetic patients and the patients with high blood pressure can be promising for reducing the cases of colorectal cancer.

Keywords: *Colorectal cancer, chronic diseases, risk factors.*

INTRODUCTION

The studies show nowadays, cancer is one of the reasons of mortality and it is one of the major problems in global hygiene ⁽¹⁻⁴⁾ and it has a great importance as one of the important subjects in general hygiene and it gains more attention in all countries day by day. In the present era, by changing lifestyles and urbanization, the rate of some cancers like gastrointestinal cancer have been increased ⁽⁵⁻⁷⁾. Colorectal cancer has been growing exponentially ⁽⁸⁾ and based on epidemiologic studies, it is the second reason for mortality in the USA. In Iran

also, the rate of colorectal cancer has increased in recent decades significantly and its prevalence in the world is in high levels. According to the annual reports of Iran national cancer registry center, colorectal cancer is the fourth reason for the mortality of men after lung, liver and gastric cancers and it is the third death reason for the women after lung and breast cancers. In Iran, this cancer is reported 7 cases per 100000 people ⁽⁹⁾. That is why, this research was carried out with the goal of reviewing the risk factors, diagnosis and the treatment of colorectal cancer among the patients with the chronic diseases in Iran.

ANALYSIS METHOD

In this review, by searching keywords like: colorectal cancer, chronic disease, chronic disease

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and colorectal cancer, risk factors of colorectal cancer among the published articles in databanks such as magiran, Iranmedex, web of science, pubmed, science direct, SID and Google scholar, information about colorectal cancer were extracted and studied. Among those articles, 40 articles were selected that studied the relationship between the chronic diseases and colorectal cancer. Then all findings related to the risk factors of colorectal cancer, its diagnosis, treatment and prevention ways were evaluated and collected.

RESULTS

Effective factors contributing to colorectal cancer in Iran

It is mentioned in some investigations that incidence of colorectal cancer in one of first-degree relatives can increase the possibility of this disease by 2 or 3 times. Accordingly, the people with the family history are more in danger of colorectal cancer incidence. The studies have shown that 15% of colorectal cancers have genetic background and 50% of 70 years old people suffer from colorectal cancer^(10, 11). High prevalence of colorectal cancer in the present time is due to diets full of animal fats, low consumption of fiber rich foods like fruits, vegetables, wheat bran and lack of physical activity. Numerous studies have shown that increase in BMI can lead to the high risks of colorectal cancer in men but this case is not true about women.

On the other hand, diabetes and high blood pressure can increase the risks of many diseases like colorectal cancer. The findings of these researches show that survival time of the patients with diabetes type II is less than those with high blood pressure while both of them do not have any effect on the painful survival of the patients with colorectal cancer and survival time of the colorectal cancer patients depends on other factors such as: cancer position, diagnostic stage and treatment, the type of treatment, nutrition and so on⁽¹²⁾.

Based on the studies, the prevalence of high blood pressure among the patients with colorectal cancer is more than diabetes type II. Colorectal cancer is more prevalent among the people with colitis, Inflammatory Bowel Disease (IBD) and Crohn's disease^(13, 14). Based on the analysis, BMI, Inflammatory Bowel Disease (IBD), alcohol abuse, tumor grade, metastasis to other lymphoid nodes depending on tumor penetration rate to intestine wall, metastasis to other organs and tumor

stage are alleffective factors on death time due to colon cancer while BMI, metastasis to lymphoid nodes and other organs, the kind of the first treatment are working factors for death time due to rectum cancer. So it can be said that the effect of risk factors on different parts of large intestine are different and they should be investigated separately. In a study which was carried out on 100 patients with rectum cancer, it was reported, the diet full of fiber is the most promising factor in reduction of rectum cancer's risks among environmental factors in an effective diet for this disease whereas metabolic syndromes and physical activities have less impact in the incidence of it. The studies revealed that diabetes slows down material transfer along intestine and it increases retention of toxic materials in intestine. Diabetes contributes to the production of mutagenic bile acids and an increase in insulin level of the blood can grow the tumors extensively. In addition, diabetes creates damages to DNA and other cells by delayed transfer of mutagens^(15, 16). Some other researchers studied the effect of high blood pressure on colorectal cancer and they suggested daily consumption of those foods which lead to low blood pressure, are so influential in reducing the risk of colorectal cancer⁽¹²⁾. So working on these chronic diseases which are more prevalent in the patients with colorectal cancer, is vital as a priority in health system.

2. Diagnostic methods of colorectal cancer in Iran

In majority of the studies on this cancer, the time of diagnosis influences the survival time of colorectal cancer patients.

Colorectal cancer due to high load (incidence, disability and death), availability of the tests for the diagnosis of pre-cancerous lesions and curability at first stages, is a good choice for screening.

Screening for colorectal cancer is done by Fecal Occult Blood Test (FOBT), Sigmoidoscopy or colonoscopy in people over 50 years old and also in the following cases:

No personal history of colorectal cancer, polyp or IBD.

No family history of colorectal cancer in first class family members that are diagnosed before 65 years old or in 2 first class family members that are diagnosed in

any age.

No family history of adenomatous polyp in one first class family member that is diagnosed before 65 years old.

This test is annually and it continues until 75 years old.

In patients with IBD (chronic ulcerative colitis or Crohn's disease), colonoscopy is done every 1 or 2 years or 8 years after pancolitis start or 12-15 years after the start of left colitis ^(18, 17).

3. The treatment of colorectal cancer

In recent years, survival of the patients with colorectal cancer has been improved in some parts of the world but it is not clear which factors are responsible for this. Investigation on the survival of the patients with cancer is one of the kinds of the researches that clarifies the condition of the disease and the factors related to it. Considering the high rate of colorectal cancer in past decades in Iran, studies about the effective factors on prognosis of survival time for the treatment of these patients is extremely significant. In a study, the survival time of the patients with diabetes type II accompanied by colorectal cancer is shorter than the patients with high blood pressure and survival time of the patients with colorectal cancer in both diseases, high blood pressure and diabetes type II is predicted the same in comparison to each other. This result was obtained while the prevalence of high blood pressure was more than diabetes type II in these patients. Generally, survival time of the patients with this cancer is related to other factors like: cancer position, diagnosis stage and treatment, the type of treatment, the type of diet and so on ^(13, 19).

Furthermore, the average survival time of the patients who are cured by drugs, is longer and generally the results of chemical therapy lead to the improvement in the survival time of the metastatic colorectal cancer patients.

In some researches, it is suggested that drug combination of Bevacizumab Plus Irinotecan and Fluorouracil for chemical therapy can improve the survival time of the metastatic colorectal cancer patients significantly ⁽²⁰⁾.

The researchers found, among rectum cancer

patients those patients who their first treatment was laparoscopic surgery, had higher survival possibility ⁽²¹⁾.

In a study, the extract of brown algae (*Cystoseira indica*) is suggested to be used as an antioxidant and anticancer agent in clinical and preclinical treatments ⁽²²⁾.

4. Colorectal cancer prevention methods

The studies reveal that the suitable diet and consumption of unsaturated oils can play role in prevention of colorectal cancer. Inflammation increases the risks of tumor formation.

Furthermore, lifestyle is one of the major risk factors for increasing the risk of colorectal cancer. Lack of physical activity, unsuitable diet, smoking, metabolic syndrome (obesity, diabetes, high blood pressure and dyslipidemia) along with positive family history of cancer in patient and polyp are major reasons for colorectal cancer while suitable lifestyle, diet full of fibers, vegetables, fruits and keeping the balance of high-fat foods and red meat, proper physical activity and avoiding alcohol and smoking can prevent colorectal cancer significantly ⁽¹⁷⁾.

By reviewing various studies, we can understand that Conjugated Linoleic Acid (CLA) is one of the compounds that can be effective on the prevention of colorectal cancer. This compound is an omega-6 fatty acids and it is found in the foods naturally but its major source is dairy products and the food products produced from the meat of ruminating animals. This compound plays a critical role in reducing the progression of colorectal cancer in patients by increasing the expression of mRNA CD36 and PPAR- γ and reducing COX-2. In addition, this agent can increase the activity of antioxidant factors ⁽¹⁴⁾. Some medicinal plants like garlic are strong antioxidants in addition to their antibacterial effect and they can inhibit the formation and growth of cancerous tumors.

This property is found in raw garlic more than cooked one, so it is recommended to use raw garlic ^(23, 24).

DISCUSSION

Cancer imposes different effects on the patients ⁽²⁵⁾, in a way colorectal cancer is a fetal cancer and it is almost prevalent in both genders.

Annually, 1.2 million people get colorectal cancer in the world and 608000 people die because of this cancer. In fact, colorectal cancer accounts for 9.7% of all cancers and 8 % of all cancer mortality worldwide⁽⁵⁾. This disease is the third prevalent cancer in the USA and it is most seen in married people. It is found among 45-65 years old people and it is observed among men abundantly⁽²⁶⁾. Obesity is one of the reasons that expose men and women in danger of colorectal cancer. Almost 11% of colon cancers are relevant to weigh gain in Europe⁽²⁷⁾. Diabetes, acromegaly and probably Cholecystectomy and slow intestine movements increase the possibility of colorectal cancer⁽¹¹⁾. Diabetes and high blood pressure diseases are increasing day by day worldwide and these diseases can increase the mortality in colorectal cancer patients⁽²⁸⁾.

CONCLUSION

Proper nutritional habits, physical activity suitable to each patient's ability, attending muscular relaxation plan for diabetic patients and the patients with high blood pressure can be promising for reducing the cases of colorectal cancer.

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Source of Funding : Self

Ethical Clearance: Informed consent, No cost to the patient.

REFERENCES

1. Borji M, Nourmohammadi H, Otaghi M, Salimi AH, Tarjoman A. Positive Effects of Cognitive Behavioral Therapy on Depression, Anxiety and Stress of Family Caregivers of Patients with Prostate Cancer: A Randomized Clinical Trial. *Asian Pacific Journal of Cancer Prevention*. 2017;18(12):3207-12.
2. Borji M, Moghadam SRM, Meymizade M. Respect for Human Dignity in Caring for Patients with Cancer in Ilam, Perspectives of Patients and Nurses.
3. Motaghi M, Darbandi B, Baghersalimi A. Comparative Effect of Chamomile Mouthwash and Topical Mouth Rinse in Prevention of Chemotherapy-Induced Oral Mucositis in Iranian Pediatric Patients with Acute Lymphoblastic Leukemia. *Iranian Journal of Blood and Cancer*. 2017;9(3):84-8.
4. Khoshnood Z IS, Rayyani M. Getting out or remaining in the cage of inauthentic self: The meaning of existential challenges in patients' with cancer. *Indian J Palliat Care* 2018.
5. Boji M, Tarjoman A, Rahmani R, Safari S, Patients' Attitudes Toward the Cancer Pain Relief, *Asian Pacific Journal of Cancer Prevention*, 2018.
6. Pouy S AF, Nourmohammadi H, Sanei P, Tarjoman A, Borji M., Investigating the Effects of Mindfulness-Based Training on Psychological Status and Quality of Life in Patients with Breast Cancer. *Asian Pacific Journal of Cancer Prevention*, 2018. .
7. Borji M, Tarjoman A, and Nourmohammadi H, Investigating the Effect of Home Care Using Eye Movement Desensitization and Reprocessing on Patients with Gastrointestinal Cancer. *Iranian Journal of Psychiatry and Behavioral Sciences*, 2018. IN PRESS.
8. Borji M. Investigating the effect of home care on death anxiety in patients with gastrointestinal cancer. *Govaresh*. 2017;22(2):131-2.
9. Bayat M, Shamsabadi F, Amini F, Dayyani M, Mehrad Majd H. Epidemiology of Gastrointestinal Cancers (Stomach, Esophageal and Colorectal) in Neyshabur City during 2006-2012. *J Neyshabur Univ Med Sci*. 2016;3(4):37-44.
10. Prenen H, Vecchione L, Van Cutsem E. Role of targeted agents in metastatic colorectal cancer. *Targeted oncology*. 2013;8(2):83-96.
11. Sæterdal I, Bjørheim J, Lislud K, Gjertsen MK, Bukholm IK, Olsen OC, et al. Frameshift-mutation-derived peptides as tumor-specific antigens in inherited and spontaneous colorectal cancer. *Proceedings of the National Academy of Sciences*. 2001;98(23):13255-60.
12. Tu H, Wen CP, Tsai SP, Chow W-H, Wen C, Ye Y, et al. Cancer risk associated with chronic diseases and disease markers: prospective cohort study. *bmj*. 2018;360:k134.
13. Spunt S, Furman W, La Quaglia M, Bondy M, Goldberg R. Cancer epidemiology in older adolescents and young adults 15 to 29 years of age. SEER AYA monograph Bethesda (MD): National

- Cancer Institute. 2008:123-33.
14. Beheshti N, Ajami M, Kamal Z, Abdollahi M, Davoodi Sh. The Effect of Dietary Conjugated Linoleic Acid and Assessment of Anti-Oxidant Factors on the Risk of Developing Colorectal Cancer. 2017.
15. Dorri S, Atashi A, Dorri S, Abbasi E, Alijani-Zamani M, Nazeri N. Designing the colorectal cancer core dataset in Iran. *Tehran University Medical Journal TUMS Publications*. 2017;74(10):697-705.
16. Arani SH, Kerachian M. Rising rates of colorectal cancer among younger Iranians: is diet to blame? *Current Oncology*. 2017;24(2):e131.
17. Azadeh S, Moghimi-Dehkordi B, Fatem S, Pourhoseingholi M, Ghiasi S, Zali M. Colorectal cancer in Iran: an epidemiological study. *Asian Pacific journal of cancer prevention: APJCP*. 2008;9(1):123-6.
18. Bibbins-Domingo K, Grossman DC, Curry SJ, Davidson KW, Epling JW, García FA, et al. Screening for colorectal cancer: US Preventive Services Task Force recommendation statement. *Jama*. 2016;315(23):2564-75.
19. Ahmadi A, Hashemi-Nazari S, Molavi-Choobini Z, Nasri H. Patten Comparison of Hypertension and Type2 Diabetes Mellitus in Patients with Colorectal Cancer. *J Isfahan Med Sch*. 2014;32(302).
20. Hurwitz H, Fehrenbacher L, Novotny W, Cartwright T, Hainsworth J, Heim W, et al. Bevacizumab plus irinotecan, fluorouracil, and leucovorin for metastatic colorectal cancer. *New England journal of medicine*. 2004;350(23):2335-42.
21. Guillaou PJ, Quirke P, Thorpe H, Walker J, Jayne DG, Smith AM, et al. Short-term endpoints of conventional versus laparoscopic-assisted surgery in patients with colorectal cancer (MRC CLASICC trial): multicentre, randomised controlled trial. *The Lancet*. 2005;365(9472):1718-26.
22. Taheri A, Ghaffari M, Houshmandi S, Namavari MM. Investigation of the anticancer and antioxidant activity of the brown algae (*Cystoseira indica*) extract against the colorectal cancer cells. *KAUMS Journal (FEYZ)*. 2017;21(4):317-25.
23. Shirzad H, Taji F, Pourgheysari B, Raisi S, Rafieian-Kopaei M. Comparison of antitumour activities of heated and raw garlic extracts on fibrosarcoma in mice. *Journal of Babol University Of Medical Sciences*. 2012;14(6):77-83.
24. Razavi N, Molavi Choobini Z, Salehian Dehkordi M, Saleh Riyahi S, Molavi Choobini S. Overview of the antibacterial properties of essential oils and extracts of medicinal plants in Iran. *journal of shahrekord university of medical sciences*. 2016.
25. Khoshnood z rm, iranmanesh s, dehghan m. Body-mind healing strategies in patients with cancer. *Asian pacific j can prev*. In press.
26. Kocot J, Kielczykowska M, Dąbrowski W, Piłat J, Rudzki S, Musik I. Total antioxidant status value and superoxide dismutase activity in human colorectal cancer tissue depending on the stage of the disease: a pilot study. *Advances in clinical and experimental medicine: official organ Wroclaw Medical University*. 2013;22(3):431-7.
27. Kabat GC, Kim MY, Stefanick M, Ho GY, Lane DS, Odegaard AO, et al. Metabolic obesity phenotypes and risk of colorectal cancer in postmenopausal women. *International journal of cancer*. 2018.
28. Naserinejad M, Baghestani AR, Shojaee S, Pourhoseingholi MA, Najafimehr H, Haghazali M. Diabetes mellitus and Hypertension increase the risk of colorectal cancer mortality; A Robust Bayesian adjustment analysis. *Gastroenterology and Hepatology from bed to bench*. 2017.

Effectiveness of Prolanis Gymnastics on Decreasing Blood Pressure in Patients with Stage One Hypertension, Indonesia

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Background: Hypertension is one of the degenerative diseases commonly found in Indonesia. It is characterized by an increase of blood pressure above its normal level and is caused by various factors. One of the government programs of Prolanis gymnastics (Chronic Disease Management Program) is a form of aerobic physical exercise. This study aims to determine the effectiveness of Prolanis exercise in lowering blood pressure in patients with hypertension after intervention. The effectiveness of the intervention can be known by looking at the results of pre post-test blood pressure of hypertensive patients. **Material and Methods:** The type of research is *quasi* experimental with *nonequivalent* control group design. Sample in this research is first stage hypertension patient that is 60 people consisting of 3 experiment group and 3 control group. Each experimental group consisted of 10 people who were given 1, 2 and 3 times a week gymnastics interventions. The control group also consisted of 10 people who did not receive the intervention. The control group also comprised 30 people who did not receive the intervention. The statistical test used is the test of Wilcoxon and Kruskal Wallis. **Results.** The results showed that Prolanis gymnastics experimental group 1 times a week systolic value p-value 0.005 < 0.05 diastolic p-value 0.005 < 0.05, Prolanis gymnastic group 2 times a week systolic p-value 0.005 < 0.05 diastolic p-value 0.005 < 0.05, Prolanis exercise group 3 times week systolic p-value 0.005 < 0.05 diastolic p-value 0.012 < 0.05. **Conclusion.** The conclusions from the results of the study is the intervention with 1 to 2 times the proline in a week more effectively to lower blood pressure in people with hypertension. It is therefore recommended for patients with stage 1 hypertension to always perform physical activities such as proline exercises.

Keywords: Prolanis, gymnastics, physical activities, Hypertension, Blood Pressure

INTRODUCTION

Hypertension is a major problem in developing countries. Hypertension is one of the many degenerative diseases occur and have a fairly high mortality rate and affects the quality of life and a people productivity. One of the major risk factors of hypertension is stroke, heart failure, chronic kidney disease, and visual impairment. Increased age is one factor causing the occurrence of hypertension, this is due to the increasing age of organ function decreased marked by decreased elasticity of the arteries and stiffness occurs blood vessels so vulnerable to an increase in blood pressure. Hypertension is a condition in which systolic blood pressure > 130 mmHg

and diastolic pressure > 80 mmHg. Hypertension does not provide typical complaints and symptoms that many people who do not realize it. Hence hypertension is said to be The Silent Killer. [1], [2], [3], [4]

Hypertension risk factors are genetic, obese, sex, stress, salt consumption patterns, smoking habits and lack of physical activity. Lack of physical activity can lead to overweight and tend to have higher heart rate frequency so the heart muscle must work hard when contraction and the pressure on the arteries is getting bigger. Regular physical exercise can improve overall physical and spiritual health, improve body immunity, regulate blood glucose levels, prevent obesity, increase insulin receptor sensitivity, normalize blood pressure and improve workability. [5], [6], [7], [8], [9], [10]

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Exercise causes major changes in the circulatory and respiratory systems where both occur together as a homeostatic response. Sports exercise that is often used in people with hypertension is aerobic exercise. Many forms of aerobic exercise that can be taken by hypertensive patients include jogging and aerobic exercise. Regular exercise can reduce both systolic and diastolic pressure in people with mild hypertension. ^{[11],[12]}

One form of exercise that can lower blood pressure is prolanis exercise. One of the government programs of Prolanis gymnastics (Chronic Disease Management Program) is a form of aerobic physical exercise. This gymnastics also includes a government program run by the Social Security Entrepreneurship Agency (BPJS). Prolanis is a system of health services and proactive approach that is implemented in an integrated manner involving participants, health facilities and BPJS (Social Security Administration Agency) Health in order to maintain health for participants who have chronic illness to achieve optimal quality of life with the cost of health services effective and efficient. ^[13]

WHO (World Health Organization) (2011) explains that 1 billion people worldwide suffer from hypertension, 2/3 of whom are in low- and middle-income developing countries and estimate that non-communicable diseases cause about 60% death and 43% morbidity worldwide is the third leading cause of death in the world. Changes in community lifestyles from argument to industry, lifestyle changes and socioeconomic societies are suspected to be the cause of the increasing prevalence of non-communicable diseases so that the incidence of non-communicable diseases varies greatly in epidemiological transitions. One of the diseases included in the group of non-communicable diseases is hypertension. ^{[14],[15],[16]}

The prevalence of high blood pressure is increasing in African countries by 46% of male and middle-income male sex. In the United States, which has high blood pressure in the male sex of 39% and female sex of 32%. The prevalence of hypertension in the People's Republic of China (PRC) is similar to the prevalence in some other countries. The Fourth Health and Nutrition Survey (2002) states that the prevalence, treatment and control rates for hypertension are 18.8%, 24.7%, and 6.1%, respectively. ^{[14],[15]}

The number of hypertension sufferers in Indonesia

aged ≥ 18 years in 2007 amounted to 31.7%. In 2013 there was a decrease of 5.9% (31.7% to 25%) Whereas in 2016 people with hypertension increased by 30.9%. The prevalence of high blood pressure in female sex was 32.9% and male gender was 28.7%. Urban prevalence is slightly higher, at 31.7% compared to rural areas which is only 30.2%. ^{[17],[18]}

The prevalence of hypertension in Makassar City in 2015 was 11,596 cases, consisting of male as many as 4,277 cases and 7,319 cases of women. The incidence of hypertension disease in East Luwu regency in 2015 was 7566 cases, in 2016 new cases were 4902 cases and old cases 7097 cases. Prevalence of hypertension is increased due to lack of physical activity, where physical exercises is very influential for people with hypertension in improving body immunity after regular exercise. Prolanis gymnastics is an effort to improve, maintain health and increase physical activity through sports activities. ^{[10],[19],[20],[21]}

Prevalence of hypertension is increased due to lack of physical activity, where physical exercise is very influential for people with hypertension in improving body immunity after regular exercise. Prolanis gymnastics is an effort to improve, maintain health and increase physical activity through sports activities. ^[10]

MATERIAL AND METHOD

This study was conducted on April 2st - June 9th, 2018. The type of this study was quasi experimental with nonequivalent control group design. The sample in this study was the first stage hypertension patient, 60 people consisting of 3 experimental groups and 3 control groups. Each experimental group consisted of 10 people who were given prolanis gymnastics interventions 1 time a week, 2 times a week, and 3 times a week, while each control group consisted of 10 people who were not intervened. Data analysis was performed by using Wilcoxon and Kruskal Wellis test with $\alpha = 0.05$. The population and sample of the study were all first stage hypertension patients of 124 people. This research uses purposive sampling technique.

RESULTS

Total sample that would be analyzed in this study was 60 samples. Based on bivariate analysis in the Table 1, analysis of prolanis gymnastic with blood pressure drop (p value < 0.005).

Table 1. Analysis Wilcoxon of Prolanis Gymnastic Effectiveness once a Week, Twice Weekly and Three Times a Week on Decreasing Blood Pressure in Patients with Stage One Hypertension

	Systolic_After Systolic_Before	Diastolic_Aftre Diastolic_Before
Group gymnastics 1 times a week p-value	-2.810 .005	-2.821 .005
Control group 1 p-value	-1.342 .180	-1.778 .075
Group gymnastics 2 times a week p-value	-2.805 .005	-1.761 .005
Control group 2 p-value	-1.414 .157	-.316 .075
Group gymnastics 3 times a week p-value	-2.803 .005	-2.527 .012
Control group 3 p-value	-1.633 .102	-1.279 .201

Table 2. Analysis Kruskal wallis test Systolic and Diastolic Blood Pressure before and after Prolanis Exercise on Decreasing Blood Pressure in Patients with Stage One Hypertension (experimental group)

	Week	Frek	Mean Rank	<i>p-value</i>
Systolic pre-test	Intervention 1 time a week	10	21.90	
	Intervention 2 time a week	10	16.15	0.003
	Intervention 3 time a week	10	8.45	
Systolic post-test	Intervention 1 time a week	10	22.75	
	Intervention 2 time a week	10	14.65	0.002
	Intervention 3 time a week	10	9.10	
Diastolic pre-test	Intervention 1 time a week	10	21.85	
	Intervention 2 time a week	10	18.15	0.000
	Intervention 3 time a week	10	6.50	
Diastolic post-test	Intervention 1 time a week	10	17.80	
	Intervention 2 time a week	10	18.00	0.097
	Intervention 3 time a week	10	1070	

Table 3. Analysis Kruskal wallis test Systolic and Diastolic Blood Pressure before and after Prolanis Exercise on Decreasing Blood Pressure in Patients with Stage One Hypertension (control group)

	Week	Frek	Mean Rank	p-value
Systolic pre-test	Intervention 1 time a week	10	17.10	0.342
	Intervention 2 time a week	10	15.00	
	Intervention 3 time a week	10	14.00	
Systolic post-test	Intervention 1 time a week	10	16.00	0.936
	Intervention 2 time a week	10	15.60	
	Intervention 3 time a week	10	14.90	
Diastolic pre-test	Intervention 1 time a week	10	16.80	0.779
	Intervention 2 time a week	10	14.10	
	Intervention 3 time a week	10	15.60	
Diastolic post-test	Intervention 1 time a week	10	11.90	0.248
	Intervention 2 time a week	10	16.80	
	Intervention 3 time a week	10	17.80	

DISCUSSION

Table 1 shows that the experimental groups 1 and 2 of systolic and systolic blood pressure before and after the intervention had p-value $0.005 < 0.05$ which means there was a significant drop in blood pressure while the diastolic blood pressure of the control group 1 and 2 before and after the intervention p-value $0.180 > 0.05$ and $0.075 > 0.05$ means no significant drop in blood pressure.

The statistic test using Wilcoxon test in Table 1 explains that group 3 obtained systolic before and after p-value $0.005 < 0.05$ meaning there is a significant decrease in blood pressure whereas diastolic blood pressure after Prolanis exercise has p-value $0.012 < 0.05$ meaning there is a significant decrease in blood pressure. Systolic blood pressure without pro-poor exercise intervention p-value $0.102 > 0.05$ means there is no significant drop in blood pressure while diastolic blood pressure without the intervention of gymnastics has p-value $0.201 > 0.05$ meaning there is no significant drop in blood pressure.

Decreased systolic and diastolic blood pressure in patients with stage 1 hypertension with 1 and 2 times weekly gymnastics interventions for 3 consecutive weeks still need to be increased regularly to normalize blood pressure, physical activity such as gymnastics prolanis is one factor that plays an important role in

reducing risk atherosclerosis by strengthening the heart and reducing the work of the heart. Physical exercise like regular exercise also helps prevent chronic illness, such as high blood pressure. [22]

Sports exercises are done in order to affect the work efficiency of the heart. We recommend that exercise is at a moderate intensity of heart rate 150-170 / minute. Medium intensity $\leq 70-80\%$ of maximum aerobic capacity. The intensity of the exercise is the length of time it takes, especially the aerobic exercise and the most important exercise intensity must be met. Frequency of exercise 3-5 times a week with an exercise length of 20-60 minutes once practice. Exercise can cause dilation of the blood vessels so that blood pressure decreases. People who exercise 3 times a week will experience increased cardiorespiratory endurance and regular exercise can reduce the risk of heart disease. [23], [24]

Table 2 explains that pre-test post-test systolic blood pressure after prolanis exercise in the experimental group 1, 2 and 3 times a week p-value $0.002 < 0.05$, means that there is a systolic blood pressure difference before prolanis exercise, whereas diastolic pre post exercise prolanis p-value $0.097 > 0.005$ means there is a difference in diastolic. All samples with systolic blood pressure decreased all because they were due to actively follow the exercises and procedures correctly for continuous heating exercises, core exercises and cooling exercises or closure exercises, whereas post-

test diastolic blood pressure did not decrease because diastolic blood pressure was pressure on the walls of the arteries and blood vessels due to the relaxation of the heart's ventricular muscles (the pressure at which the atrial muscle contrasts and the blood goes into the ventricle). Cardiac output is defined as the amount of blood volume pumped per ventricle per minute. The determinants of cardiac output are the speed of the heart beats per minute and the volume of blood the heart pumps per stroke (cardiac output = heart frequency). This can be affected by psychological state.^[25]

Table 3 explains that pre-test systolic blood pressure in the control group 1, 2 and 3 times a week p-value $0.936 > 0.005$, means no difference in systolic blood pressure, whereas diastolic pre-post p-value $0.248 > 0.005$ mean there was no difference in diastolic blood pressure in the control group. One effort that can be done to stabilize and lower blood pressure in people with hypertension and prevent complications that is by doing gymnastics prolanis. Prolanis gymnastics can be applied in both experimental and control groups with frequencies 1 and 2 times a week done regularly, regularly and continuously to gain greater benefits

Rismayanthi explained that aerobic exercise is especially beneficial for improving and maintaining the health and endurance of heart, lung, blood circulation, muscle, and joints. Low impact aerobic gymnastics has a great influence on the body, especially on heart and lung resistance. Physical exercise is very influential for people with hypertension.^[26]

Improved immune system in the body after regular exercise, regulating blood glucose levels, preventing obesity, increasing insulin receptor sensitivity, normalizing blood pressure and improving work ability. Aerobic aerobics can help improve blood lipid profile, lower total cholesterol, Low Density Lipoprotein (LDL), triglycerides and increase High Density Lipoprotein (HDL) and improve hemostatic system and blood pressure.^[27]

CONCLUSION

The conclusions from the results of the study is the intervention with 1 to 2 times the proline in a week more effectively to lower blood pressure in people with hypertension. It is therefore recommended for patients with stage 1 hypertension to always perform physical activities such as proline exercises.

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Ethical considerations: Ethical clearance was obtained from Institute of Health Science "Maluku Husada", Ambon, Indonesia; with number" RK.03/KEPK/STIK/I/2018. Just before the interview, written (or thumb impression) consent was obtained from each participant in Institute of Health Science Ambon guidelines.

Conflicts of Interest : The authors alone are responsible for the views expressed in this article and they do not necessarily represent the views, decisions, or policies of the institutions with which they are affiliated.

REFERENCES

- [1] American heart Association [internet]. Guideline for the prevention, detection, evaluation and management of high blood pressure in adults. 2017. [Cited 2018 Mart 11]. Available from: <http://www.acc.org>.
- [2] Masriadi, Azis R, Sumantri E, Mallongi A. Effectiveness of non-pharmacologic therapy through surveillance approach to blood pressure degradation in primary hypertension patients, Indonesia. Indian Journal of Public Health Research & Development. 2018; 9 (4): 249-255.
- [3] Ministry of Health of the Republic of Indonesia. Health profile of the Republic of Indonesia, 2015.
- [4] Masriadi, Mega Ermasari. The Relationship of family history, usage of wasted cooking oil, alcohol consumption, smoking habit the incidence of essential hypertension at two areas of health Center of North Buton Regency, Province of South East Sulawesi. Journal of Sciences: Basic and Applied Research (IJSBAR), 2015; 24 (1): 146-155
- [5] Shruti Prabhakaran Nair, S.S.G., Farhin Idariya. Impact of kinesiphobia on physical activity in patients with arterial hypertension. Journal of Health Sciences & Research, 2017; 7(5): 170-5.
- [6] Osamor, P.E. Social support and management of hypertension in south-west Nigeria. Cardiovascular Journal Of Africa, 2015. 26(1): 29-33.
- [7] Shen, Y., et al. Family member-based supervision of patients with hypertension: a cluster

- randomized trial in rural China. *Journal of Human Hypertension*, 2017; 31: 29-36.
- [8] Situmorang, P.R., Factors associated with hypertension incidence in inpatient patients at Sari Mutiara General Hospital Medan Year, 2014. *Journal of Scientific Nursing*, 2015; 1 (1): 569-74.
- [9] Eka Nur So'emah, A.H., Amar Akbar. Effect of ergonomic gymnastic to lipid profile and blood pressure in patients with hypertension At Sumber Agung Village Jatirejo District Mojokerto Regency. *Journal Of Nursing and Midwifery*, 2017; 2 (2): 155-163
- [10] Deiby O. Lumempouw, Herlina I. S. Wungouw, Hedison Polii. Effect of prolanis gymnastics on people with hypertension. *E-Biomedicine Journal (eBm)*, 2016; 4(1): 1-18
- [11] Ridjab DA. Effect of Physical Activity on Blood Pressure. *Journal of Atmajaya Medicine*. 2005; 4 (2): 73
- [12] Ministry of Health of the Republic of Indonesia. Basic Health Research (RISKESDAS) 2007.
- [13] Ministry of Health of the Republic of Indonesia. Health Profile of the Republic of Indonesia, 2017.
- [14] Xuejiao Liu, D.Z., Yu Liu, Xizhuo Sun, Chengyi Han, Bingyuan Wang, Yongcheng Ren, Junmei Zhou, Yang Zhao, Yuanyuan Shi, Dongsheng Hu, Ming Zhang. Dose–response association between physical activity and incident hypertension. *Hypertension*. 2017; 69(10): 1-48.
- [15] Susan Huang, Y.C., Jing Zhou, Jianming Wang. Use of family member-based supervision in the management of patients with hypertension in rural China. *Patient Preference and Adherence*, 2014; 8:1035–1042.
- [16] WHO. World Health Organization-International Society of Hypertension Guidelines for the Management Of Hypertension. *Journal of Hypertension*, 1999; 151-183.
- [17] Ministry of Health of the Republic of Indonesia. The Data and information Center, 2014.
- [18] Ministry of Health of the Republic of Indonesia. Health Profile of the Republic of Indonesia, 2016.
- [19] Makassar City Health Office. Health Profile of Makassar City, 2015.
- [20] East Luwu Health Office. Health Profile of East Luwu Health Office, 2018.
- [21] Wotu Community Health Center. Profile of Wotu Community Health Center, 2018.
- [22] Rizqiyatiningsih, S, The influence of ergonomic gymnastics on decreasing blood pressure with degree 1 hypertension in Lansia in Wironustom Village Gatak Sukoharjo District. Scientific writing strata one, University of Muhammadiyah Surakarta. 2014.
- [23] Kusmana, D. Sports For Healthy People and Heart Disease Patients. Faculty of Medicine University of Indonesia, 2006; Jakarta.
- [24] Kusmana, D. Sports for Heart Health, 2002. Faculty of Fisheries University of Indonesia: Jakarta.
- [25] Guyton. Textbook of Medical Physiology, 1997. Jakarta: EGC
- [26] Rismayanthi C. The Effect of Indonesian Heart Gymnastics Exercise Against Blood Pressure Drop on Hypertension Patients [Thesis]. Yogyakarta: PPS IK UNY, 2009.
- [27] Syahrani, The influence of ergonomic gymnastics on systolic blood pressure in elderly with hypertension in Social Institution Tresna Werdha Budi Mulya 3 Margaguna Jakarta Selatan.2, Syarif Hidayatullah State Islamic University Jakarta, 2017.

Analysis of Ingredients of a Traditional Solid form of Cannabis (Majoon Birjandi) Produced in Southern Khorasan Province

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ABSTRACT

Background: An issue that threatens the foundation of family in modern society is addiction to licit and illicit euphoric substances. Among them are cannabis and its derivatives (e.g., Majoon produced in Southern Khorasan in Iran). Cannabinoids are substances with effects such as euphoria, excitation, anti-nausea, agitation, and psychological dependence. The aim of this study was to investigate and analyze the ingredients of the edible cannabis product Majoon produced in South Khorasan province.

Methods: In order to collect data, three samples of each different type of Majoon were analyzed by GC/MS method. Gas chromatography-mass spectrometry was used to analyze the samples. The results from sample analyses were examined in reference to extensive, library and descriptive-analytical studies. The frequency of each of the ingredients obtained from the samples was determined.

Results: The results showed that there are cannabinoids such as cannabidiol, cannabinol, and dronabinol within the products sampled. The results of the current study indicate that there are psychoactive cannabinoids in MB. The active ingredients of cannabis are obtained from the flowering tops and leaves of the female cannabis plant called *Cannabis sativa*.

Conclusion: The results obtained from the analysis of the ingredients of Majoon Birjandi types suggest that nonconventional types have more euphoric effects than the traditional and current types because they have dronabinol and cannabinol in addition to cannabidiol. So their toxicological effects may be different. Further studies in this regard is recommended.

Keywords: *Cannabinoids, Cannabis, Gas chromatography-Mass spectrometry, Majoon Birjandi, Toxicological analysis*

INTRODUCTION

One of the issues that threatens the foundation of the family in modern society is addiction to licit and illicit psychoactive substances, which has spread widely especially among the youth¹. Among these psychoactive substances are cannabis and its derivatives including marijuana (leaves, stems, and flowering tops) and hashish (resin from the female flowering plant). As the

most widely used illegal psychoactive drug worldwide, cannabis has approximately 163 million users in the world and 14.5 million abusers in the United States alone. Cannabis contains more than 400 identified chemicals, including cannabinoids and terpenoids. 9 Δ -tetrahydrocannabinol (THC) is the primary psychoactive constituent². THC content varies in different parts of the plant. The amount of THC is highest in blooming flowers and, to a lesser degree, in the leaves, lower leaves of stems, and seeds respectively³. Since ancient times, people in the eastern parts of Iran have been making a traditional lozenge, called Majoon Birjandi (MB). MB is mainly produced in South Khorasan Province, particularly in Birjand and Khoosf out of

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saffron, date, cardamom, ginger, cinnamon, coconut, pistachio, walnut, almond, hazelnut, sesame seeds and flowers (*Cannabis sativa*), as well as hemp oil and several other substances. It is mostly used by the general public in Iran ⁴.

According to historians, *Cannabis sativa* is among the first plants cultivated by man, and its use as a drug dates back to more than 3000 years B.C. ⁵. Given the easy access and use of edibles (similar to sweets), risks of their abuse increase ⁴.

According to Noorollahi's study conducted in 2012, 88 cases of MB poisoning were reported in Vali-Asr Hospital of Birjand (the central city of Southern Khorasan province) from 2010-2011. Moreover, in a previous study, we found that MB users for whom urinary tests for THC were positive showed some signs and symptoms of cannabis use ⁴.

Identification of ingredients of MB can help legal and regulatory investigations, including recognition of synthesis of the potion, the source of its production, and possible ways to transfer these compounds to other provinces. It can also contribute to security and judiciary issues as well as clinical centers in adopting treatment protocols for dealing with patients poisoned by these chemicals. The aim of this study was to evaluate and analyze the psychoactive constituents of MB.

MATERIAL AND METHOD

During this investigation, the ingredients of Majoon Birjandi were analyzed following five steps: 1. sample collection, 2. analysis of physical properties of the samples, 3. sample extraction and preparation, 4. toxicological analysis, and 5. data processing.

A total of four types of Birjandi samples, including the traditional type, the current type, and two non-conventional types were put in special containers and coded (Table 1).

The samples were first prepared by grinding and mixing with 0.1 M phosphate buffer. The pH of the mixture was adjusted to acidic (pH=2), basic (pH=12) and neutral (pH=7) in three parts. After overtaking the mixtures, aqueous solutions were extracted with three aliquots of chloroform/isopropanol (8:2 v/v). The organic layer was collected and evaporated to dryness. Methanol (100 μ L) was added to the extracted product and 2 μ L of each sample was injected to GC-MS.

The results of sample analyses were interpreted in light of extensive library research and descriptive and analytical examination, whereby, the frequency of each of the substances obtained from the samples was determined.

To analyze the samples, *gas chromatography-mass spectrometry* [made by Agilent Company, GC 7890A (Agilent Technologies, Sdn Bhd, Selangor, and MS 5975C model; Agilent Technologies)] which operated by electron impact (70 eV) in full scan mode (50–550 m/z) was used. HP5-MS capillary column (cross-linked 5% methyl phenyl silicone, 30 m length $\times$ 0.25 mm ID $\times$ 0.25 μ m film thickness) of the chromatography was utilized. Helium carrier gas was used at a rate of 1.5 mL/minute. The temperature program was set with the following parameters: injector temperature, 250°C; and interface temperature, 280°C. The oven temperature was programmed as follows: initial temperature, 60°C; initial hold, 1 min; temperature program rate, 2°C/min; final temperature, 280°C. The library of the system was supported by three databases of NIST, Pest, and Wiley, which provided the possibility of checking 50,000 different combinations.

RESULTS

Examination of “Unconventional Type 1” using GC/MS revealed cannabidiol (Fig 2), dronabinol (Fig 4) and cannabinol (Fig 3) (cannabis plant alkaloids).

Examination of “Unconventional Type 2” using GC/MS revealed cannabidiol (Fig 2), dronabinol (Fig 4) and cannabinol (Fig 3) (cannabis plant alkaloids).

Examination of “Current Type” using GC/MS showed cannabidiol (Fig. 2) (cannabis plant alkaloids).

Examination of “Traditional Type” using GC/MS revealed cannabidiol (Fig. 2) (cannabis plant alkaloids).

Table 1. Specifications of Birjandi potion

	No.	Shape	Color	Total weight
Unconventional 1	3	Lozenge	Mustard	57.661
Unconventional 2	2	Lozenge	Mustard	41.761
Current	3	Rectangle	Mustard	46.051
Traditional	3	Rectangle	Mustard	29.803

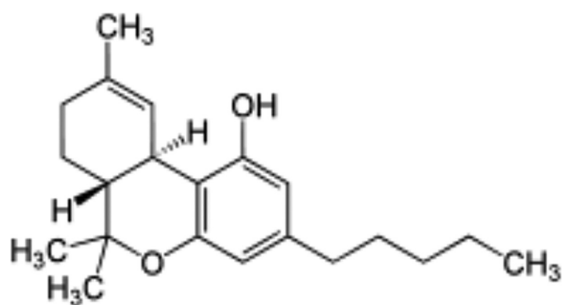


Figure 1. Chemical formula of tetrahydrocannabinol

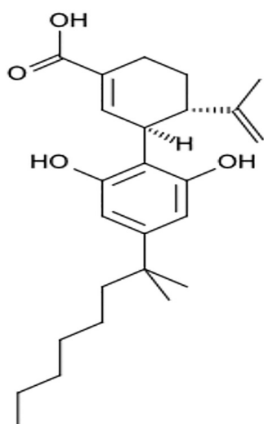


Figure 2. Chemical formula of cannabidiol

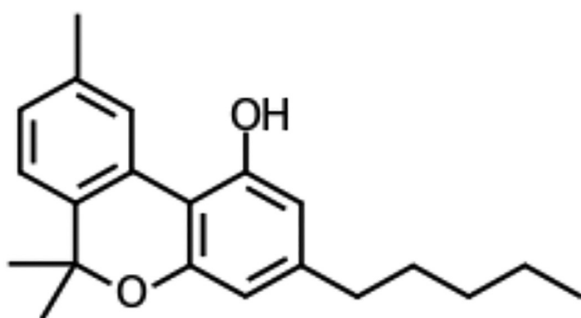
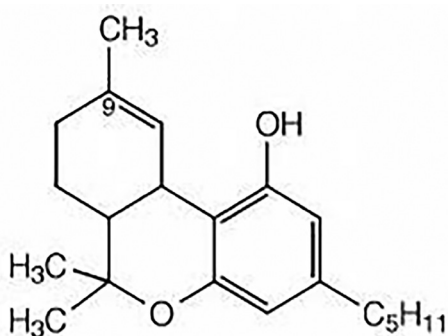


Figure 3. Chemical formula of cannabinol



$C_{21}H_{30}O_2$ (molecular weight = 314.47)

Figure 4. Chemical formula of dronabinol

DISCUSSION

The psychoactive constituents of the cannabis plant are called cannabinoids. A variety of cannabinoids including tetrahydrocannabinol, cannabinol, cannabidiol, cannabinolic acid, cannabigerol, and cannabichromen are synthesized by plants. Tetrahydrocannabinol Delta-9 (Δ -9 THC) is known to be responsible for most of the psychoactive effects of cannabis absorbed by cannabinoid receptors in the brain⁶. Sativa and Indica are two major Cannabis species. The sativa species have a more psychological and stimulating effect and the indica species have a more physical and soothing effect⁶. In the human body, there are many cannabinoid receptors in the brain, liver, lungs, kidneys, and vessel walls. These receptors are sensitive to cannabinoids. The bodies of all mammals produce cannabinoid substances, which are similar to natural plant cannabis (marijuana); these animal produced cannabinoids are referred to as endogenous cannabinoids. Endogenous or endocannabinoids stimulate cannabinoid receptors in the body. Cannabinoids can be found in large amounts in commercially produced cannabis plants.

The cannabinoid system of the human body is very similar to the system of internal morphine (endorphins), and their functions are comparable. Two types of cannabinoid receptors have been identified in the human body: CB1, which are found primarily in the brain, liver, lungs, pituitary, adrenal, digestive system, testicles, ovaries, uterus, vessel walls and the heart; and CB2 are more often located in bone marrow, thymus, and the immune system of the body⁷.

In the cannabis plant, there are more than 85 different cannabinoids forms, the most prominent type is tetrahydrocannabinol (Fig 1), which can produce hallucinations. The main ingredient in the natural cannabis plant is cannabidiol, which has medicinal properties and is effective in the treatment of various diseases such as multiple sclerosis (MS), diabetes, or other autoimmune diseases such as rheumatoid arthritis.

Cannabidiol has several medicinal properties and does not create hallucinations and euphoria; however, it is very difficult to extract it from the cannabis plant. Cannabidiol has many therapeutic effects. In fact, almost all antibacterial and anti-cancer and healing effects of the cannabis plant are related to cannabidiol⁸. Anti-cancer effects of cannabis (marijuana and hashish)

are related to cannabidiol⁹.

Also, the results of the present study showed that cannabinal, an ingredient of cannabis, is found in Majoon Birjandi. Based on laboratory research, it can be concluded that there is cannabinal in (type 1 and 2 of) the Majoon sampled.

Cannabinal is a mildly psychoactive substance found in cannabis. It is, in fact, a metabolite of the drug THC (tetrahydrocannabinol) which has fewer effects on cannabinoid receptors 1 (agonist) and more effects on type 2 of cannabinoid receptors. For this reason, cannabinal has mostly a therapeutic effect and enhances the immune system of the human body¹⁰.

The results of the present study also showed dronabinol, one of the psychoactive components of cannabis, exists in Majoon Birjandi. According to laboratory research, it can be concluded that there is dronabinol in type 1 and 2 of the Majoon Birjandi sampled. THC in the cannabis plant has both medical and harmful properties. Despite the legal restrictions, cannabis is often used to relieve chronic and neuropathic pain, and it carries psychotropic and physical adverse effects with a tendency for addiction¹¹.

Harmful properties of THC:

The most common side effects of cannabinoids are tiredness and dizziness (in more than 10% of patients), psychological effects, and dry mouth. Tolerance to these side effects nearly always develops within a short time. Withdrawal symptoms are hardly ever a problem in the therapeutic setting¹¹. It was shown that heavy use of cannabis may induce grey matter alterations¹². Oral or sublingual forms of cannabis significantly have less harmful effects than smoked cannabis due to slower absorption of oral form¹¹.

THC affects the central nervous system and causes symptoms such as lethargy, increased sensitivity to light and sound, and confusion in understanding the environment. The physiological effects of THC include increased heart rate, dry mouth, increased appetite, and low blood pressure.

Useful properties of THC:

Cannabis has been legalized in several states in the U.S. for recreational purposes, as well as, medical use. Recreational legalization is a big step forward in that it

removes the necessity of having to have clinical trials that show a preponderance of the evidence supporting the efficacy of cannabis products. In other words, in states that have legalized cannabis for recreational use (e.g. Colorado & Oregon) potential users 21 and older can buy these products for whatever use they prefer. To our knowledge, there are no products currently being marketed in the U.S. that would be considered traditional folk medicines, like Majoon Birjandi.

Medical marijuana is available in some U.S. states either in herbal form or via prescription for Marinol. Dronabinol (Marinol) is a synthetic version of THC¹³. It resembles 9- tetrahydrocannabinol THC in chemical structure. Dronabinol is used as a strong antiemetic in the treatment of chemotherapy-induced nausea and anorexia-related weight loss in patients with AIDS. However, data on the toxicity of this medicine is still scarce. Moreover, Nabiximol, which is still under evaluation by clinical trials in the US, is commercially available in Canada and the UK and is administered to relieve pain and spasticity in patients with multiple sclerosis. Marijuana has been mainly used to treat nausea, loss of appetite, and pain¹⁴.

MB is the only existing solid form of cannabis in Iran and other countries (except US) and due to the similarity between MB and Marinol®, MB may be used for medical purposes in the future in Iran and other countries such as the U.S.

The results of the current study indicate that there are psychoactive cannabinoids in MB. The active ingredients of cannabis are obtained from the flowering tops and leaves of the female cannabis plant called *Cannabis sativa*⁵.

The results obtained from the analysis of the ingredients of Majoon Birjandi types suggest that nonconventional types have more euphoric effects than the traditional and current types because they have dronabinol and cannabinal in addition to cannabidiol.

Conflict of Interest: There is no conflict of interest to be declared.

Ethical Clearance: This study was approved by the ethics committee of Islamic Azad University.

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REFERENCES

1. Karrari P, Mehrpour O, Afshari R, Keyler D. Pattern of illicit drug use in patients referred to addiction treatment centres in Birjand, Eastern Iran. *JPMA The Journal of the Pakistan Medical Association*. 2013;63(6):711-6.
2. Martin-Santos R, Fagundo AB, Crippa JA, Atakan Z, Bhattacharyya S, Allen P, et al. Neuroimaging in cannabis use: a systematic review of the literature. *Psychol Med*. 2010;40(3):383-98. Epub 2009/07/25. doi: 10.1017/s0033291709990729.
3. ElSohly MA, Mehmedic Z, Foster S, Gon C, Chandra S, Church JC. Changes in Cannabis Potency Over the Last 2 Decades (1995-2014): Analysis of Current Data in the United States. *Biol Psychiatry*. 2016;79(7):613-9.
4. Mehrpour O, Karrari P, Afshari R. Recreational use and overdose of ingested processed cannabis (Majoon Birjandi) in the eastern Iran. *Hum Exp Toxicol*. 2012;31(11):1188-9. Epub 2012/07/04. doi: 10.1177/0960327112446814.
5. Merlin MD. COVER ARTICLE: Archaeological Evidence for the Tradition of Psychoactive Plant Use in the Old World. *Econ Bot*. 2003;57(3):295-323.
6. Hu C, Zawistowski J, Ling W, Kitts DD. Black rice (*Oryza sativa* L. indica) pigmented fraction suppresses both reactive oxygen species and nitric oxide in chemical and biological model systems. *J Agric Food Chem*. 2003;51(18):5271-7. Epub 2003/08/21.
7. Klein TW, Newton C, Larsen K, Lu L, Perkins I, Nong L, et al. The cannabinoid system and immune modulation. *J Leukoc Biol*. 2003;74(4):486-96.
8. Mechoulam R, Parker LA, Gallily R. Cannabidiol: an overview of some pharmacological aspects. *J Clin Pharmacol*. 2002;42(11 Suppl):11s-9s.
9. Alexander A, Smith PF, Rosengren RJ. Cannabinoids in the treatment of cancer. *Cancer Lett*. 2009;285(1):6-12.
10. Grotenhermen F, Muller-Vahl K. The therapeutic potential of cannabis and cannabinoids. *Dtsch Arztebl Int*. 2012;109(29-30):495-501.
11. Lamarine RJ. Marijuana: modern medical chimaera. *J Drug Educ*. 2012;42(1):1-11. Epub 2012/08/10. doi: 10.2190/DE.42.1.a. PubMed PMID: 22873011.
12. Cousijn J, Wiers RW, Ridderinkhof KR, van den Brink W, Veltman DJ, Goudriaan AE. Grey matter alterations associated with cannabis use: results of a VBM study in heavy cannabis users and healthy controls. *NeuroImage*. 2012;59(4):3845-51.
13. Leung L. Cannabis and its derivatives: review of medical use. *J Am Board Fam Pract*. 2011;24(4):452-62.
14. Woolridge E, Barton S, Samuel J, Osorio J, Dougherty A, Holdcroft A. Cannabis use in HIV for pain and other medical symptoms. *J Pain Symptom Manage*. 2005;29(4):358-67. Epub 2005/04/29. doi:10.1016/j.jpainsymman.2004.07.011. PubMed PMID: 15857739.

Effectiveness of Cognitive Restructuring on Reducing Learned Helplessness in Educable Students with Intellectual Disability

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ABSTRACT

Background and Objective: This study aimed to determine the effectiveness of training based on cognitive restructuring in reducing learned helplessness among educable students with intellectual disability in Qaen, Iran.

Method: This applied research adopted a quasi-experimental pretest-posttest-follow-up design and randomly recruited 60 students. The students were randomly allocated to the case and control groups. At baseline, both groups completed the Learned Helplessness Questionnaire. The case group then received nine sessions of training based on cognitive restructuring. Results: The questionnaire was readministered immediately and one month after the intervention (posttest and follow-up). The data were analyzed using independent and paired t-tests and analysis of covariance (ANCOVA) in SPSS 19. There was a significant difference between the case and control groups after covariate adjustment ($P < 0.001$). In fact, training based on cognitive restructuring explained 4.22% and 9.17% the variance in the case group's posttest and follow-up scores of learned helplessness, respectively.

Conclusion: Since our confirmed the effectiveness of training based on cognitive restructuring in decreasing the levels of learned helplessness in students with intellectual disability, similar training programs should be used to improve the attitudes of educable children with intellectual disability towards problems and failures.

Key-words: Cognitive Restructuring, Learned Helplessness, Intellectual disability, students.

INTRODUCTION

One of the most important needs of the students is to identify their capabilities and to understand that they have to assume responsibility for their actions and learning process and to take control of their affairs. ¹ On this basis, the attribution theory discusses the concept

of “learned helplessness” which is the most negative self-concept. Learners with learned helplessness do not associate effort with progress² and believe that they will never succeed no matter how hard they try. Seligman was the first to propose the idea that the consequences of behaviors are independent of the behaviors themselves. Seligman defined the concept of learned helplessness as a special state of mind caused by a person's belief that all events are out of his/her control. In other words, after a series of experiences where a person's actions do not affect the outcomes of his/her behaviors, he/she learns that behaviors and their consequences are independent. ^{3, 4} Seligman also argued that learned helplessness caused by uncontrollable events leads to a negative cognitive structure and the belief that success and

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failure are independent of behaviors. In fact, people's negative and pessimistic attributional style regarding the consequences of their actions can result in helplessness.⁵

Intellectual disability, also called intellectual disability, is a special mental condition caused by specific circumstances before, during, and after birth. Due to their impaired or delayed mental development, individuals with intellectual disability cannot generally benefit from the regular educational programs. They also face problems in social adjustment and adaptation to the environment.⁶

A person's thoughts and attitudes are among the major factors affecting the development and consistency of helplessness. In fact, perceived uncontrollability, and not actual controllability, is a determinant of helplessness. Moreover, rather than being determined by external events, the actions and feelings of people are mainly affected by their thoughts on and attitudes toward external events.⁷ Apparently, changing a person's feelings and behaviors would require the modification of his/her thoughts and perceptions. Therefore, instead of focusing on external, environmental, genetic, and hereditary factors and childhood events, cognitive therapists seek to modify their clients' thinking, cognition, and interpretation and to help them develop reasonable attitudes.^{8, 9, 10, 11} Thus, since learned helplessness is believed to be the result of unhealthy cognitions and attributional processes, it can be eliminated or controlled through the modification of unhealthy attitudes and cognitive approaches.

The cognitive approach identifies dysfunctional (irrational) beliefs, thinking errors, and cognitive distortions as the main cause of all emotional and behavioral problems. Based on this approach, during the perception and interpretation of their social interactions and experiences of various events, most people develop thinking errors such as exaggeration, catastrophizing, distortion, hasty conclusions, and exaggerated generalizations.¹² No events can cause a problem by itself, i.e. people's way of thinking, processing patterns, and interpretation of the events can lead to negative feelings and emotions. The main goal of cognitive therapy is to empower the clients to identify and fight against their automatic thoughts and wrong cognitive distortions and to not only achieve a positive sense, but also develop a correct and realistic cognitive schema.^{8, 13}

One of the effective methods based on cognitive therapy is cognitive restructuring. This method uses the challenge between the therapist and the client to help the client change his/her negative and dysfunctional beliefs. It is, hence, applied to reduce undesirable covert cognitive behaviors (undesirable thoughts).¹⁴ Through this method, the clients learn to change their perceptions of self, the world, and the future, substitute negative thoughts with more positive beliefs, and utilize more appropriate techniques to deal with their emotional problems.¹⁵

Although numerous studies have evaluated cognitive restructuring and learned helplessness in various countries, none of such studies has focused on students with intellectual disability. Therefore, this study examined the effectiveness of cognitive restructuring in decreasing learned helplessness among educable children with intellectual disability.

METHOD

This applied research adopted a quasi-experimental pretest-posttest-follow-up design with a control and a case group.

Sample

The statistical population in this study consisted of all 75 educable students (40 boys and 35 girls) with intellectual disability in Qaen, Iran during the academic year 2014-15. Considering the size of the population and the research type, the method proposed by Morgan and Krejcie was used to randomly select 30 boys and 30 girls and allocate them to two groups of 30 (case and control groups).

Measures

The Learned Helplessness Questionnaire (LHQ) was used to collect data. The LHQ is a 20-item self-administered tool developed by Solomon and Rothblum in 1989. The items are scored on a four-point Likert scale (from "Not at all true of me" to "Very true of me") and items 1, 7, 17, 19, 21, and 23 are reverse scored. The total scores of the LHQ range between 20 and 80 with higher scores reflecting a greater degree of learned helplessness. The internal consistency of the questionnaire was confirmed in healthy populations ($\alpha = 0.85$ and $\alpha = 0.92$), individuals with drug dependence ($\alpha = 0.90$), and chronically ill oncology patients ($\alpha =$

0.83), hemodialysis patients ($\alpha = 0.92$), and individuals with spinal cord injury ($\alpha = 0.94$).^{16,17} The reliability of the LHQ was also confirmed in the present study ($\alpha = 0.76$).

Statistical analysis

Paired and independent t-tests along with the analysis of covariance (ANCOVA) were applied to analyze the data. All analyses were performed using SPSS 19.0 (SPSS Inc., Chicago, IL, USA) and P values less than 0.05 were considered significant.

RESULTS

Table 1 compares the case and control groups in terms of the mean scores of learned helplessness. As seen, in the case group (in both genders and the whole group), the mean posttest and follow-up scores of learned helplessness were lower than the pretest scores.

Table 1: The mean scores of learned helplessness in the male and female students of the case and control groups

group	Gender	Number	Mean			SD		
			Pretest	Posttest	Follow up	Pretest	Posttest	Follow up
Control	Female	15	51.00	50.20	50.13	5.60	4.63	5.66
	Male	15	50.60	49.47	50.00	5.90	6.24	4.78
	Total	30	50.80	49.83	50.06	5.65	5.41	5.15
Experimental	Female	15	50.07	43.80	43.86	4.59	6.71	6.70
	Male	15	49.93	45.33	45.73	5.61	5.80	5.76
	Total	30	50.00	44.57	44.80	5.03	6.21	6.21

Table 2 shows the results of paired t-test comparing the pretest and posttest scores of learned helplessness in the case group.

According to Table 2, the case group's posttest score of learned helplessness was significantly lower than its pretest score (44.57 ± 6.21 vs. 50.00 ± 5.03 ; $P < 0.005$). Moreover, the mean scores of learned helplessness among both boys and girls significantly reduced in posttest (in comparison to pretest).

Table 2: Comparison of pretest and posttest scores of learned helplessness in the case group (paired t-test results)

groups	SD	Mean Standard deviation	T test	df	p	Mean difference
Female	4.367	1.127	5.55	14	0.000	6.26
Male	7.845	2.026	2.27	14	4.60	4.60
Total	6.296	1.149	4.72	29	5.43	5.43

The results of independent t-tests comparing the pretest scores of the case and control groups are summarized in Table 3.

Table 3: The results of independent t-tests comparing the pretest scores of the case and control groups

Gender	Levene-Test		T-Test					
	f	p	t	df	p	Mean difference	Mean	
							Control	Experiment
Female	0.21	0.649	0.49	28	0.622	0.93	51.00	50.07
Male	0.01	0.919	0.31	28	0.754	0.66	50.60	49.93
Total	0.05	0.825	0.578	58	0.565	0.80	50.80	50.00

As Table 3 shows, there were no significant differences in the mean pretest scores of learned helplessness between the case and control groups (the total scores and the scores of male and female students). Therefore, the two groups were matched in terms of learned helplessness before the intervention. Table 4 presents the results of independent t-tests comparing the two groups in terms of posttest scores of learned helplessness.

Table 4: The results of independent t-tests comparing the case and control groups in terms of scores of learned helplessness after the intervention based on cognitive restructuring

Gender	Levene Test		T-Test					
	f	p	t	df	p	Mean difference	Mean	
							Control	Experiment
Female	2.05	0.163	-3.04	28	0.005	-6.40	50.20	43.80
Male	0.01	0.904	-1.87	28	0.006	-4.13	49.47	45.33
Total	1.54	0.220	3.50	58	0.001	-5.16	49.83	44.57

As seen in Table 4, the posttest scores were significantly lower in the case group than in the control group (44.57 ± 6.21 vs. 49.83 ± 5.41 ; $P < 0.005$). Likewise, the posttest scores of both male and female cases were significantly lower than those of their control counterparts ($P < 0.006$ and $P < 0.005$, respectively). However, this reduction was greater in females than males.

Table 5 compares the differences between pretest and posttest scores of learned helplessness in both the case and control groups.

Table 5: The results of independent t-tests comparing the difference between pretest and posttest scores of learned helplessness in the case and control groups

Gender	Levene Test		T-Test					
	f	p	t	df	P	Mean difference	Mean	
							Control	Experiment
Female	3.49	0.143	-4.08	28	0.000	-5.46	0.80	6.26
Male	0.01	0.740	-1.68	28	0.005	-3.46	1.13	4.60
Total	3.24	0.220	-3.67	58	0.001	-4.46	0.97	5.43

According to Table 5, the difference between the mean pretest and posttest scores of the case group was significantly larger than that of the control group (5.43 ± 6.29 vs. 0.97 ± 2.17). Since the level of significance was determined as > 0.05 based on Levin's test, the first row of the results was used to compare the male and female students of the two groups. The differences between the mean scores of female cases and controls and male cases and controls were again significant and equal to 6.26 and 4.60, respectively.

Table 6 shows the results of a multivariate ANCOVA of the scores of learned helplessness in the case and control groups.

Table 6: The results of analysis of covariance (ANCOVA) of the scores of learned helplessness (pretest-posttest) in the case and control groups

Test	Source changes	Sum of squares	df	Mean Square	f	p	Eta coefficient			
	Pretest	827.893	1	827.893	41.335	0.091				
	group	329.803	1	329.803	16.466	0.000	0.224			
	Error	1141.640	57	20.029						
			Total	136056.000	60					
Follow up	Pretest	166.445	1	166.455	5.502	0.088				
	group	374.898	1	374.898	12.394	0.001	0.179			
	Error	1724.222	57	30.250						
	Total	137302.000	60							

DISCUSSION

Similar results were reported by Shikatani et al.¹⁸, Ghamari et al.¹⁹, Asikhia²⁰, and Tavangar et al.²¹ According to Hooper²² and McHugh⁵, training based on cognitive therapy significantly decreased learned helplessness and thus increased self-efficacy. It is important for students to rely on their own capabilities and to understand that positive changes within one's self can yield very positive results in life.. This indicates that one's assessment of a

particular situation is generally better than the objective nature of the situation. A person with improper function in information processing will develop cognitive errors and psychological disorders. Among the major issues discussed in educational and psychological literature is the ability of individuals to analyse their successes and failures. However, leaving success to chance and other uncontrollable factors will decrease the person's perseverance. Therefore, the development of learned helplessness prevents any hopes and efforts and links any movement to further failures.²³

It can, hence, be concluded that cognitive techniques and training based on cognitive restructuring can decrease the students' tendency to attribute their failures to external factors and consequently reduce their levels of learned helplessness. The most important goal of cognitive restructuring is to help people interpret various events based on their own abilities and the existing realities. Misinterpretation of events, i.e. linking success to external factors and failure to internal factors, will lead to false attributions, learned helplessness, and ultimately low self-esteem. Cognitive restructuring is consistent with attributional restructuring and can not only eliminate false attributions, but also decrease the levels of helplessness.

Conflict of Interests: Nil.

Source of Funding: This study was derived from an MSc thesis financed by Azad Islamic University, Qaen Branch.

Ethics Clearance: The study was performed in compliance with all ethical considerations and standards of the journal. All procedures were conducted in accordance with the ethical standards of the Institutional and/or National Research Committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

REFERENCES

- Sanjuan P, Perez A, Rueda B, Ruiz A. Interactive effects of attributional styles for positive and negative events on psychological distress. *Personality and Individual Differences*, 2008; 45: 187-190.
- Swanson JN, Dougall AL, Baum A. Learned helplessness. In V. S. Ramachandran (Ed.), *Encyclopedia of Human Behavior* (2nd ed). San Diego: Academic Press, 2012; 15: 525-530.
- Isaacowitz DM, Seligman MEP. Learned

- Helplessness. *Encyclopedia of Stress* (2nd ed), 2007; 12(3):567-570
4. Hunziker MH, Dos Santos CV. Learned helplessness: effects of response requirement and interval between treatment and testing. *Behavioural Processes*, 2007; 76(29): 183-91.
 5. McNatt DB, Judge TA. Self-efficacy intervention, job attitudes, and turnover: A field experiment with employees in role transition. *Human Relations*, 2008; 61(37): 783-810.
 6. Esmaeeli-Nieh S, Sherr EH. Mental Retardation/Intellectual Disability. In M. J. Aminoff & R. B. Daroff (Eds.), *Encyclopedia of the Neurological Sciences* (Second Edition). Oxford: Academic Press. 2014; 12(6): 1090-1094.
 7. Greenberg JL, Mothi SS, Wilhelm S. Cognitive-Behavioral Therapy for Adolescent Body Dysmorphic Disorder: A Pilot Study. *Behavior Therapy*, 2016; 47(2): 213-224.
 8. Dimitriu O. Empathy Insertion in Cognitive-behavioural Psychotherapy. *Procedia – Social and Behavioral Sciences*, 2014; 127: 707-711.
 9. Alexopoulos GS, Raue P, Arean P. Problem-solving therapy versus supportive therapy in geriatric major depression with executive dysfunction. *The American Journal of Geriatric Psychiatry*, 2003; 11: 46-52.
 10. Beail N. What works for people with intellectual disability? Critical commentary on cognitive-behavioral and psychodynamic psychotherapy research. *Intellectual Disability*, 2003; 41: 468-472.
 11. Benedict RH, Shapiro A, Priore R. Neuropsychological counseling improves social behavior in cognitively-impaired multiple sclerosis patients. *Multiple Sclerosis Journal*, 2000; 6: 391-396.
 12. Beck AT, Rush AJ, Shaw BF, Emery G. *Cognitive therapy of depression*. New York: Wiley. 1979.
 13. Ho FY, Chan CS, Tang KN. Cognitive-behavioral therapy for sleep disturbances in treating posttraumatic stress disorder symptoms: A meta-analysis of randomized controlled. *Clinical Psychology Review*, 2016; 43: 90-102.
 14. Deldin PJ, Chiu P. Cognitive restructuring and EEG in major depression. *Biological Psychology*, 2005; 70(18): 141-151.
 15. Hagen R, Hjemdal O. Cognitive Behavioural Therapy. *Encyclopedia of Human Behavior* (Second edition). Elsevier. 2012; 24(9): 525-530.
 16. Quinless FW, Nelson MA. Development of a measure of learned helplessness. *Nursing Research*, 1988; 37(16): 11-15.
 17. Sullivan DR, Liu X, Corwin DS, Verceles AC, McCurdy MT. Learned helplessness among families and surrogate decision-makers of patients admitted to medical, surgical, and trauma ICUs. *Chest*, 2012; 142(78): 1440-1446.
 18. Shikatani B, Antony MM, Kuo JR, Cassin SE. The impact of cognitive restructuring and mindfulness strategies on post event processing and affect in social anxiety disorder. *Journal of Anxiety Disorders*, 2014; 28(11): 570-579.
 19. Ghamari Kivi H, Rafeie SH, Kiani AR. Effectiveness of Cognitive Restructuring and Proper Study Skills in the Reduction of Test Anxiety Symptoms among Students in Khalkhal, Iran. *American Journal of Educational Research*, 2015; 3(1): 1230-1236.
 20. Asikhia OA. Effect of cognitive restructuring on the reduction of Cognitive-Restructuring training on mathematics anxiety in Mathematics among a group of Senior Secondary School Students in Ogun State, Nigeria. *International Journal of Educational Research*, 2014; 2(1): 1-20.
 21. Tavangar L, YazdKhasti F. Effectiveness of Eclectic Intervention (Cognitive Restructuring, Cognitive Coping Skills and Role playing Approaches) on self-Assertiveness and Social Anxiety among Isfahan University Students. *The scientific Journal of ZANJAN University of Medical Sciences*, 2013; 21(3): 76-85.
 22. Hooper N, McHugh L. Cognitive Diffusion versus Thought Distraction in the Mitigation of Learned Helplessness. *The Psychological Record*, 2013; 63(26): 1-10.
 23. Tyler A. The relationship between optimistic and women depression. *European Journal of Personality*, 2008; 23(16): 71-84.

Awareness of the Staff of Slaughterhouses and Animal Husbandries of Crimean-Congo Hemorrhagic Fever in Shoushtar, Iran in 2017

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ABSTRACT

Field: Since Crimean-Congo Hemorrhagic Fever (CCHF) has no indicative clinical symptom in the infected livestock, the current research was conducted to compare the awareness of the staff of slaughterhouses and animal husbandries in Shoushtar, Iran in 2015.

Method: In this descriptive-analytical study, 200 staff of slaughterhouses and animal husbandries were selected by census sampling. Data were collected by a researcher-made questionnaire, which was completed by the study units. Data were analyzed by SPSS statistical software (version 20) using descriptive and inferential statistics, including independent t-test, Pearson Correlation Coefficient, Spearman, chi-square test and Kolmogorov-Smirnov test.

Finding: The results showed that the awareness of the staff of slaughterhouses and animal husbandries was at a low level. The mean awareness was 6.46 ± 2.61 among the stockbreeders) and 8.01 ± 2.89 among the slaughterhouse staff, indicating a significant relationship between the two groups ($P < 0.001$).

Conclusion: According to the obtained results, it is necessary to develop educational programs and workshops to raise the knowledge of staff about CCHF in slaughterhouses and animal husbandries.

Keywords: Crimean-Congo Hemorrhagic Fever, Awareness, Slaughterhouses, Staff, Animal Husbandries

INTRODUCTION

Adopting health measures to maintain health, increasing the life expectancy and average life and improving the quality of life are safer than performing

treatment. Although the health cares and health-related plans are more expensive in short term, but in the long term and considering all people in the community, health and preventive measures are more advantageous and more economical than treatment. However, hygiene is not limited merely to human but it should be given a special attention along with all factors that play a key role in human's life such as the health of domestic animals we deal with directly or indirectly.¹ Human beings need power to do their works, and they should provide this power and energy from healthy and nutritious food. If this food is exposed to contamination, it can endanger their life because food contains healthy and nutritious materials and microbes need nutrients as

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well, so food can be the source of diseases. That is why we need to know about food preparation methods, food contamination, maintenance methods and the principles of combating germs and pathogens in order to be able to prevent the diseases caused by consumption of contaminated food. The livestock products such as milk and meat are undoubtedly the most frequently used foods per household, and these products have numerous roles in the life, nutrition and the survival of human and play an essential role in ensuring food safety and community health. If these kinds of food products are prepared non-sanitarily, they can cause many diseases. Among these products, meat is the most important source of animal protein.²

Today the common diseases among human beings and animals include viral fevers, which are one of the most dangerous, deadliest and most common human diseases.³ One can point to CCHF that is a component of the disease whose agent is of Tyro virus genus and Binoviridae family, which is mostly transmitted by arthropods.⁴ This disease is an acute infection that was diagnosed first in Crimea in 1944 and later was known with this name due to its outbreak in Congo.⁵ The CCHF virus was introduced as one of the deadliest viruses.⁶ The disease does not cause any apparent symptoms in animals and plays the role of a tank for the virus.^{7,8}

The incubation period is 2-9 days.⁹ The highest level of prevalence has been reported in summer in July and the lowest level of infection has been reported to be in fall.¹⁰ The World Health Organization (WHO) has listed CCHF in new diseases, which requires controlling and preventive measures. Pakistan, Tajikistan, Afghanistan, Iran and Turkey are five countries where the disease has been observed.^{11,12} Possible cases of CCHF have been reported in Iran since 1999.

This disease is considered an endemic disease in Iran.¹³ The severity of the disease was reported to be 15% in Khorasan Razavi¹⁴ and 20% in Zahedan.¹⁵ Also, confirmed cases have been reported by people in Sistan and Baluchistan, Khuzestan, Chaharmahal and Bakhtiary, Western Azerbaijan, Bushehr, Yazd, Kerman, Tehran, Isfahan, Golestan, Fars and Qom provinces of Iran in recent decades, which have led to death.^{16,17} Therefore, it is necessary to have adequate knowledge about this disease.

Regarding the job, Rezai et al (2012) found

the greatest number of confirmed positive cases in slaughterhouse staff and butchers (37.5%) and in livestock breeders (31.2%). This disease is more prevalent in men than in women, which is due to the nature of men's jobs in which they have more contact with livestock.¹⁸ Further, Sargolzaei et al (2012) evaluated the physicians' awareness of the healthcare system of CCHF and found that among 112 attending physicians, 42.9% had low level of information, 42.1% had average level of information, 8% had good information and none of them had excellent information about the healthcare system of CCHF.¹⁹

The high risk groups in endemic areas include people who have contact with livestock and other animals, including farmers, pet owners, slaughterhouse staff and veterinarians.²⁰ If no training is provided to them to prevent and recognize the disease, they will be exposed to the disease directly. The purpose of this study was comparing the awareness of the staff of slaughterhouses and animal husbandries about the CCHF in Shoushtar, Iran in 2015.

MATERIALS AND METHOD

This cross-sectional, descriptive-analytical study compared the knowledge of the staff of slaughterhouses and stockbreeders about in Shoushtar, Iran in 2017. Sampling was done by census method. The inclusion criterion was having the experience of working for at least one year and the exclusion criterion was incomplete completion of the questionnaire. A total of 200 samples (40 slaughterhouse staff and 160 livestock breeders) were chose and investigated in this study.

The data collection tool in this study included a researcher-made questionnaire. To assess its validity, it was given to ten experts and specialists from Tehran Azad University of Medical Sciences. The final questionnaire was obtained after considering the suggestions and modifying and eliminating some of the items. The reliability of the scale was determined by internal consistency. For this purpose, the questionnaires were given to 20 individuals who had the samples' profiles, then they were excluded from the study. The reliability of the questionnaire was obtained to be $\alpha=0.78$ according to Cronbach's alpha, indicating a desired reliability for the questionnaire. The questionnaire included questions about demographic information such as age, gender and education level as well as 20 questions about knowledge

of CCHF (9 questions about the knowledge of disease, 3 questions about the symptoms, 3 questions about disease transmission and 5 questions about prevention). The questions were designed in such a way that there was only one correct option per question. Each correct response was assigned one score, and zero score was given to wrong responses. Then, the scores were classified into three levels: the score below ten was considered weak, 10-15 was considered average and above 15 was considered as good.

The questionnaire was distributed among the samples and was completed in person. Data were analyzed by SPSS statistical software (version 20) using descriptive statistics, including mean, standard deviation, maximum and minimum scores, frequency and percentage as well as inferential statistics,

including, Pearson correlation coefficient, Spearman, chi-square test and Kolmogorov-Smirnov test to assess the normality of data distribution. The acceptable level of significance to test the hypothesis was set at 0.05.

RESULTS

In this descriptive-analytical study, 200 staff of slaughterhouses and animal husbandries in Shoushtar were included (40 staff of slaughterhouses (20%) and 160 staff of animal husbandries (80%). The average age of animal husbandry staff was (39.23 ± 12.5) and the average age of slaughterhouse staff was (37.7 ± 12.5). 100% of slaughterhouse staff were male and 20% of animal husbandry staff were female. The data were distributed normally according to Kolmogorov-Smirnov test ($p > 0.05$).

Table 1. The demographic data

Variable			Number	Percentage
Gender	Slaughterhouse Staffs	Men	0	0
		Woman	40	100
	Animal husbandry Staffs	Men	22	13.8
		Woman	138	86.2
Education Level	Slaughterhouse Staffs	Illiterate	7	17.5
		Pre-Diploma	9	22.5
		Diploma	15	37.5
		Associate	3	7.5
		Bachelor or Higher	6	15.0
	Animal husbandry Staffs	Illiterate	33	20.6
		Pre-Diploma	40	25.0
		Diploma	57	35.6
		Associate	9	3.8
		Bachelor or Higher	24	15.0
Age	Slaughterhouse Staffs	Less than or equal 30 Years	21	52.5
		31 to 40	3	7.5
		41 to 50	9	22.5
		Greater than or Equal to 51	7	17.5
	Animal husbandry Staffs	Less than or equal 30 Years	71	44.4
		31 to 40	7	4.4
		41 to 50	53	33.1
		Greater than or Equal to 51	29	18.1
Work Experience	Slaughterhouse Staffs	Less than 10 years	23	57.5
		10 to 20	7	17.5
		More than 20 years	10	25.0
	Animal husbandry Staffs	Less than 10 years	77	48.1
		10 to 20	47	29.4
		More than 20 years	36	22.5

Table 2. The Medial and the standard deviation of the samples 'scores in the research variable

	Group	Number	Standard deviation $\pm$ Average	T Test	Significance level
Age	Ranchers	160	(39.23 $\pm$ 12.5)	0.692	0.489
	Staffs	40	(37.7 $\pm$ 12.5)		
Work Experience	Ranchers	160	(13.03 $\pm$ 9.55)	0.589	0.557
	Staffs	40	(12.04 $\pm$ 9.12)		
Awareness	Ranchers	160	(6.46 $\pm$ 2.61)	-3.33	<0.001
	Staffs	40	(8.01 $\pm$ 2.89)		

There was no statistically significant difference between the ages of two groups (table 2). There was a statistically significant difference between the awareness of two groups ($p < 0.001$), the awareness score of slaughterhouse staffs (8.01 $\pm$ 2.89) was more than that of the animal husbandry staff (6.46 $\pm$ 2.61) (table 2). There was no statistically significant difference in education level between the two groups (Chi-Square=1.269, $p=0.867$). There was no significant association between the education and awareness among the animal husbandry staff ($r=0.700$, $p=0.629$), but there was a significantly inverse relationship between age and awareness ($r=0.224$, $p=0.004$). There was a significantly direct association between education and awareness ($r=0.238$, $p=0.002$) (table 2). There was no statistically significant relationship between education and awareness ($r=.145$, $p=0.371$), but there was a significantly inverse relationship between age and awareness ($r=0.343$, $p=0.03$). There was a significantly direct relationship between awareness and education ($r=0.397$, $p=0.01$) (Table 2)

DISCUSSION

Looking at the incidence of CCHF in Iran and other countries where the disease is native to the, we find out that the greatest danger is illegal contact with and illegal slaughter of the livestock.³ The results of this study showed the awareness of the study groups was at a low level. However, there was a statistically significant difference in the level of awareness between the two groups, and the slaughterhouse staff's awareness was more than that of the animal husbandry staff, which could be due to residence in city, veterinary organization supervision and providing information

to the slaughterhouse staff by environmental health experts. Yavarian (2013) also showed that the awareness of the slaughterhouse staff and livestock breeders of this disease was not at an appropriate level.²¹ In their study, Sargolzai (2012) concluded that the awareness of Zahedan general practitioners of the control system of CCHF was at an undesirable level, but the physicians who had the experience of taking the retraining courses of the disease had more information.¹⁹ Çilİngİroğlu (2010) conducted a study in Turkey and reported that 85% of women did not have sufficient knowledge.²² However, Ghasemirad (2013) claimed that the awareness of butchers and slaughterhouse staff was at an average level in Yazd but their performance to prevent the disease was undesirable.²³

The findings of this study indicated a significantly inverse relationship between age and awareness, as the higher was education, the higher was awareness, which is consistent with the results of Çilİngİroğlu.¹⁸ But in the research done by Farzinnia (2013) in Qom, there was no significant association between the age and attitude of the studied subjects,²⁴ which is not consistent with the results of the current study.

The findings also showed a significantly direct relationship between the education and awareness of the two groups, the higher the education level, the higher their awareness of CCHF, which is consistent with the results of Çilİngİroğlu.²² However, Ali Z (2013) in Pakistan found no statistically significant relationship between education level and awareness,¹² confirming the findings of the current study.

CONCLUSION

The results of this study showed that the knowledge of slaughterhouse and animal husbandry staff about CCHF and the danger of contact with livestock and mites was not at a desirable level. So, it is essential to prevent this disease by necessary trainings and raising the knowledge of the personnel of high-risk jobs about this disease.

Conflict of Interests: Nil

Ethical Considerations: Ethical matters e.g. plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc. have been totally observed by the authors.

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REFERENCES

1. Mousavi S, Siranvand M. Community Health Nursing. Moein Institute of Science and Technology Publication.2011.
2. Ghaneian M.T, Ehrampoush M.H, Farsad M, Dehvari M. Evaluation of Health Conditions of Livestock and Poultry Slaughterhouses in Yazd Province. *Journal of Science and Research, Yazd School of Public Health*.2013; 2(12): 124-135.
3. Abdollahi Shahvali E, Nasrabadi T, Fesharaki M. The effect of Crimean Congo fever training on the knowledge and practice of Slaughterhouse Staff in shoushtar. *Journal of nurse and physician within war*. 2016; 3(8):12-19.
4. Saghafipour A., Norouzi M., Sheikholeslami N., Mostafavi R. Epidemiologic status of the patients with Crimean Congo Hemorrhagic Fever and its associated risk factors. *Iranian Journal of Military Medicine*. 2012; 14 (1):1-5.
5. Leblebicioglu H, Ozaras R, Irmak H, Sencan I. Crimean-Congo Hemorrhagic Fever in Turkey. Current Status and Future Challenges. *Antiviral Res*.2016; 126:21–34.
6. Ergonul O. (2016). Crimean-Congo Hemorrhagic Fever, *Journal Eid*. 19: 200-215.
7. Appannanavar SB, Mishra B. An Update on Crimean Congo Hemorrhagic Fever. *Journal of Glob Infectious Diseases*. 2011; 3 (3): 285–292.
8. Jane P. Messina, David M. Pigott, Nick Golding, Kirsten A. Duda, John S. Brownstein, Daniel J. Weiss ,and et al. The Global Distribution of Crimean-Congo Hemorrhagic Fever. *Transactions of the Royal Society and of Tropical Medicine and Hygiene*.2015; 109(8): 503–513.
9. Akuffo R, Brandful JA, Zayed A, Adjei A, Watany N, Fahmy NT, and et al. (2016). Crimean-Congo Hemorrhagic Fever Virus in Livestock Ticks and Animal Handler Seroprevalence at an Abattoir in Ghana. *BMC Infect Dis*.2016; 16: 324 .doi: 10.1186/s12879-016-1660-6.
10. Saberianpour Sh. Crimean-Congo Hemorrhagic Fever, *Periodical of the Student Research Committee of Sabzevar University of Medical Science*. 2014; 2(19):30-40.
11. Yolcu S, Kader C, Kayipmaz AE, Ozbay S, Erbay A. Knowledge Levels Regarding Crimean Congo Hemorrhagic Fever among Emergency Healthcare Workers in an Endemic Region. *Journal of clinical medicine research*. 2014; 6(3):197-204. doi: 10.14740/jocmr1801w.
12. Ali Z, Kumar R, Ahmed J, Ahmed J, Ghaffar A, Mureed SH. Mureed Knowledge Attitude and Practice of Crimean-Congo Hemorrhagic Fever Among Rural Population Of Baluchistan, Pakistan. A Public Health Nutritional Assessment of Elderly in Islamabad A Mixed Method Study. *J Publ Health*.2013; 3(4): 11–13.
13. Ergonul O, Whitehouse CA. Crimean-Congo Hemorrhagic Fever: A Global Perspective. Berlin: Springer; 2007 *Disease and Tropical Medicine Tehran – Iran*. 2010.
14. Ebadi F, Esmaeil R A, Zohoor A. Epidemiological survey of Crimean Congo hemorrhagic fever in Khorasan Razavi. *MEDICAL SCIENCES*. 2011; 21 (1):61-66.
15. Sharifi-Mood B, Metanat M, Hashemi- Shahri SM, Mardani M, Hashemi SA, Fayyazjahani F. Crimean-Congo Hemorrhagic Fever Following Consumption of Uncooked Liver: Case Series Study. *Iran J Clin Infect Dis*.2011; 6(3):128-30.
16. Chinikar S, Ghiasi SM, Moradi M, Goya MM, Shirzadi MR, Zeinali M, and et al. Geographical Distribution and Surveillance of Crimeancongo Hemorrhagic Fever in Iran. *Vector Borne Zoonotic Dis*. 2010; 10(7):705-8. doi:

10.1089/vbz.2009.0247.

17. Chinikar S , Ghiasi SM , Ghalyanchi- Langeroudi , Goya MM , Shirzadi MR , Zeinali M.and et al. An Overview of Crimean-Congo Hemorrhagic Fever in Iran. *Iranian Journal of Microbiology*. 2009; 1(1):7-12.
18. Rezaei F, Rezazadeh A, Moghaddami M, Mir Ahmadizadeh A.R, Rezazadeh F. Reporting Five Cases infected by Crimean-Congo Hemorrhagic in Fars Province in 2010, *South Medicine Periodical*, Bushehr University of Medical Sciences, 2012; 15(3):241-248.
19. Sargolzai N, Dehghan Haghighi J, Kharazmi F. Care System of Crimean Congo Hemorrhagic Fever and General Physicians in Zahedan. *Journal of Medical University o, Mashhad University of Medical Sciences, Mashhad, Iran*.2013; 56(1):21-25.doi :10.22038/mjms.2013.454.
20. Erbay A. In: *Molecular Detection of Human Viral Pathogens*. Liu D, Editor. Boca Raton, FL, US: CRC Press Taylor and Francis Group; 2010. Crimean-Congo Hemorrhagic Fever Virus; Pp. 617–629.
21. Yavrian H. Considering The Impact of Crimean Congo Hemorrhagic Fever Training (CCHF) on of Health Behavior Changes of Zahedan Slaughterhouse Staffs, Master's Thesis, Tehran, Tarbiat Modares University.2013.
22. Çilingiroğlu N, Temel F, Altıntaş H. Publics Knowledge, Opinions and Behaviors about Crimean-Congo Hemorrhagic Fever: An Example from Turkey. *Kafkas Üniversitesi Veteriner Fakültesi Dergisi*. 2010; 16 (Suppl-A): S17-S22. DOI:10.9775/kvfd.2009.814.
23. Omrani M. Considering the Awareness and Performance of Yazd City Butchers and Slaughterhouse Staffs about Crimean Congo Hemorrhagic Fever (CCHF), PhD Dissertation, Islamic Azad University, Yazd Unit.2013.
24. Farzinnia B, Saghaipour A, Telmadarraiy Z. Study of the Epidemiological Status of Crimean-Congo Hemorrhagic Fever Disease in Qom Province, 2011, Iran. *Qom Univ Med Sci J*. 2013; 7 (4):42-48.

Autopsy Study of Deaths due to Fall from Height: A Three Year Prospective Study

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ABSTRACT

Background: Fall from height pose a substantial public health jeopardy globally, and are one among the important leading causes of death due to injuries. Deaths due to fall from height are common in the State of Karnataka and continue to increase due to multiple reasons but predominantly due to rapid urbanization with multistoried set ups. In order to assess the magnitude of this ongoing problem, a three year prospective autopsy study among deaths due to fall from height was carried on with regard to its demographic profile, manner, physics and pattern of injuries at KIMS hospital Bangalore. **Results:** Most of the victims were males (86%) and majority of the decedents belonged to 21-30 year age group. Among them, building constructor workers (41%) formed the highest number of victims. The most frequent height of fall causing death was found to be falls from heights ranging between 40-50 meters. The most common manner of death was found to be Accidental (55%) in nature. Lastly all cases showed severe visceral and skeletal injuries either independently or in combination.

Keywords: Fall, Height, Autopsy, Blunt injury, head injury, skeletal injuries, visceral injuries

INTRODUCTION

Deaths due to fall from height (FFH) are common in urban settings. In occupational settings, it is the most common type of accident. Builders, electricians, miners and painters are particularly at risk. It is also a major cause of personal injury, especially for the children and the elderly. Globally, FFH are a substantial public health jeopardy. They account to the second most common cause of injury-associated mortality after traffic accidents. Falls are also a major cause of emergency room visits and admissions in hospitals. Factors contributing to falls from heights include

faulty equipment, such as ladders and scaffold structures and human factors, such as intoxication and inattention. FFH deaths are frequently associated with a varying range of external and internal injuries often severe, fatal and mortal. The most common regions include the head, limbs, abdomen, chest, pelvis and the neck in order of descent. Relatively rare injuries include regions such as the retroperitoneum and gastro-intestinal tract. Virtually there is no height limit for deaths in FFH due to head injury, which are common in ground level falls in the aged and in children. It has been found that an average height of 10 to 24 meters fall is required for one to sustain neck injury and above 25 meters for chest and abdominal injuries ^{1,2,3}. Deaths due to FFH are common in Bangalore, the capital city of Karnataka and hence a 3 year prospective autopsy study was undertaken to evaluate the demographic profile and injury pattern to understand the magnitude of the problem and to better evaluate the cause of death from the pattern of injuries.

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MATERIAL AND METHOD

The study material consisted of 1503 medicolegal

autopsies conducted in the department of forensic medicine and toxicology, Kempegowda Institute of Medical Sciences and Hospital, Bangalore, Karnataka, during a period of 3 years (from June 2015 to June 2018). Of these, 78 cases were deaths due to fall from height, which were studied, prospectively after obtaining clearance from the institutional ethical clearance committee.

Data for the study comprised of inquest reports and interviews from relatives and friends, of the victims. A detailed proforma for recording the particulars, history, demographic profile and injury pattern was prepared. The information thus collected, was analyzed using appropriate statistical tools (namely Microsoft Excel 2007 and IBM SPSS V.20).

OBSERVATIONS AND RESULTS

During the study period, 1503 cases were brought for Medicolegal postmortem examination, of which 78 (5%) cases were deaths due to Fall from height.

Year wise analysis between mid-2015 to mid-2018 showed highest number of deaths due to FFH in the year 2016, where we encountered 33 cases (42%) [Table 1]. Maximum number of victims (28%) belonged to the age group ranging between 21-30 years [Table 2]. Observing sex wise death distribution, majority of the victims were found to be males (86%) [Table 3]. Majority of the victims were building construction workers (41%) [Table 4]. Highest frequency of deaths due to FFH occurred from a Height of more than 50 meters (38%) [Table 5]. Most of the deaths due to FFH were Accidental in manner (55%) [Table 6]. While considering the fatal internal injuries, Brain was found to be injured in all cases (100%) followed by liver and lung in order of descent 90% and 51 % respectively. Fractures of the skull, limb bones and pelvis were observed in 90% of the cases [Table 7].

TABLE 1: Year Wise Distribution of Fall from Height Deaths [FFH]

S.NO	Year	No. of Deaths	Percentage (%)
1.	2015	16	21
2.	2016	33	42
3.	2017	21	27
4.	2018	08	10
	Total	78	100

TABLE 2: Age wise distribution of FFH Deaths

S.NO	Age Group (Years)	No. of Deaths	Percentage (%)
1.	0-10	02	3
2.	11-20	10	13
3.	21-30	22	28
4.	31-40	18	23
5.	41-50	07	9
6.	51-60	13	17
7.	>60	6	8
	Total	78	100

TABLE 3: Sex wise distribution of FFH Deaths

S.NO	Sex	No. of Deaths	Percentage (%)
1.	Male	67	86
2.	Female	11	14
	Total	78	100

Table 4: Occupation of the Victims in FFH Cases

S.NO	Occupation	No. of Deaths	Percentage (%)
1.	Student	14	18
2.	Electrician	2	3
3.	Construction worker	32	41
4.	Employed in other sectors	6	8
5.	Unemployed	24	31
	Total	78	100

Table 5: Height of Fall (In Meters) in FFH Cases

S.NO	Height (in meters)	No. of Deaths	Percentage (%)
1.	5-10	1	1
2.	10-20	1	1
3.	20-30	6	8
4.	30-40	14	18
5.	40-50	26	33
6.	>50	30	38
	Total	78	100

Table 6: Manner of Death in FFH Cases

S.NO	Manner	No. of Deaths	Percentage (%)
1.	Accidental	43	55
2.	Suicidal	34	44
3.	Homicidal (Dyadic death)	1	1
	Total	78	100

Table 7: Visceral & Skeletal injuries in FFH Deaths

S.NO	Organ / Bones	No. of Deaths	Percentage (%)
1.	Brain	78	100
2.	Lung	40	51
3.	Liver	70	90
4.	Spleen	40	51
5.	Skull Fracture	70	90
6.	Rib Fracture	40	51
7.	Limb Bone Fractures	70	90
8.	Pelvic Fractures	70	90

DISCUSSION

In this section a comparison is made with observation made specifically on deaths due to FFH by other researchers prior or at parallel to our study. In the present study the total number of deaths due to FFH were about 5% of all deaths encountered during the 3 year study period, which is consistent with the findings made by Jagannatha SR et al, Venkatesha VT et al and Turgut et al ^{4,5,6}. The age group in our study showed maximum numbers falling within 21-30 years which is consistent with findings made by with the findings made by Jagannatha SR et al, Venkatesha VT et al and Kiran Kumar et al ^{4,5,7}. However, it did not correlate with the findings made by Prathapan et al, who observed maximum number of victims in 41-50 years age group ⁸. Taking Sex into consideration, male

death preponderance was observed and this finding is consistent with observation made by all researchers compared here in this section ⁴⁻⁸. Occupation wise, we observed highest number of deaths among building construction workers and this finding is similar to the studies made by Jagannatha SR et al and Venkatesha VT et al ^{4,5}, but it did not correlate with the findings made by Prathapan et al and Turgut et al who found maximum deaths due to FFH occurring in tree climbers and slip falls among the elderly ^{6,8}. The average Height of fall resulting in death investigated by us was found to be more than 50 meters which is consistent with the findings made by Jagannatha SR ⁴, but, it did not correlate with the findings made by rest all researchers cited above in this section ⁵⁻⁸. With regard to the manner of death and internal injuries, FFH deaths in our study were accidental in nature, and pattern or distribution or occurrence of internal organ and skeletal injuries is similar to the studies made by all researchers cited above in this section ⁴⁻⁸. In the above discussed section, findings which did not correlate with the observations made by other researchers could be explained probably due to regional and occupational variations.

CONCLUSION

While there cannot be a probable remedy for suicidal falls or homicidal push-falls, there can be several remedies suggested in order to prevent accidental falls, since they outnumber the latter. Strong and proper fencing of Terraces and balconies at homes, adequate safety equipment such as helmets and safe straps for building construction workers and other personnel who are at risk in their respective professions or skills working at height. Uniform policy in this regard should be framed by the state or central government and also be made compulsory so that the workplace authorities will ensure the safety of all its employees if not by will but by the order of the state.

Ethical Committee Clearance: Obtained

Source of Funding: Nil

Conflict of Interest: Nil

REFERENCES

1. Biswas G. Review of forensic medicine and toxicology. 3rd ed. Jaypee brothers Medical Publishers (P) Ltd.; 2015: 292-93.

2. Evan AN, Carol H, Bo Xia et al. Falls from Height in the Construction Industry: A Critical Review of the Scientific Literature. *Int. J. Environ. Res. Public Health*. 2016; 13(7): 638.
3. Ersoy S, Sonmez BM, Yilmaz F, et al. Analysis and injury patterns of walnut tree falls in central anatolia of turkey. *World J Emerg Surg*. 2014;9:42.
4. Jagannatha SR, Pradeep Kumar MV, Naveen Kumar et al. Injuries Due To Fall From Height – A Retrospective Study. *Journal of Forensic Medicine & Toxicology*. 2010; 27(1): 47-50.
5. Venkatesh VT, Pradeep Kumar MV, Jagannatha SR et al. Pattern of skeletal injuries in cases of falls from a height. *Med. Sci. Law*. 2007; 47(4): 330-334.
6. Turgut K, Mehmet ES, Cemil C et al. Falls from height: A retrospective analysis. *World J Emerg Med*. 2018;9(1):46-50.
7. Kiran Kumar JV and Srivastava A K. Pattern of Injuries in fall from Height. *J Indian Acad Forensic Med*. 2013;35(1): 47-50.
8. Prathapan V, Umadethan B. Fall from Heights – Pattern of Injuries. *International Journal of Biomedical Research*. 2015; 6(01): 8-13.

TABLES

Evaluation of the Effect of Different Finish Lines and Luting Agents on Marginal Fit and Microleakage in Direct Metal Laser Sintered Copings – An in Vitro Study

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ABSTRACT

Background & Objectives: The present study aimed to study the effect of finish line and luting cements on marginal gap and micro leakage in copings fabricated by Direct Metal Laser Sintering (DMLS)

Method: 28 maxillary premolars were divided in two groups depending upon finish line design. Co-Cr copings were fabricated with DMLS technique. Ceramic layering was done followed by cementation with two luting agents. These samples were sectioned and marginal gap was measured by stereomicroscope and also calibrated for microleakage.

Results: The mean marginal gap value for crowns fabricated by DMLS was $139.73 \pm 66.06 \mu\text{m}$. The mean marginal gap was least for samples in Group B(b) $105.35 \pm 67.25 \mu\text{m}$ followed by Group B(a) $135.71 \pm 19.66 \mu\text{m}$; Group A(a) $142.85 \pm 71.39 \mu\text{m}$ and highest value was seen for Group A(b) $175 \pm 82.28 \mu\text{m}$. 85.7% samples had microleakage. Highest microleakage was seen with samples in Group A(a) and least in Group B(a). None of the values were found to have statistical significance with significance value less than 0.05.

Conclusion: There is no effect of finish line or luting cement on the marginal gap or microleakage on metal ceramic crown with copings fabricated by DMLS method.

Keywords: Direct Metal Laser Sintering, metal ceramic crowns, marginal gap.

INTRODUCTION

The desire to incorporate the predictable and consistent precision provided by CAM technique has boosted many new manufacturing methods. Direct Metal Laser Sintering is one such computer aided method which can produce up to 90 units per run¹. It reduces material wastage and simplifies post fabrication procedures for metal copings. DMLS

requires three inputs: material, energy and CAD model². The material used is a chrome cobalt powder-based working alloy. Molybdenum, tungsten, silicon, cerium, iron, manganese and carbon are the other ingredients used. They are nickel and beryllium free. The alloy is a mix of particles of the size of 3–14 μm . Energy used is a high-powered laser beam³ (200 W Ytterbium fiber optic laser). This energy is used to melt the alloy powder. The third input is *CAD model*. The machine reads in data from a CAD drawing and lays down successive layers of alloy powder and in this way, builds up the model from a series of cross sections. DMLS is a much cleaner and time-efficient alternative to casting. It eliminates arduous steps of investing, de-investing, metal trimming and polishing.

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Laser sintered copings have shown higher ultimate tensile strength, 0.2% yield strength, and elastic modulus compared to its casted counterparts⁴. The shear bond strength of DMLS copings with porcelain has also shown promising results.^{5,6}

A superior marginal fit that provides resistance to biologic failures like microleakage, secondary caries and sensitivity needs to be investigated

The purpose of this study was to assess if variation in finish line and luting agent influences the marginal discrepancy and microleakage in copings fabricated by DMLS technique.

The null hypothesis was, there will be no effect of finish lines and luting agents on microleakage in copings fabricated with Direct Metal Laser Sintering Technique

MATERIALS AND METHOD

28 Maxillary Premolars were divided into 2 groups of 14 specimens each.

Group A: Metal sintered Co-Cr Copings for crowns with 1mm deep chamfer finish line

Group B: Metal sintered Co-Cr Copings for crowns with 1.5 mm shoulder finish line.

Axial reduction of 1.5mm and occlusal reduction 1.5 mm on non-functional cusp and 2 mm on functional cusp was maintained. 6° uniform taper was ensured with a customised paralleling device for airtor.

Impressions were made with medium body and light body polyvinyl siloxane material (Reprosil; Dentsply caulk, USA) in special trays made for each sample prior to the tooth preparation. Dies were poured with scan able die stone and were sent to a laboratory for scanning and designing using CAD (Computer- Assisted Designing) program. Cement thickness of 25 µm, 1mm above the finish line and a thickness of 0.3mm of each metal coping were maintained. The designing data was then sent to the EOSINT M 270 DMLS system. The Co-Cr alloy powder was sintered by the machine using Yb-fibre laser, (200 W) in increments. Ceramic layering was done on each coping to resemble a maxillary premolar.

Each group was further divided into two subgroups of 7 each.

Subgroup (a): Co-Cr coping cemented with self-adhesive resin cement (RelyXU200 resin cement, 3M ESPE, Seefeld, Germany)

Subgroup (b): Co-Cr copings cemented with Glass ionomer luting cement (GC Fuji, GC Corporation, Japan.

Samples were subjected to thermocycling at 5°C and 55°C for 1000 cycles in artificial saliva. 24 hours after thermocycling all the samples were de-mounted and immersed in basic fuchsin dye 0.5% concentration for 24 hours. Roots were painted with nail paint varnish up to 1mm below the CEJ to prevent any dye penetration through the roots.

Each sample was unrooted with a horizontal cut 1mm below the CEJ and then sectioned mesio-distally through the central groove to give two sections buccal and lingual. It was assessed at mesial and distal of each section, for microleakage and marginal gap. Vertical discrepancy was measured as a perpendicular distance between the finish line and crown under 4x magnification lens in a stereomicroscope. Microleakage was assessed as the amount of dye penetration over the axial walls of the sample and was graded as given by Tjan et al⁷

0-No dye penetration

1-Dye penetration up to 1/3rd of axial wall

2-Dye penetration up to 2/3rd of the axial wall

3-Dye penetration along the full length of the axial wall

4-Dye penetration extending on to the occlusal surface

Results were analysed using one-way ANOVA test and Chi Square test .

RESULTS

Descriptive analysis revealed 14.3% out of 28 samples had score 0. The percentage of score '0' in each group according to finish line and cement types was 28.6% for Group A(a), 14.3% for Group A(b) and Group B(b) and 0 % for Group A(b). 53.6% samples had score 1 while 17.9% had the maximum score of 4. Table I reveals distribution of microleakage scores for each subgroup. Chi Square test revealed a p value of 0.587 indicating no significant influence of finish line or luting

agent in microleakage of DMLS crowns.

The highest mean of 175µm was found with the samples in Group A(b) and the least of 105.35µm was with Group B(b) (Graph I). One-way ANOVA revealed there was no statistical significance ($p=0.278$) in the groups when different finish lines and luting agents were used. Post Hoc Tukey test applied to check intergroup statistical difference of marginal discrepancy, showed no significant difference. Association test of ANOVA revealed no association between marginal gap and microleakage in the samples.(Table II)

Table I: Distribution of microleakage score in each group

	Groups				
Dye penetration	Group A(a)	Group A(b)	Group B(a)	Group B(b)	Total
score 0	2	0	1	1	4
Score 1	2	5	5	3	15
Score 2	0	0	1	1	2
Score 3	1	0	0	1	2
Score 4	2	2	0	1	5
Total	7	7	7	7	28

Table II: ANOVA for association between mean marginal gap and microleakage in each group

Microleakage Scores	n	Mean	Std. Deviation	p Value
Score 0	4	143.75	88.0932	0.559
Score 1	15	128.333	64.3419	
Score2	2	156.25	26.5165	
Score 3	2	100	17.6777	
Score 4	5	180	73.7394	
Total	28	139.732	66.0609	

DISCUSSION

The present study to assess the effect of two commonly indicated finish lines for metal ceramic

crowns and FPDs found that the least value for marginal gap for samples with deep chamfer finish line was 50µm and the highest was 287µm (mean=158.92µm). Samples with shoulder finish lines had smaller marginal gaps than with chamfer finish line. The total mean marginal gap of the crowns made by DMLS in the present study was 139.73±66.06µm.

A study done by Ridhima et al¹¹ found the marginal gap in 40 metal ceramic crowns with 90° shoulder (42 ± 4.1 µm), shoulder with 30° bevel(39 ± 5.2 µm) , shoulder with 45° bevel(34 ± 3.8 µm),chamfer (51 ± 5.6 µm) finish lines made by conventional casting under thermo-mechanical loading. They found the marginal gap increased in the following order : shoulder with 45° bevel, shoulder with 30° bevel, right angle shoulder and chamfer. The difference was found to be statistically significant. Similar results have been found by Jung-Zen syu, Geraard Byrne, Leon Laub Martin Land⁸ . It is observed that the crowns with chamfer finish lines initially have a better seating with less marginal gap/ discrepancy, but as the crown is seated with luting agent the marginal discrepancy tends to increase. This can be explained as the immediate adaptation at the margins provides less space for the cement layer to escape thus leaving a greater gap in the final cemented prosthesis. On the other hand crowns with shoulder finish lines have poor seating initially, however this provide greater space for the cement to escape thus giving lesser marginal discrepancy/gap in the final prosthesis⁹.

DMLS copings in many studies have shown greater marginal gap values compared to other two methods. However, studies by Örtorp et al¹⁰ and Harish.V et al.¹¹ have observed some contradicting results. The DMLS marginal gaps were narrower than that of casting and CAD/CAM gave the widest marginal gaps. A crucial factor involved in the fabrication of DMLS coping is scanning for CAM designing. Any object with low reflective property gives more accurate readings. All dies in the present study were sprayed with titanium oxide (TiO₂) to reduce their reflective indices.

The microleakage assessment in the present study showed only 4 samples out of 28 had no microleakage. This is not surprising as whatever be the method of fabrication or cement used there is always a gap present between the crown margin and tooth. Also, basic fuchsin dye diffuses easily compared to oral fluids¹². Majority of the samples (53.6%), in the present study

had an acceptable microleakage score of 1. Maximum microleakage score of 4 was observed with 17.9% of samples. These samples belonged to Group A(a), Group A(b) and Group B(b). Thus, chamfer finish line either with resin cement or GIC presents higher microleakage compared to shoulder finish line combined with resin cement. The combination of shoulder finish line with resin (Group B(a)) had the least microleakage. None of these values were seen to be statistically significant. Sample with chamfer finish line cemented with GIC luting had the maximum marginal gap of 175µm while samples having shoulder finish line and cemented with GIC had least marginal gap of 105.35 µm. Andree Piwowarczyk et al¹³ in his study observed statistically significant marginal gap with conventional GIC in samples prepared with chamfer finish lines. However, the present study did not have any statistical significance probably due to the lower sample size.

Marginal gap and microleakage are important parameters to judge clinical longevity of prosthesis. ADA specifies for clinical acceptability the prosthesis should have a marginal gap of 25 µm¹⁴. Different authors have mentioned different ranges of marginal gap Assif et al¹⁵ stated the mean marginal gap is closer to 140 µm, while Hung et al¹⁶ suggested a value of 50-75µm. Gulker and Bjorn et al¹⁷ suggested that up to 200 µm should be tolerated. The marginal gap values observed in the present study were higher than the values presented in previous literature on DMLS crowns. This probably can be explained due to the use of hydraulic press used in the study to apply a uniform force on 5kg during cementation which exert force on a single point contact which might have led to uneven distribution of pressure causing inadequate flow and accumulation of luting agent at the margins. High temperatures used for ceramic veneering in PFM crowns also leads to distortion in the metal copings and increased marginal gap values^{18,19}. To standardise this parameter all samples in the present study were veneered with 5 ceramic layers including 2 opaque firing cycles.

While studying the association of marginal gap values with microleakage the present study corroborates with previous literature showing no association between the two. The mean marginal gap of samples having no microleakage was higher (143.75±88.09µm) as compared to samples which had dye penetrating throughout the axial surface (100±17.67 µm). As

seen in Table 2 samples with score 4 have maximum mean marginal gap (180 ±73.73µm) followed by samples with score 2(156.25±26.51 µm), score 0, score 1(128.33±64.34µm) and finally score 3.

The merits of the present study lie in the detail to standardize confounding factors like the thickness of impression material, thickness of cement layer, equalization of pressure while cementation. Thermocycling was done to simulate oral environment and to make the study more clinically relevant. However, the small sample size, lack of customized cementation device, absence of a control group can be counted as demerits.

CONCLUSION

Reviewing the results obtained in the present study the null hypothesis that, there would be no effect of finish lines and luting agents on microleakage and marginal gap in metal sintered copings was accepted. This study thus sums up that there is no effect of finish line and luting agents on the marginal gap and microleakage in metal ceramic crowns made by DMLS method. The association results also showed that there is no ground rule that if marginal gap is more there will be more microleakage. Although not statistically significant there was a trend of shoulder finish line having smaller marginal gaps than the chamfer. There is still ambiguity regarding the marginal discrepancy in DMLS crowns compared to casting and CAD/CAM. However, most of the literature has regarded this discrepancy insignificant and further clinically acceptable studies are required.

Conflict of Interest : Nil

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REFERENCES

1. UcarY, AkovaT, Akyil, Brantley WA. Internal fit evaluation of crowns prepared using new dental crown fabrication technique: laser-sinteredCo-Crcrowns.JProsthetDent.2009;102:253 9.
2. K. Vijay Venkatesh, V. Vidyashree Nandini. Direct Metal Laser Sintering: A Digitised Metal Casting Technology. J Indian Prosthodont Soc. 2013 ; 13: 389–392.
3. A. Simchi. Direct laser sintering of metal powders:

- Mechanism, kinetics and microstructural features. *Materials Science and Engineering A* 428 2006; 148–158.
4. Yun-Jung Choi, Jai-Young Koak, Seong-Joo Heo, Seong-Kyun Kim, Jin-Soo Ahn, Dong-Soo Park. Comparison of the mechanical properties and microstructures of fractured surface for Co-Cr alloy fabricated by conventional cast, 3-D printing laser-sintered and CAD/CAM milled techniques. *Korean Acad Prosthodont* 2014;52:67-73.
5. Tolga Akova, Yurdanur Ucar, Alper Tukay. Comparison of the bond strength of laser-sintered and cast base metal dental alloys to porcelain. *Dental Materials* 2008;24:1400-1404.
6. Lin Wu, Haiting Zhu, Xiuying Gai, Yanyan Wang. Evaluation of the mechanical properties and porcelain bond strength of cobalt-chromium dental alloy fabricated by selective laser melting. *J Prosthet Dent* 2014;111:51-55.
7. Antony Tjan, DrDent et al: Marginal leakage of cast gold crowns luted with an adhesive resin cement: *J Prosthet Dent* 1992;67:11-15.
8. Jung-Zen Syu, Byrne, Gerard, Laub, Leon W, Land, Martin F. Influence of Finish-Line Geometry on the Fit of Crowns. *Int J Prosthodont*. 1993;6:25-30.
9. Vaishali Nemane, Ravikumar Suryakanth Akulwar, Suresh Meshram. The Effect of Various Finish Line Configurations on the Marginal Seal and Occlusal Discrepancy of Cast Full Crowns After Cementation An Invitro Study. *J Clin Diagn Res*. 2015 ; 9: ZC18–ZC21.
10. Anders Örtorp, David Jönsson, Alaa Mouhsen, Per Vult von Steyern. The fit of cobalt–chromium three-unit fixed dental prostheses fabricated with four different techniques: A comparative in vitro study. *Dental Materials* 2011;27: 356–363.
11. Harish V, Mohamed Ali S.A., Jagadesan N, Mohamed Ifthikar, Siva Senthil, Debasish Basak. Evaluation of Internal and Marginal Fit of Two Metal Ceramic System – In Vitro Study. *Journal of Clinical and Diagnostic Research*. 2014 ;8: ZC53-ZC56.
12. Isil Sener, Begum Turker, Luiz Felipe Valandro, Mutlu Ozcan, Dr. Med Dent. Marginal gap, cement thickness, and microleakage of 2 zirconia crown systems luted with glass ionomer and MDP-based cements. *Gen Dent*. 2014;62:67-70.
13. Andree Piwowarczyk, Hans-Christoph Lauer, John A. Sorensen. Microleakage of various cementing agents for full cast crowns. *Dental Materials* 2005; 21: 445–453.
14. JongKyoung Park, WanSun Lee, HaeYoung Kim, WoongChul Kim, and JiHwan Kim. Accuracy evaluation of metal copings fabricated by computeraided milling and direct metal laser sintering systems. *J Adv Prosthodont*. 2015 ; 7: 122–128.
15. Assif D, Rimer Y, Aviv I. The flow of zinc phosphate cement under a full coverage restoration and its effect on marginal adaptation according to the location of cement application. *Quintessence Int*. 1987;18:765–774.
16. Hung SH, Hung KS, Eick JD, Chappell RP. Marginal fit of porcelain fused to metal and two types of ceramic. crown. *J Prosthet Dent*. 1990;63:26–31.
17. Necla Demir, Atiye Nilgun Ozturk, and Meral Arslan Malkoc. Evaluation of the marginal fit of full ceramic crowns by the microcomputed tomography (microCT) technique. *Eur J Dent*. 2014 ; 8: 437–444.
18. Ali Hafezeqoran, Roodabeh Koodaryan, Ali Esmaili, Heydar Noori, Alireza Shahbaz. Marginal Adaptation of Metal Ceramic Crowns Cast from Four Different Base Metal Alloys before and after Porcelain Application. *Advances in Bioscience & Clinical Medicine*. 2015; 3 ;30-36.
19. Ganesh B. Bajaj. A Comparative Study of the Effect of Four Consecutive Firing Cycles on the Marginal Fit of All: Ceramic Crown System and Metal Ceramic Crown System. *J Indian Prosthodont Soc*. 2013 ; 13: 247–253.

Transferrin (rs3811647) Gene Polymorphism in Iron Deficiency Anemia in Saudi Arabia

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ABSTRACT

Background: Iron-deficiency anemia (IDA) is the common type of anemia. The World Health Organization (WHO) estimates that worldwide, 42% of pregnant women, 30% of non-pregnant women (aged 15 to 50 years), 47% of pre-school children (aged 0 to 5 years), and 12.7% of men older than 15 years are anemic. Iron deficiency accounts for about half the world's anemia. Previous genome wide association studies revealed a number of genetic polymorphisms could be associated with iron status including: rs3811647 (TF), rs7385804 (TFR2), rs235756 (BMP2), and rs4820268 TMPRSS6. The aim of this study to determine the functional polymorphism (rs3811647) of transferrin (TF) gene in iron deficiency anemia in female university students in Saudi Arabia.

Method: A total of 110 female university students of age 18-25 years were selected. Blood samples were obtained from all participants and hematological and biochemical iron status indices were gathered. Genotyping was carried out by ARMS PCR followed by agarose gel electrophoresis, and appropriate statistical analysis.

Results: The genotype distribution of transferrin (rs3811647) region in female university students in Tabuk, Saudi Arabia were 36.66% (AA), 63.33 (GA) and 0% (GG) in iron deficient students compared to 40% (AA), 60% (GA) and 0% (GG) in normal students, in which there is no significant differences in allelic distribution between iron deficiency group and normal group. However, results show transferrin polymorphism was significantly associated with reduced serum iron and reduced serum ferritin.

Conclusion: Our finding suggest that transferrin polymorphism is significantly associated with decreased iron status, but not significantly associated with iron deficiency anemia in Saudi female students in north region of Saudi Arabia.

Keywords: Iron-deficiency anemia (IDA), Transferrin (TF) gene, Anemia, TMPRSS6

INTRODUCTION

Almost every living organism requires iron, which is contained in all human cells and is vital to numerous metabolic functions. The most important among these is

the transport of oxygen in hemoglobin. Iron deficiency is the most globally widespread nutritional deficiency ⁽¹⁾, which affects significant numbers of women and children in developed countries and can result in anemia, which 30% of the world's total population, or 2 billion people, suffer from. This global health issue can be linked to socio-economic problems because it can constrain the capacity for work, thus impacting upon a country's economy and growth (WHO). When it is left untreated, iron deficiency can develop into iron deficiency anemia, a condition characterized by an insufficient red blood cell (erythrocyte) count, or low hemoglobin levels. Iron

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deficiency anemia develops when an individual has insufficient iron in their body, meaning that they cannot produce enough of the protein hemoglobin. Hemoglobin binds to oxygen, allowing red blood cells to provide the body with oxygenated blood. Serum ferritin is regarded as the most effective test to distinguish cases of iron deficiency from non-iron deficiency cases ⁽²⁾. According to a report by the World Health Organization (WHO), in Saudi Arabia a total of 32.3% non-pregnant women in the child bearing age range have anemia ⁽³⁾.

The WHO has further estimated that globally, 47% of pre-school children (aged 0 to 5 years), 42% of pregnant women, 30% of non-pregnant women (aged 15 to 50 years), and 12.7% of men aged more than 15 years are anemic. Around half of all anemia cases around the world are linked to Iron deficiency. The WHO also reported in 2004 that iron deficiency anemia (IDA) had caused 273,000 deaths worldwide, with the following breakdown: 45% in Southeast Asia, 31% in Africa, 9% in the Eastern Mediterranean, 7% in the Americas, 4% in the Western Pacific, and 3% in Europe, with 97% of these deaths among low- and middle-income countries ⁽⁴⁾. Shill et al. (2014) found a higher percentage of iron deficiency anemia among female students than their male peers (36.7%, $p < 0.0001$) or 63.3 % of the total population were found to have anemia. Students who were non-anemic (68.7 %) were found in the study to more regularly consume breakfast than anemic students (41.0%), which explains the latter group's insufficient iron intake and nutrition deficiency at breakfast time with regard to their intakes of minerals, protein, vitamin C, fat, sugar, starch, and fiber ⁽⁵⁾. A study carried out using a sample of female students found that 64 per cent suffered from Iron deficiency anemia. The total sample of surveyed participants was 268, of which 171 were anemic. However, most anemic students could be categorized as mildly (45%) & moderately anemic (49%), while only 6% were severely anemic. This study revealed that the high prevalence of anemia was due to poor dietary habits, and more specifically, was caused by the common habit among female students to skip breakfast ⁽⁶⁾.

A study was performed in Saudi Arabia which explored Iron deficiency prevalence among a sample of girls aged 6 -12 years in the northern Jeddah region. It found that the prevalence of Iron deficiency anemia in that group was 23%. The authors identified no significant association in the body mass index (BMI),

family income, mother's working status, breast feeding status, or chronic illness among either anemic or non-anemic students. The food habits of the students were investigated, and insufficient iron intake was found ⁽⁷⁾. Another Saudi Arabian study aimed to determine anemia prevalence and risk factors among women of child bearing age in the capital, Riyadh. Eligible female participants were recruited by being invited to primary health care centers (PHCCs) to complete questionnaires, and to have anthropometric measurements and a complete blood count taken. The study found that 40% (390) of the participants had anemia (Hb < 12 g/dL). A multivariate logistic regression established that a family history of iron deficiency anemia (OR 2.91, 95% CI 1.78–4.76), and infrequent meat consumption (OR 1.54, 95%CI 1.15–2.05) could be associated with a higher risk of anemia, while a higher body mass index (OR 0.95, 95% CI 0.92–0.97) was linked to a lower risk of anemia ⁽⁸⁾. A study was performed on a molecular basis to investigate whether the TMPRSS6 polymorphism is a major genetic determinant of iron metabolism in healthy individuals, influences serum levels of hepcidin, the hormone controlling iron metabolism, and erythropoiesis in chronic hemodialysis (CHD). This research aimed to match a sample of normal adults with a sample of participants with CHD. It found no noticeable variation in Serum hepcidin levels between the wider CHD population and the controls, but higher levels were noted in the CHD subgroup after subjects with relative iron deficiency had been excluded. Hepcidin levels, erythropoiesis, and anemia management among CHD patients were found to be affected by A736V TMPRSS6. This research reported that identification of the TMPRSS6 genotype will contribute to improved anemia management ⁽⁹⁾. Recent genome-wide association studies have found significant associations between several genetic polymorphisms and plasma iron status, including: rs3811647 (TF), rs7385804 (TFR2), rs235756 (BMP2), rs855791 (V736A) and rs4820268 (TMPRSS6) ^(10, 11). In the present study, we therefore aimed to identify the functional polymorphism (rs3811647) of the TF gene in iron deficiency anemia among a sample of female university students enrolled at Tabuk University, Saudi Arabia.

METHOD

Study plan and data collection

A total of 110 female university students studying

at the University of Tabuk, Saudi Arabia aged between 18 and 26 was enrolled in this study. Students diagnosed with an eating disorder, pregnant, breastfeeding, taking medication or nutritional supplements were excluded. This study was approved by the Research Ethics committees in Tabuk University.

Hematological parameters

Whole blood was collected either in tubes containing EDTA for hematological tests or in tubes without additional anticoagulant for biochemical screening. The hematological tests include hemoglobin (Hgb), platelets, red blood cells (RBCs) and white blood cells (WBCs) performed using a Beckman coulter LH750 machine (Beckman Coulter Inc., Miami, FL, USA). Biochemical screening, include Serum iron and ferritin performed using a modular machine (Hitachi, UK). According to the criteria defined by WHO, iron deficiency anemia referenced as (ferritin <15ng/ml and haemoglobin <12g/dl), iron deficiency without anemia referenced as (ferritin <15ng/ml and haemoglobin >12g/dl).

Genotyping

Tetra-Primer Amplification Refractory Mutation System Polymerase Chain Reaction (T-ARMS PCR) was used in this study for detection of transferrin (rs3811647) polymorphism using external primers and internal primers as following:

Forward outer:

AATGCGAGAGAATCATGGAAGGA

Reverse outer: GATGTACCCTTACCCAGAGCC

Forward inner (G allele):

GAGGGAGTTTACAGACAGATCG

Reverse inner (A allele):

CCCTTCCTAGATGTATAATCCTAGAT

PCR reaction was performed in total 25µl reaction volume contained 50ng genomic DNA, 0.4µM of each primer, 250µM dNTP, 1.5mM MgCl₂ and 1U Taq DNA polymerase. The PCR amplification was performed with a 5 minutes initial denaturation at 95°C followed by 30 seconds at 94°C for denaturation, 30 seconds at 64°C for

annealing, 30 seconds at 72°C for extension and final extension at 72°C for 5 minutes. The PCR reaction was performed for 30 cycles. Products were separated using 2% agarose. Product sizes are control 475 bp, G allele 284 and A allele 191 bp.

Statistical analysis

Statistical significance was determined using χ^2 test or an independent Student's *t*-test whenever appropriate using SPSS V.15. Data were considered significant for ($p \leq .05$).

RESULTS

Genotype distribution of transferrin (rs3811647) polymorphism

The study consisted of 110 female university students of age 18-25 years. The genotype distribution of transferrin (rs3811647) region were 36.66% (AA), 63.33 (GA) and 0% (GG) in iron deficient students compared to 40% (AA), 60% (GA) and 0% (GG) in normal students (Table 1). Data showed that there was no significant differences in allelic distribution between iron deficiency group and normal group ($p=.374$).

Genotype distribution of transferrin (rs3811647) polymorphism with respect to clinical parameters

In this study, we analyzed the distribution of transferrin (rs3811647) polymorphism to hemoglobin, iron, ferritin, RBCs, platelets and WBCs (Table 2). Data showed that transferrin (rs3811647) polymorphism is significantly associated with decreased serum iron ($p=.035$) and decreased serum ferritin ($p=.04$), but not with other parameters (hemoglobin, RBCs, platelets and WBCs).

Association of transferrin (rs3811647) polymorphism with the iron deficiency anemia risk:

The frequency distribution of transferrin (rs3811647) G/A genotypes in anemia group and normal group are demonstrated in Table 3. Data showed that genotypes and allele frequencies of transferrin (rs3811647) were not significantly different between iron deficiency anemia group and normal group.

Table 1: Genotype distribution of transferrin (rs3811647)

	N	GG N (%)	GA N (%)	AA N (%)	Chi-Square	DF	<i>p value</i>
Normal	50	20 (40%)	30 (60%)	0 (0%)	0.79	2	0.374
Iron deficiency status	60	22 (36.7%)	38 (63.3%)	0 (0%)			

Table 2: Genotype distribution of transferrin (rs3811647) polymorphism with respect to clinical parameters

	N	GG	GA	AA	X2	DF	<i>p value</i>
Hemoglobin							
Normal	85	29	56	00	2.51	2	0.28
Abnormal	23	12	11	00			
Iron							
Normal	38	24	14	00	6.7	2	0.035
Abnormal	70	26	44	00			
Ferritin							
Normal	52	34	18	00	6.4	2	0.04
Abnormal	56	23	33	00			
RBC							
Normal	85	29	56	00	2.51	2	0.28
Abnormal	23	12	11	00			
Platelets							
Normal	106	39	67	00	3.33	2	0.18
Abnormal	02	02	00	00			
WBC							
Normal	80	29	51	00	0.08	2	0.96
Abnormal	28	11	17	00			

Table 3: Genotypes and allele frequencies of transferrin (rs3811647) polymorphism in normal subjects and in iron deficiency anemia group

Genotypes	Normal subjects		Anemia group		OR (95% CI)	Risk Ratio(RR)	<i>p-value</i>
	(N=50)	%	(N=18)	%			
TF-GG	20	40%	10	55.6%	1(ref.)	1(ref.)	
TF-GA	30	60%	8	44.4%	0.53(0.17-1.58)	0.84(0.62-1.141)	0.25
TF-AA	00	0%	00	0%	1.95(0.036-105)	1.32(0.183-9.54)	0.78
Dominant							
TF-GG	20	40%	10	55.6%	1(ref.)	1(ref.)	
TF (GA+ AA)	30	60%	8	44.4%	0.53(0.17-1.58)	0.84(0.62-1.141)	0.25
Recessive							
TF (GG+GA)	50	100%	18	100%	1(ref.)	1(ref.)	
TF-AA	0	0%	0	0%	2.72(0.052-142.6)	1.46(0.20-10.44)	0.70
Allele							
TF-G	70	70%	28	77.8%	1(ref.)	1(ref.)	
TF-A	30	30%	8	22.2%	0.66(0.27-1.63)	0.90(0.73-1.11)	0.30

DISCUSSION

Previous studies have described and investigated genetic variants in TF in relation to their association with iron status⁽¹²⁻¹⁶⁾. In recent years, genome-wide association (GWA) studies have reported a significant association between SNP rs3811647 in TF and higher serum transferrin and total iron-binding capacity (TIBC)⁽¹⁷⁻¹⁹⁾. The aim of the present research was to identify the functional polymorphism (rs3811647) of the transferrin (TF) gene in iron deficiency anemia among a sample of female university students in the Saudi Arabian context. An et al. explored the association between IDA risk and the genetic variants found in the genes which contribute to iron delivery and hepcidin regulation pathways. They concluded that variant rs3811647 in TF is associated with lower levels of serum iron, serum transferrin and transferrin saturation; however, this variant was not found to affect iron deficiency or the risk of anemia⁽¹⁰⁾. Another study by McLaren et al. identified an association between rs3811647 SNP in TF and TIBC, but this variant was not found to be associated with other measures of individual iron status or case-control, which suggests that the study's results do not claim that TF SNP plays a role in regulating human iron metabolism⁽¹⁸⁾. The present study investigated the genotype distribution of TF (rs3811647) region in a sample of female university students in Tabuk, Saudi Arabia, then examined the potential association between this SNP and the risks of iron deficiency and IDA among them. We report a significant association between TF (rs3811647) polymorphism and both decreased serum iron and decreased serum ferritin; however, we found no association between TF (rs3811647) polymorphism and levels of hemoglobin, RBCs, platelets or WBCs. Neither did we find any association between TF (rs3811647) polymorphism and IDA risk.

CONCLUSION

Our finding suggest that transferrin (rs3811647) gene polymorphism is significantly associated with decreased iron status, but not significantly associated with iron deficiency anemia in Saudi population in north region of Saudi Arabia.

Ethics approval and consent to participate

Ethical approval for the research was sought and obtained from the University of Tabuk's Committee of Research Ethics.

Conflict of Interest: The author declares no conflict of interest.

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REFERENCES

1. Sana E. Abdalla, Enaam A. Abdelgader, Tayseer A. Diab, Ilham M. Omer, Kordofani AA. Iron Deficiency Anaemia In Pregnancy And The New Born Child. Merit Research Journal Of Microbiology And Biological Sciences. 2013;1(2):021-9.
2. Ong KH, Tan HL, Lai HC, Kuperan P. Accuracy of various iron parameters in the prediction of iron deficiency in an acute care hospital. Ann Acad Med Singapore. 2005;34(7):437-40. PubMed PMID: 16123817.
3. Bruno de Benoist, Erin McLean, Ines Egli, Cogswell M. Worldwide prevalence of anaemia 1993–2005 2013.
4. Pasricha SR, Drakesmith H, Black J, Hipgrave D, Biggs BA. Control of iron deficiency anemia in low- and middle-income countries. Blood. 2013;121(14):2607-17. doi: 10.1182/blood-2012-09-453522. PubMed PMID: 23355536.
5. Shill KB, Karmakar P, Kibria MG, Das A, Rahman MA, Hossain MS, et al. Prevalence of iron-deficiency anaemia among university students in Noakhali region, Bangladesh. J Health Popul Nutr. 2014;32(1):103-10. PubMed PMID: 24847599; PubMed Central PMCID: PMC4089078.
6. Hassan NN. The prevalence of iron deficiency anemia in a Saudi university students. Journal Microscopy and ultrastructure. 2015;3(1):25-8.
7. GAR MA. Prevalence of Iron deficiency anemia among the female children in northern part of Saudi Arabia. JKAU: MedSci. 2008;15(1):55-65.
8. Alquaiz AM, Gad Mohamed A, Khoja TA, Alsharif A, Shaikh SA, Al Mane H, et al. Prevalence of anemia and associated factors in child bearing age women in riyadh, saudi arabia. J Nutr Metab. 2013;2013:636585. doi: 10.1155/2013/636585. PubMed PMID: 24205435; PubMed Central PMCID: PMC4089078.

9. Pelusi S, Girelli D, Rametta R, Campostrini N, Alfieri C, Traglia M, et al. The A736V TMPRSS6 polymorphism influences hepcidin and iron metabolism in chronic hemodialysis patients: TMPRSS6 and hepcidin in hemodialysis. *BMC Nephrol.* 2013;14:48. doi: 10.1186/1471-2369-14-48. PubMed PMID: 23433094; PubMed Central PMCID: PMC3585892.
10. An P, Wu Q, Wang H, Guan Y, Mu M, Liao Y, et al. TMPRSS6, but not TF, TFR2 or BMP2 variants are associated with increased risk of iron-deficiency anemia. *Hum Mol Genet.* 2012;21(9):2124-31. doi: 10.1093/hmg/dds028. PubMed PMID: 22323359.
11. Danquah I, Gahutu JB, Zeile I, Musemakweri A, Mockenhaupt FP. Anaemia, iron deficiency and a common polymorphism of iron-regulation, TMPRSS6 rs855791, in Rwandan children. *Trop Med Int Health.* 2014;19(1):117-22. doi: 10.1111/tmi.12216. PubMed PMID: 24175968.
12. Lee PL, Ho NJ, Olson R, Beutler E. The effect of transferrin polymorphisms on iron metabolism. *Blood Cells Mol Dis.* 1999;25(5-6):374-9. doi: 10.1006/bcmd.1999.0267. PubMed PMID: 10660486.
13. Lee PL, Halloran C, Beutler E. Polymorphisms in the transferrin 5' flanking region associated with differences in total iron binding capacity: possible implications in iron homeostasis. *Blood Cells Mol Dis.* 2001;27(2):539-48. doi: 10.1006/bcmd.2001.0418. PubMed PMID: 11500065.
14. Lee PL, Halloran C, Trevino R, Felitti V, Beutler E. Human transferrin G277S mutation: a risk factor for iron deficiency anaemia. *Br J Haematol.* 2001;115(2):329-33. PubMed PMID: 11703331.
15. Aisen P. The G277S mutation in transferrin does not disturb function. *Br J Haematol.* 2003;121(4):674-5. PubMed PMID: 12752114.
16. Sarria B, Navas-Carretero S, Lopez-Parra AM, Perez-Granados AM, Arroyo-Pardo E, Roe MA, et al. The G277S transferrin mutation does not affect iron absorption in iron deficient women. *Eur J Nutr.* 2007;46(1):57-60. doi: 10.1007/s00394-006-0631-x. PubMed PMID: 17206377.
17. Benyamin B, McRae AF, Zhu G, Gordon S, Henders AK, Palotie A, et al. Variants in TF and HFE explain approximately 40% of genetic variation in serum-transferrin levels. *Am J Hum Genet.* 2009;84(1):60-5. doi: 10.1016/j.ajhg.2008.11.011. PubMed PMID: 19084217; PubMed Central PMCID: PMC3068053.
18. McLaren CE, Garner CP, Constantine CC, McLachlan S, Vulpe CD, Snively BM, et al. Genome-wide association study identifies genetic loci associated with iron deficiency. *PLoS One.* 2011;6(3):e17390. doi: 10.1371/journal.pone.0017390. PubMed PMID: 21483845; PubMed Central PMCID: PMC3069025.
19. Benyamin B, Ferreira MA, Willemsen G, Gordon S, Middelberg RP, McEvoy BP, et al. Common variants in TMPRSS6 are associated with iron status and erythrocyte volume. *Nat Genet.* 2009;41(11):1173-5. doi: 10.1038/ng.456. PubMed PMID: 19820699; PubMed Central PMCID: PMC3135421.

Comparison Effects of Acute and Chronic Intra-peritoneal Injections of Saffron Stigma Extract and Safranal-Crocine Mixture on Anxiety, in Mice

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ABSTRACT

Saffron is a highly consumed food seasoning that is important due to its anti-anxiety properties. This study aimed at comparing the effects of acute and chronic injection of saffron stigma extract and Crocin-Safranal mixture (CSM) on the anxiety in mice. In this experimental study, 56 male mice assigned to seven groups, treatments were administered as acute or chronic intra-peritoneal injections and anxiety degree as measured by the use of plus maze. Results showed that acute injection of saffron stigma extract at 50 and 150 mg/kg and CSM at all 3 doses significantly increased the percentage of time spent in the open arm compared to the control. Also, saffron extract at acute dose of 50 mg/kg and CSM at acute dose of 0.68 mg/kg significantly increased percentage of time spent in the open arm compared to the same chronic doses. Overall, the comparison of saffron extract and CSM doses showed that 2.04 and 4.08 mg/kg acute and chronic doses of CSM significantly increased percentage of time spent in the open arm compared to saffron extract at 150 and 300 mg/kg ($p < 0.05$). Thus, it can be concluded that acute intra-peritoneal doses of saffron stigma extract, in a dose dependent manner, and CSM, at all doses applied, had anti-anxiety effects. Furthermore, 50 mg/kg saffron extract and 4.08 mg/kg CSM had the highest anti-anxiety effect at acute phase and acute doses of saffron extract and CSM were generally more effective than chronic doses in reducing anxiety.

Keywords: Saffron, Crocin, Safranal, Anxiety

INTRODUCTION

Anxiety disorders are the most prevalent neurosis with the estimated prevalence rate of 10-30%.^{1,2,3,4} Regarding the importance of reducing anxiety and its treatment as well as the side effects of synthetic drugs, research on identifying effective herbal medicines with lower adverse effects particularly in laboratory animal models is warranted.⁵

Saffron (*Crocus sativus* L), a perennial plant from Iridaceae family, is a highly consumed herbal medicine that is used for the treatment of anxiety and insomnia in traditional medicine.⁶ Safranal and Crocin are two major components of saffron which contribute to its pharmacological effects. Safranal is volatile, water insoluble and picroCrocine derived compound that is responsible for the odor and flavor of saffron while Crocin is soluble in water and is the main chromatic compound of in this plant.⁷ Studies show that saffron extract or its active components have various effects on central nervous system improving Learning disability and par amnesia caused by ethanol administration and neutralizing the effects of ethanol on hippocampus.⁸ In some empirical studies on animal models, the anti-inflammatory and analgesic,^{9,10,11} anticonvulsant^{12,13} and antidepressant^{14,15} effects of saffron stigma and petal

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extract have been confirmed. The antidepressant effect of saffron stigma and petal extract has also been confirmed in clinical trials.¹⁶ Crocin and Safranal have also been effectively used in the treatment of depression.¹⁷

The results of a study revealed that only Safranal but not the Crocin had anti-anxiety effects at both low and high doses.¹⁸ Nevertheless, considering the above mentioned studies and the lack of information on the synergistic effects of Crocin and Safranal and because the chronic effects of Saffron stigma extract and Crocin-Safranal mixture (CSM) and also the comparison of possible effects of these compounds on anxiety has not been investigated, this study aimed at investigating the effects of acute and chronic injection of saffron stigma extract and Crocin-Safranal mixture on the anxiety in male mice.

MATERIALS AND METHOD

Animals

Razi male mice weighing 20–30 g were obtained from a random bred colony in the animal House of Gonabad University of Medical Sciences. Animals were housed in the colony room 12/12 h light/dark cycle at 21 ± 2 °C. Animals had free access to water and food. All animal experiments were carried out in accordance with Gonabad University of Medical Sciences, Ethical Committee Acts, and This Committee approved this project with code 91/6/267.

Plant material

Crocus sativus L. stigmas from Gonabad, Khorasan province Razavi, was analysed according to the ISO 3632-2: safranal, expressed as a direct reading of the absorbance at about 330 nm, expressed as a direct reading of the absorbance of crocin at about 440 nm.

Chemicals

Crocin and Safranal were obtained from Sigma Company and dissolved in normal saline at concentrations similar to those in the extract

Preparation of extracts

6 g of stigma saffron powder was macerated in 800 ml ethanol 50% for 72 h. The mixture of plant and Etanol was subsequently centrifuged (5 min, 3000 rpm) and the supernatants were evaporated to dryness under reduced pressure at 40 °C. The yield of the extract was

52% (w/w).

Quantification of crocin and safranal in saffron extract

To quantify crocin and safranal in saffron extraction, a modified method was used.^{19,20} Quantification were performed on a HPLC system, Agilent Technologies SL 1200 Series (Waldbronn, Germany) composed of a quaternary pump equipped with 152 micro vacuum degasser, thermostated autosampler, column compartment and DAD detector and a Symmetry C18 column (250×4.6 mm, 5 μ m). The injection of 5 ml of sample with 45 minutes for crocins using an isocratic mobile phase of Matanol: water (80: 20%) at a flow rate of 1 ml/min. The injection of 100 ml of sample with 50 minutes for safranal and using an isocratic mobile phase of Acetonitrile: water (80: 20%) at a flow rate of 0.5 ml/min.

Treatment

Male mice were divided into 7 groups of eight each. Mice of group I were received 10 ml/kg normal saline. Mice of groups II, III, IV received saffron extracts at doses of 50, 150 and 300 mg/kg, respectively. Mice of groups V, VI and VII were received CSM at doses 0.68, 2.04 and 4.08 mg/kg, respectively. All agents were administered intra-peritoneally. Anxiety levels were measured after the first injection (Acute phase). Then injected into different groups on a daily basis continued after the tenth injection (Chronic phase), Anxiety was measured again by Elevated plus Maze (EPM).

Elevated plus maze test

Anxiolytic activity was measured using the EPM test. This test has been widely validated to measure anxiety in rats. EPM used were made of wood,^{21,22} and consisted of two open arms ($50 \times 10 \times 1$ cm each), two enclosed arms ($50 \times 10 \times 50$ cm each) and a central platform (10×10 cm), arranged in such a way that the two arms of each type were opposite to each other. The maze was elevated 500 cm above floor level. This model does not have to teach and learn. Twenty five minutes after injection, the animals for 5 minutes in a wooden box with black walls with dimensions of $40 \times 40 \times 30$ cm was transferred to investigative activity increased animal. Each animal was placed individually in the center of the maze, facing one of the close arms. During the 5 min test period, the number of open and

enclosed arms entries, plus the time spent in open and enclosed arms, was recorded, depending on the method of shooting. Increased time spent in the open arms was considered to reflect an anxiolytic effect, in comparison with the control group. In EPM, closed arm indicates security and the open arm is indicative of seeking, so that it means less anxiety if the animal spends more time in the open arm.^{23,24,25} All tests were conducted between 09:00 and 15:00.

The percent of time spent in the open arms is

calculated according to the following formula:

$$\left[\frac{\text{Time spent in the open arms}}{\text{Time spent in the open arms} + \text{Time spent in the close arms}} \right] \times 100$$

RESULTS

Using the calibration curve, the quantification of crocin and safranal in a sample of saffron extract was achieved about 13170 and 707 mg/kg, respectively. (Figure 1)

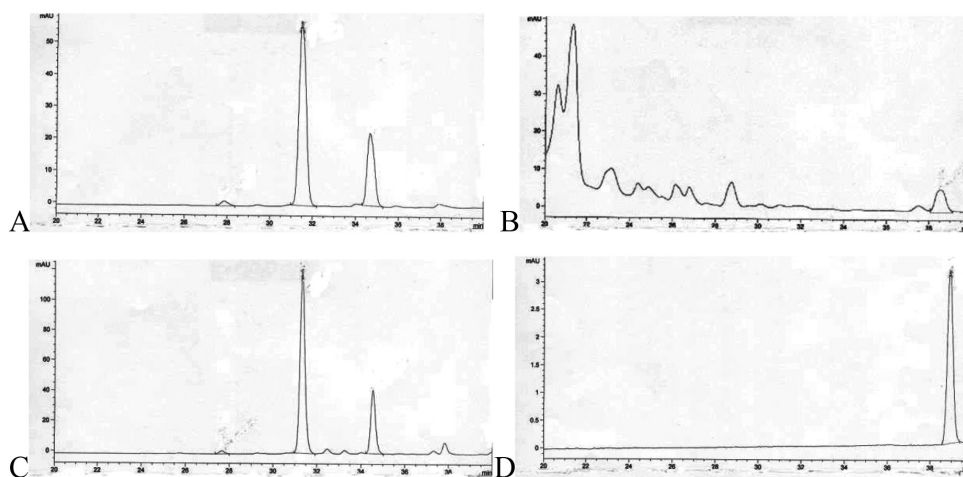


Figure 1: chromatogram of crocin (A), safranal (B) from Saffron extract; chromatogram crocin (C); chromatogram safranal (D)

Plus maze test

Acute intra-peritoneal injection of 50 and 150 mg/kg saffron extract and 0.68, 2.04 and 4.08 mg/kg Crocin-Safranal mixture significantly increased percentage of time spent in the open arm compared to the control (Figure 2). Also, the comparison of acute and chronic doses showed that acute doses of 50 mg/kg saffron extract and 0.68 mg/kg Crocin-Safranal mixture significantly increased the time spent in the open arm in comparison to the same chronic dose. However, the acute dose of 300 mg/kg saffron extract significantly decreased time spent in the open arm compared to the same chronic dose of saffron extract (Figure 3).

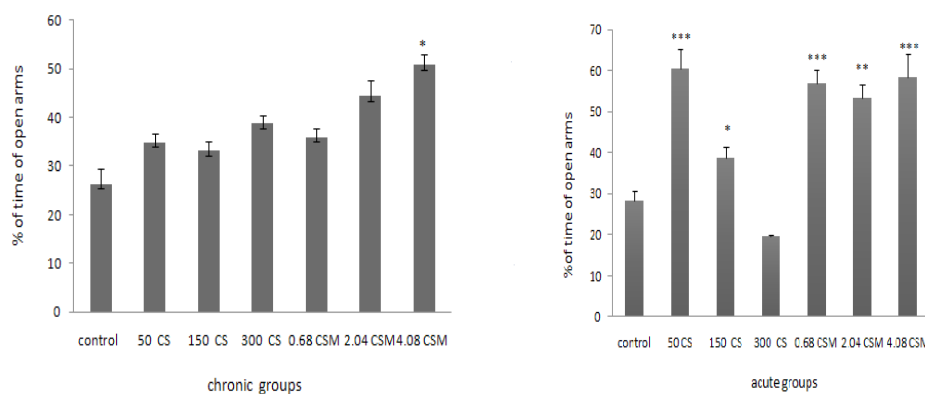


Figure 2: Effects of acute and chronic intraperitoneal Different amounts of *Crocus Sativus* extract (CS) and Crocin–Safranal Mixture (CSM) on the percentage of time spent in the open arms entries of the elevated plus-maze test, compared with saline control. Data are expressed as mean $\pm$ SEM. (* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, $n=8$).

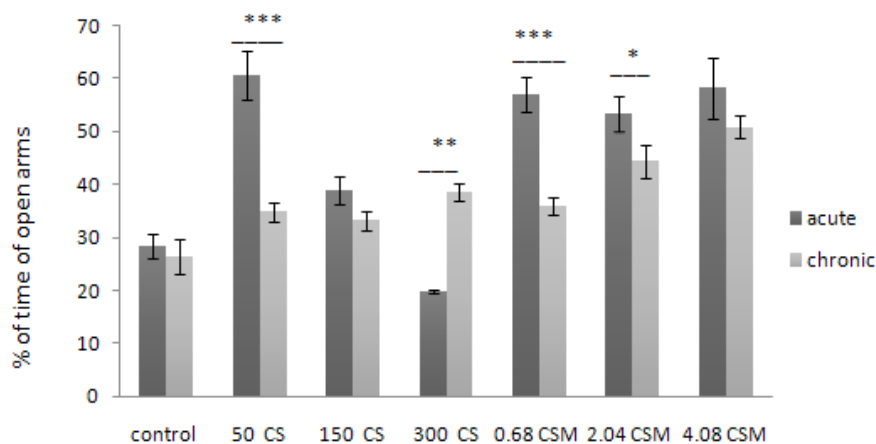


Figure 3: Compare effects acute and chronic different amounts *Crocus Sativus* extract (CS) and Crocin-Safranal Mixture (CSM) on the percentage of time spent in the open arms entries of the elevated plus-maze test. Data are expressed as mean $\pm$ SEM. (* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, $n=8$).

Overall, the comparison of different doses of saffron extract and Crocin-Safranal mixture showed that acute and chronic doses of 2.04 and 4.08 mg/kg Crocin-Safranal mixture significantly increased the percentage of time spent in the open arm compared to 150 and 300 mg/kg saffron extract ($p < 0.05$) (figure 4).

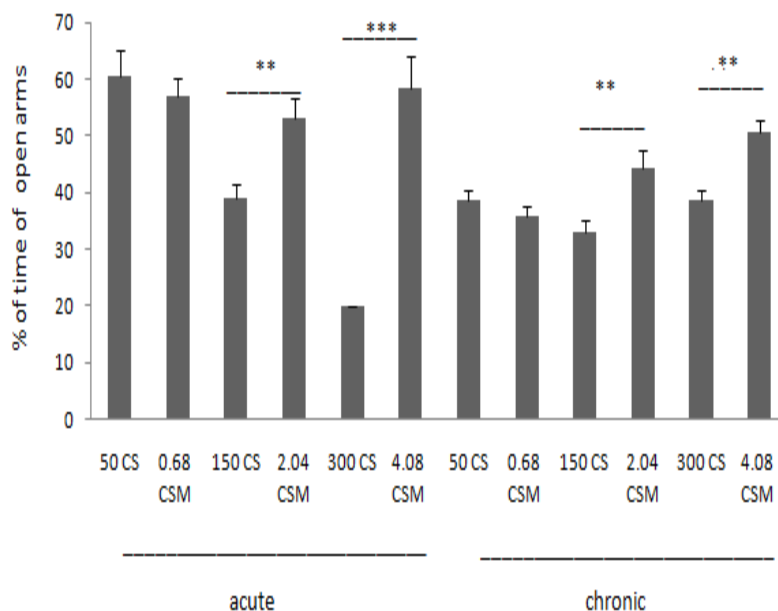


Figure 4: Compare effects acute and chronic Different amounts *Crocus Sativus* extract (CS) than Crocin-Safranal Mixture (CSM) on the percentage of time spent in the open arms entries of the elevated plus-maze test. Data are expressed as mean $\pm$ SEM. (** $p < 0.01$, *** $p < 0.001$, $n=8$).

DISCUSSION

Findings of the present study showed that acute intra-peritoneal doses of saffron stigma extract, in a dose dependent manner, and CSM, at all doses corresponding to those of the extract, had anti-anxiety

effects. The comparison of acute and chronic doses of the extract and CSM showed that CSM was more effective than the extract in reducing anxiety indicating that the anti-anxiety effects of saffron in attributable to these components. This finding is coordination with similar studies about anti fear¹⁰, and Anxiolytic¹⁸ effects of saffron.

Results also indicated that the anti-anxiety effect of saffron extract at all doses is not the same as that of CSM at the same doses. All doses of CSM had anti-anxiety effects but saffron extract lacked this effect at higher doses containing high amounts of Safranal and Crocin. This finding along with those from a study showing anti-anxiety effects for Safranal but not the Crocin¹⁸ indicate the probability of interference of other compounds than Crocin found in saffron extract that may have prevented anti-anxiety effect of Safranal. Therefore, it can be said that plant extracts are more effective at specific doses and should be consumed precisely. Anyway, it appears that anti-anxiety effects of lower doses of saffron extract and various doses of CSM is associated with the release of some neurotransmitters and suppression of the others. For instance, studies show that Safranal has agonistic effects on GABA and benzodiazepine²⁶ and it seems that Safranal, mimics Diazepam (a benzodiazepine drug with proved sedative and anti-anxiety effects) and exerts its sedative, relaxing and anti-anxiety effects through interaction with GABA receptors present in the brain particularly those in midbrain reticular formation²⁷ and increases the time animal spends in the open arm.²⁸

CONCLUSION

The comparison of acute and chronic intra-peritoneal injection of saffron extract and CSM showed no chronic anti-anxiety effect for the extract on day 10 and chronic anti-anxiety effects only for the highest dose of CSM. To the best of our knowledge, this is the first study comparing chronic effects of saffron extract and CSM and therefore the comparison of our results with the others was not possible. However, it can be said that acute doses of saffron and CSM were more effective than chronic ones. This can be explained by probable adaptation of receptors or decreased their irritability. However, it is possible that the time may have been contributed and maybe the duration of chronic phase should have taken more than 10 days for a better efficiency in this study.

Conflict of Interest: The authors state no conflict of interest.

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Ethics Clearance: Ethical matters e.g. plagiarism, informed consent, misconduct, data fabrication and/

or falsification, double publication and/or submission, redundancy, etc. have been totally observed by the authors.

REFERENCES

1. Siegelbaum SA, Hudspeth AJ. Principles of neural science. Kandel ER, Schwartz JH, Jessell TM, editors. New York: McGraw-hill; 2000 Jan.
2. Lehrner J, Marwinski G, Lehr S, Jöhren P, Deecke L. Ambient odors of orange and lavender reduce anxiety and improve mood in a dental office. *Physiology & Behavior*. 2005 Sep 15;86(1-2):92-5.
3. Baxter AJ, Scott KM, Vos T, Whiteford HA. Global prevalence of anxiety disorders: a systematic review and meta-regression. *Psychological medicine*. 2013 May;43(5):897-910.
4. Mitte K, Noack P, Steil R, Hautzinger M. A meta-analytic review of the efficacy of drug treatment in generalized anxiety disorder. *Journal of clinical psychopharmacology*. 2005 Apr 1;25(2):141-50.
5. Carlini EA. Plants and the central nervous system. *Pharmacology Biochemistry and Behavior*. 2003 Jun 1;75(3):501-12.
6. Omidbaigi R, Betti G, Sadrghi B. Influence of corn weigh on productivity of saffron, result of cultivation experiment in khorasan.
7. Xi L, Qian Z, Du P, Fu J. Pharmacokinetic properties of crocin (crocin digentiobiose ester) following oral administration in rats. *Phytomedicine*. 2007 Sep 3;14(9):633-6.
8. Zhang Y, Shoyama Y, Sugiura M, Saito H. Effects of *Crocus sativus* L. on the ethanol-induced impairment of passive avoidance performances in mice. *Biological and Pharmaceutical Bulletin*. 1994 Feb 15;17(2):217-21.
9. Nam KN, Park YM, Jung HJ, Lee JY, Min BD, Park SU, Jung WS, Cho KH, Park JH, Kang I, Hong JW. Anti-inflammatory effects of crocin and crocetin in rat brain microglial cells. *European journal of pharmacology*. 2010 Dec 1;648(1-3):110-6.
10. Tamaddonfard E, Farshid AA, Eghdami K, Samadi F, Erfanparast A. Comparison of the effects of crocin, safranal and diclofenac on local inflammation and inflammatory pain responses induced by carrageenan in rats. *Pharmacological Reports*. 2013 Sep 1;65(5):1272-80.

11. Tamaddonfard E, Hamzeh-Gooshchi N. Effect of crocin on the morphine-induced antinociception in the formalin test in rats. *Phytotherapy research*. 2010 Mar 1;24(3):410-3.
12. Hosseinzadeh H, Talebzadeh F. Anticonvulsant evaluation of safranal and crocin from *Crocus sativus* in mice. *Fitoterapia*. 2005 Dec 1;76(7-8):722-4.
13. Khosravan V. Anticonvulsant effects of aqueous and ethanolic extracts of *Crocus sativus* L. stigmas in mice. *Arc Iran Medi*. 2002 Jan;5:44.
14. KARIMI GR, Hosseinzadeh H, KHALEGH PP. Study of antidepressant effect of aqueous and ethanolic extract of *Crocus sativus* in mice.
15. Basti AA, Moshiri E, Noorbala AA, Jamshidi AH, Abbasi SH, Akhondzadeh S. Comparison of petal of *Crocus sativus* L. and fluoxetine in the treatment of depressed outpatients: a pilot double-blind randomized trial. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*. 2007 Mar 30;31(2):439-42.
16. Akhondzadeh S, Tahmacebi-Pour N, Noorbala, Amini H, Fallah-Pour H, Jamshidi AH, Khani M. *Crocus sativus* L. in the treatment of mild to moderate depression: a double-blind, randomized and placebocontrolled trial. *Phytother*. 2005; 19 (2): 148–151.
17. Hosseinzadeh H, Karimi G, Niapoor M. Antidepressant effect of *Crocus sativus* L. stigma extracts and their constituents, crocin and safranal, in mice. InI International Symposium on Saffron Biology and Biotechnology 650 2003 Oct 22 (pp. 435-445).
18. Hosseinzadeh H, Noraei NB. Anxiolytic and hypnotic effect of *Crocus sativus* aqueous extract and its constituents, crocin and safranal, in mice. *Phytotherapy Research*. 2009 Jun 1;23(6):768-74.
19. Hadizadeh F, Mahdavi M, Emami SA, Khashayarmanesh Z, Hassanzadeh M, Asili J, Seifi M, Nassirli H, Shariatimoghadam A, Noorbakhsh R. Evaluation of ISO method in saffron qualification. InII International Symposium on Saffron Biology and Technology 739 2006 Oct 28 (pp. 405-410).
20. Sujata V, Ravishankar GA, Venkataraman LV. Methods for the analysis of the saffron metabolites crocin, crocetins, picrocrocin and safranal for the determination of the quality of the spice using thin-layer chromatography, high-performance liquid chromatography and gas chromatography. *Journal of Chromatography A*. 1992 Oct 30;624(1-2):497-502.
21. Carobrez AP, Bertoglio LJ. Ethological and temporal analyses of anxiety-like behavior: the elevated plus-maze model 20 years on. *Neuroscience & Biobehavioral Reviews*. 2005 Jan 1;29(8):1193-205.
22. Lister RG. The use of a plus-maze to measure anxiety in the mouse. *Psychopharmacology*. 1987 Jun 1;92(2):180-5.
23. Carvalho-Freitas MI, Costa M. Anxiolytic and sedative effects of extracts and essential oil from *Citrus aurantium* L. *Biological and Pharmaceutical Bulletin*. 2002;25(12):1629-33.
24. Komada M, Takao K, Miyakawa T. Elevated plus maze for mice. *Journal of visualized experiments: JoVE*. 2008(22).
25. Handley SL, McBlane JW. An assessment of the elevated X-maze for studying anxiety and anxiety-modulating drugs. *Journal of pharmacological and toxicological methods*. 1993 Jun 1;29(3):129-38.
26. Hosseinzadeh H, Sadeghnia HR. Protective effect of safranal on pentylenetetrazol-induced seizures in the rat: involvement of GABAergic and opioids systems. *Phytomedicine*. 2007 Apr 10;14(4):256-62.
27. de Melo CT, Monteiro AP, Leite CP, de Araújo FL, Lima VT, Barbosa-Filho JM, de França Fonteles MM, de Vasconcelos SM, de Barros Viana GS, de Sousa FC. Anxiolytic-like effects of (O-methyl)-N-2, 6-dihydroxybenzoyl-tyramine (riparin III) from *Aniba riparia* (Nees) Mez (Lauraceae) in mice. *Biological and Pharmaceutical Bulletin*. 2006;29(3):451-4.
28. Vieira LF, Reis MD, Brandão AR, Viana IM, Silva JP, Barreto E, Smaniotto S. Anxiolytic-like effect of the extract from *Bowdichia virgilioides* in mice. *Revista Brasileira de Farmacognosia*. 2013 Aug;23(4):680-6.

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