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Imidacloprid Poisoning: Case Report

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ABSTRACT

Imidacloprid is a newer insecticide belonging to the group of Neonicotinoids. Though considered to have less lethality to humans, case reports of severe manifestations are not uncommon. There has been an increasing number of cases of Imidacloprid poisoning reported from developing countries. We report a patient with neurological manifestatons following consumption of Imidacloprid and summarize the various complications reported in medical literature in order to identify predictors of outcome.

Keywords: *Imidacloprid, poisoning, manifestations, predictors, India.*

INTRODUCTION

Imidacloprid belongs to the group of Neoonicotinoids which are a new class of insecticides that act by inducing neuromuscular paralysis and eventual death. Its use has become widespread due to its selective toxicity and lethality to insects, with low toxicity to mammals. On the basis of animal studies,WHO has classified Imidacloprid as a moderately toxic compound and as a class Two/Three agent by the United States Environmental Protection Agency(USEPA). Several case reports of Imidacloprid paralysis and death have been reported among which the neurological and cardiovascular manifestations have been described as the toxidrome. We report a patient with deliberate consumption of Imidacloprid presenting with neurological manifestations. We have also done a review of literature and have proposed the indicators for better outcome.

CASE REPORT

A 22 year old man from South India was brought to the Emergency Department with deliberate ingestion of 75 ml of 17.8% of Tatameda Imidacloprid Solution in an attempt to commit suicide. Immediately he was rushed to a Primary Health Care facility following which he was given a gastric lavage and was referred to us for further management.

On arrival, the patient complained of dizziness and of mild non specific diffuse abdomen pain along with vomiting. He did not give any history of fever, seizures, palpitations or breathlessness.

On examination, he was conscious but agitated, irriatable and restless. His pulse rate on arrival was 98/minute and blood pressure was 100/60 mm Hg. He was not tachypnoeic and his systemic examination was normal. His pupils were normal and reactive to light. He had no fasciculations or neck muscle weakness.

His investigations revealed a mild leucocytosis with neutrophil predominance(Total leucocyte count-16,200,neutrophils-90,lymphocytes-5,monocytes-5),normal renal(Creatinine -0.89mg%/urea:25mg%) and liver(Total bilirubin-0.42mg/dl,Direct bilirubin-0.20mg/dl, Serum Albumin-4.5g/dl, SGOT-23,U/L,SGPT-12U/L,Alkaline phosphatase-65U/L) function tests,normal creatinine phosphokinase(CPK-65) and normal serum cholinesterase(7320 U/L).

Through out the course of his hospital stay for 48 hours, he did not develop any cardiac arrythmias or neurological manifestations.His irritability resolved

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spontaneously and on psychiatric evaluation,he was diagnosed to have chronic depression.He was discharged in a stable condition.

DISCUSSION

Imidacloprid belongs to the—Chloronocotinyl notroguanide class of insecticides.

It was developed in 1985 and was registered in 1994 as an insecticide. It acts as a nicotinic acetylcholinergic receptor agonist causing blockage of signal transduction at the post synaptic junction, thus leading to neuromuscular paralysis.[1] It shows higher_ selectivity to a4b2 subtypoe of receptors in insect nerve as compared to mammals. In view of this property, it has been used as a selective pesticide on crops, cockroaches and for termite control.[2] In a case series from South Asia including 68 patients presenting with neonicotinoid poisoning, Imidacloprid was the commonest neonicotinoid used as an insecticide and had no fatality reported which justifies the reason for it to be known as an agent with low toxicity[3] . Toxicity profile continues to be the same inspite of the mode of exposure [Ingestion, transdermal].

Post ingestion, most patients can present with nausea, vomiting, abdominal pain, diarrhea, head ache, dizziness, dilated pupil, tachycardia and hypertension.[3] Severe toxicity has been reported in a few patients which are being respiratory failure, recurrent ventricular fibrillation, leukoclastic vasculitis, neuropsychiatric abnormality, seizure, central nervous system depression and rhabdomyolysis.[1,2,3,4] Our patient presented with mild neurological manifestation in the form of irritability and drowsiness with a near normal GCS [14/15].

The lethal dose for mammals has been studied in rat models and has been found to be very high [475-5000mg/kg]. Concentration in blood following exposure to Imidacloprid can be detected and quantified with the help of biochemical assays but have been tried mostly for research purposes. In clinical practice, levels do not correlate well with toxicity profile or help in management .[3]

Till date no specific antidote has been found; future research regarding the same is unlikely, owing to its low toxicity profile. Management is mostly supportive as in our patients where symptoms were self-limiting and improved with supportive measures. Oximes like pralidoxime can theoretically worsen nicotinic effects and hence their role in treatment is unclear.[3]

In order to identify the predictors of outcome, we did a literature search of human Imidacloprid intoxication case reports and series. We searched for the same in Pub med and Google scholar and included patients with ingestional exposure, without co-exposure to other substances. We identified four previous case reports with poor outcome being defined as death as compared to seven patients with good outcome [Table 1]. Trend towards poor outcome was seen among women, patients with hypotension and low GCS. Age, institution of gastric lavage or clinical symptoms at presentation did not differ among both the groups.

In a recent study in rural North India surveying pesticide use pattern among farmers, Imidacloprid use was the third most commonly used agent and constituted 16.4% among the total pesticides used.[5] In view of its selectivity to insects and safety profile, the various severe manifestations have been ignored. The above mentioned case fatalities and severe systemic manifestations are a reminder to physicians regarding the possible consequences following ingestion of a pesticide considered to be much safer. Though most patients with mild toxicity need observation, patients with low GCS, respiratory depression, ventricular arrythmia, and rhabdomyolysis with hepatic and renal dysfunction are at a higher risk of worsening thus requiring high index of suspicion along with meticulous monitoring and supportive measures.

Table 1: Previous reports of Imidacloprid poisoning along with their outcome

No:	Study	Age	Sex	Outcome	GCS	Arrythmia	Hypo-tension	Gastric lavage	Venti-lator [days]	Others
1.	Huang[6] 2006	69	F	Expired	11/15	VT, VF	-	+	11 hours	N,V
2.	David[7] 2007	69	F	Expired	NA	-	-	-	-	-
3.	Shadina [8] 2008	35	M	Expired	5/15	-	+	+	NA	Dizziness, palpitations, bradycardia
4.	Mohammed[3] 2009	35	F	Alive	NA	-	+	+	4days	N,V, headache, diarrhoea
5.	Panigrahi[9] 2009	37	M	Alive	NA	-	NA	NA	NA	Dyspnoea, tachycardia, mydriasis
6.	Karatas [10] 2009	67	M	Alive	3/15	-	+	+	4	Mydriasis, tachycardia, salivation
7.	Iyyadurai[2] 2010	34	M	Expired	Low	-	+	NA	12	Oliganuria, metabolic acidosis, deranged liver and renal parameters
8.	Viradiya k[1] 2011	41	M	Alive	12/15	-	NA	+	5	N,V, abdomen pain, muscle twitching
9.	Agha [4] 2012	62	M	Alive	NA	-	+	-	-	N, Fever, hematuria, abdomen pain, maculopapular rash
10.	Alok K[11] 2013	60	M	Alive	NA	-	-	NA	NA	NA

Abbreviations: N: Nausea, V: Vomiting, VT: Ventricular Tachycardia, VF: Ventricular Fibrillation

CONCLUSION

Recently there has been an increase in case reports of neonicotinoid poisoning. Toxic manifestations following ingestion are predominantly cardiorespiratory and neurological. Though most patients present with features of mild toxicity, patient with low GCS, ventricular arrhythmia, hepatic and renal dysfunctions are at higher risk of worse outcome. Supportive and symptomatic treatment is the mainstay of treatment at present.

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Prallethrin 1.60% (All Out) and Status Epilepticus- A Rare Association

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ABSTRACT

Introduction: Mosquito repellents marketed as vaporizers contain pyrethroids. Most data regarding toxicity of pyrethroids are gathered from dermal or inhalational absorption. Toxicity profile following oral intake is scarcely reported. This is the first case report following oral ingestion of prallethrin.

Case Report: A 25 year old female presented to the emergency room in M.B.S. hospital, kota with ingestion of 70 ml prallethrin (1.60%) and later developed status epilepticus. She was managed in the ICU requiring mechanical invasive ventilation. No cause for her status could be determined after all investigations. It was on review of history with the patient and relative that the cause was determined. She had ingested two entire bottle of liquid mosquito repellent vaporizer (approximate 70 ml).

Discussion: Mosquito repellents contain pyrethroids which act on sodium channels and cause hyper excitability of neurons. There are no known antidotes. Treatment is symptomatic.

Keywords: *Prallethrin, status epilepticus, toxicity.*

CASE REPORT

A 25 year old healthy female presented to the emergency room of our hospital with ingestion of 70 ml prallethrin (1.60%) one hour before. A Ryle's tube was inserted and gastric lavage was done. The patient had complaint of nausea, vomiting, and abdominal discomfort for which symptomatic treatment was given. After half an hour patient developed generalized seizures. There was no history of trauma, fever or drug usage prior to the onset of seizures. There was no past or family history of seizures. Endotracheal intubation was done in view of persistent seizures. Pupils were dilated but sluggishly reacting to light. There were no signs of bladder or bowel incontinence. Deep tendon reflexes were not elicitable at presentation. Blood sugar checked in the emergency room was normal. Oxygen saturation was 99%. The patient was given a single dose of intravenous (IV) diazepam 10 mg for control of generalized tonic-clonic convulsion but since control over the convulsions was not achieved, a loading dose of phenytoin 1 g was given. As the convulsions persisted, she was administered intravenous lorazepam (4 mg repeated after 15 minutes). Blood sugar, electrolytes, and arterial blood gas analysis showed hypocalcemia and hypokalemia for which correction was done. Non-invasive blood pressure, electrocardiography, and oxygen saturation monitoring was done. The patient was then shifted to the intensive care unit (ICU) and IV infusion of midazolam 0.1 mg/kg/h and propofol was initiated. Phenytoin 100 mg given 8 hourly. There was no episode of convulsions thereafter. A central venous cannulation was done to guide the fluid therapy and titrate the dose of ionotrope. The patient required mechanical ventilation in view of her tachypnea and impendig respiratory musle fatigue. She needed to be paralysed to control the seizures. The NCCT brain done was normal study. On 2nd day patient developed hypotension for which ionotropic support was started. The patient also developed septicaemia (TLC up to32000 cell per cumm) for which broad spectrum antibiotics were started. Endotracheal tube secretions were cultured and diagnosed staph. aureus was detected as a source of septicaemia. On 3rd day since seizure activity was no more there her paralytic

agents were stopped and patient was put only on phenytoin and levetricitam. EEG was recorded and showed back ground activity of 14-15 Hz, 20-40 mv bisynchronous beta rhythm suggestive of generalized cerebral dysfunction. Her sensorium improved and was gradually weaned off the ventilator after two day. She was oriented and fully cooperative. She gave the history of ingestion of contents of two bottles of mosquito repellent available in the house commercially marketed as All-Out (prallethrin 1.6% w/w liquid, 35 mL in each bottle, that is, total dose of 1120 mg**).** She was discharged in a stable condition.

DISCUSSION

This case report describes the clinical manifestation following oral suicidal intake of prallethrin .Status epilepticus refers to a life-threatening condition in which the brain is in a state of persistent seizure. Status epilepticus is defined as a continuous seizure lasting for at least 30 min or two or more discrete seizures between which the patient does not recover consciousness. In the 15-30 patients per 100,000 per year, who present in status epilepticus, mortality is as high as 10% [(1)]

Prallethrin is a structural derivative of naturally occurring pyrethrins. Pyrethrin is an extract from the flower Chrysanthemum cinerariifolium and is effective against insects. However its use is limited by its rapid biodegradability. Pyrethroids are the result of research and development efforts in the molecule of pyrethrin so that the potency is retained and is commercially viable [(2, 3)] Prallethrin is one such result of these efforts. However with the increase in their potency the toxicity profile has also increased due to the structural modifications.

Pyrethroids exert their neurotoxic effects especially on insects. Their toxicity to humans is at least three orders of magnitude lower than for insects [(4)] Pyrethroids produce reversible impairment of motor function and 'knockdown' in flying insect species that may be followed by death, depending upon the exposure level. The primary action of pyrethroids is on the sodium channel. The interaction with sodium channels leads to a state of hyper excitable cells which is the presumed cause for its neurotoxicity. There is also a hypothesis that other targets like voltage sensitive calcium channel might also be involved. Pyrethroids act most readily on the tetrodotoxin resistant subtype of the sodium channel, expressed in the developing mammalian brain and in the adult dorsal root ganglia. The proportion of sodium channels modified is dose-de pendent, but the duration of their hyper excitable state is determined by the structure of the pyrethroid and is independent of dose[(2)]

Hence, the degree of hyperexcitability is dose-related, but the nature of this excitability is structure-dependent. The neurotoxicity of pyrethroids to mammals depends on the stereo chemical configuration at cyclopropane C-1 or the homologous position in compounds lacking the cyclopropanecarboxylate moiety. This structure-dependency is expressed in terms of the variable time constant of prolongation of the sodium current which varies continuously across a range of structures.

Prallethrin is a synthetic pyrethroid with fast knock-down activity against household insect pests. Prallethrin is almost insoluble in water but highly soluble in organic solvents, such as hexane, ethanol, acetone, toluene, etc. An ideal therapeutic agent would antagonize the abnormal, pyrethroid-evoked, sodium current but leave the normal one unchanged. However all out solution also have solvent deodorized kerosene (96.4%) and 1% stabilizer hydroxytoluene.Neural tissue, which is rich in myelin, a lipid component is acted upon by kerosene causing central nervous system depression and ventilatory drive suppression [(5)] However no case report of seizure in kerosene poisioning till date was found. So status epilepticus was most likely due to prallethrin**.**

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Conflict of Interest : We have no conflicts of interest to declare.

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Ethical Clearance: This study has been conducted in M.B.S. and associated group of hospitals of Govt. Medical College, Kota. This study had been done originally by us after consent from

patient and approval of ethics committee. Written informed consent was obtained from the patient and parents for publication of this case, reports and any accompanying images. We are ensuring that, this study manuscript has not been submitted and published elsewhere.

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Estimation of Sex from Foot Print using Standard Footprint Length Formula, Heel Ball Index and Foot Index

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ABSTRACT

The present study revealed the importance of footprints and estimation of sex from footprints. Like fingerprints no two humans have the same footprint pattern which makes them a unique source to find the identity of a person. Footprints found at a crime scene can help in solving crime. Footprints are used to find sex of the individual. The standard foot print length (obtained from the statistically derived standard foot print length formula) was used as a benchmark to estimate the sex of the individual. Heel ball index is also used to estimate sex in which foot width at ball and foot width at heel is used. Heel Ball index may be utilized in sex determination when a part of the foot is brought for medico-legal investigation. Foot index is derived to determine the sex of an individual. The study will be a valuable tool in Forensic investigation in various areas, most importantly in identification in mass disasters cases and comparison of bodies in accidents etc.

Keywords: *Forensic Investigation, Footprints, Medico-legal investigation, Standard foot print length, Heel ball index, Foot index*

INTRODUCTION

Footprints (footmarks) are the impressions or images left behind by a person walking or running. The print left behind at a crime scene can give vital evidence against the perpetrator of the crime. They are a unique source of information unlike the fingerprints. Photographs or castings of footprints can be taken to preserve the finding. Analysis of footprints and shoeprints is a specialist part of forensic science. Footprints can also allow the detective to find the approximate height from, footprint and shoeprint. The Foot tends to be approximately 15% of the person's average height. Individual characteristics of the footprints like numerous creases, flatfoot character, horizontal and vertical ridges, corns, deformities etc. can help the forensic scientist in cases pertaining to criminal identification. Foot prints have been shown to have determined the height and the sex of the individual. Footprint is a very vital part of the evidence chain. Every time you take a step a footprint is left behind. Researchers have studied the relationship between footprints and stature. This study was done with an objective to estimate sex of person from its footprint with the help of standard footprint formula.[1]

Foot prints are common type of impression evidence found at and around the crime scene. Forensic examination involves the comparison of weight bearing area of the bottom of the bare foot, where ridge detail is not present. Some time it is equally important in the possibility of eliminating a suspect whose feet do not match the impression found at the crime scene. The most frequent example of the use of bare foot morphology is the comparison of a suspect's bare foot with that of an impression found at the crime scene.[2]

Foot print is physical evidence and physical evidence has a number of functions which are as follow:

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1. To prove the commitment of crime.
2. To link the crime with suspect.
3. To identify a suspect.
4. To exonerate the suspect.
5. To provide expert testimony in the court.[3]

Bare foot impression that have been recovered from the crime scene and which posses sufficient skin ridges (Dermatoglyphic) patterning can be compared by a latent fingerprint expert with the skin ridge patterning on the suspect feet using the some methodology as that use in finger print comparison.[4]

When the detail necessary to enable a skin ridge pattern of examination is not present, these impressions often still contain sufficient detail to enable a meaningful comparison with the size and shape characteristics of the feet. The evidence occurs at the crime scene in three forms .Which is as follow:

- One form is that made by a naked or bare foot.
- A second form is that made by a sock clad foot.
- A third form of bare foot print is evidence, is the impression and mark left by the foot on the inner surface of the shoes.[5]

A human foot is highly individual in its form, size and shape. These features are originate from and are initially influenced by an individual genetic code. However, environmental and physiological influence, as well as other acquired characteristics, injuries and pathologies that occurs throughout an individual's life.[6]

MATERIALS & METHODOLOGY

The present study was conducted on 102 individuals (52 males and 50 females) who were college going students of Maharshi Dayanand University Rohtak, Haryana, India. All the individuals were of 17-26 years old. Camel fountain pen ink was used to take the footprints because footprints taken from this ink remains permanent for analysis. Stamp pad was used along with white sheets and ethanol to clean. The footprints obtained from the right foot of the subjects were selected for the study.[7]

The ink was uniformly spread on a cotton cloth placed in a box. A stamp pad was made from this and the subject was first asked to place his/her right feet on the stamp pad uniformly. A plain white sheet was taken and told the subject to put his/her feet on it. The footprints thus obtained were numbered and filed. After taking the footprints, the sole of the feet were cleaned with cotton wool soaked in acetone. The subjects were advised to wash it again with soap and water. The footprints obtained from the right foot of the subjects were selected for the study. Maximum foot print length was measured as a straight distance between the highest points on the first or the second toe (whichever was higher) and the lowest point on the margin of the heel. The footprint length, width, heel length and width etc. was calculated manually.

RESULTS

Footprints were obtained from 102 individuals (52 males and 50 female) of Rohtak District of Haryana State, India. In the footprints, footprint length, heel length, heel width and footprint width was measured. (Fig: - 1 & 2)

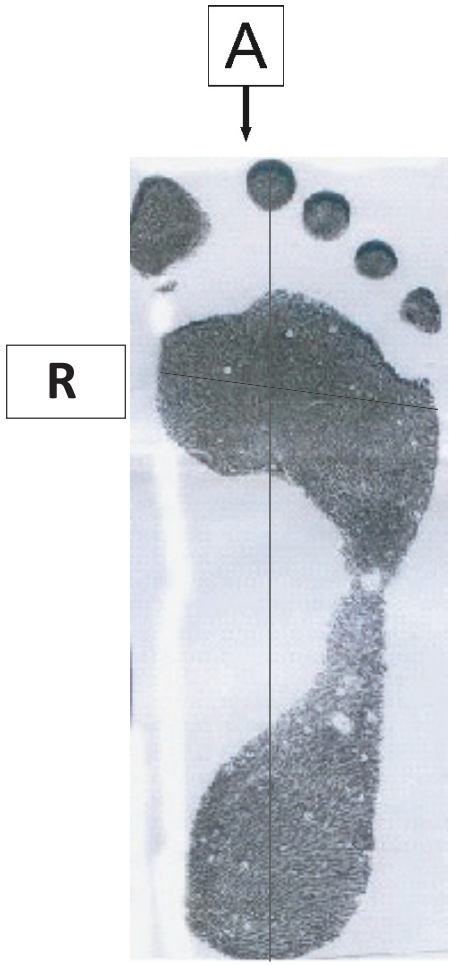

Fig: - 1 Foot length (A) and foot width (B)

Fig: - 2 Heel length(C) and heel width (D) of the footprint.

Standard Footprint length was determined by measuring footprint length of males and females and Standard deviation was calculated.

In the present study the standard footprint length of males is greater as compared to females (Table 1). On applying the sensitivity the specificity tests on the results obtained, the accuracy of predicting sex by this method was determined. So present study revealed that males have more Standard Foot Print Length as compared to females. Therefore footprint can be used to differentiate males and females and to determine the sex of the individual.

Table 1:-Standard footprint length formula

	Males value(in cm)	**Females value(in cm)**
Footprint length(mean)	25.10	22.17
Standard Deviation	0.913	1.260
S.F Length	(25.10-0.91) +(22.17+1.26)/2	
	(24.18+23.43/ 2)=23.80cm	

Standard footprint length= (Male mean foot print length-SD) + (Female mean foot print length+SD)/2

Heel ball index shows a small difference in males and females population. The heel ball index was slightly more in males as compared to females (Table: - 2). Hence, heel ball index can also helps in sex estimation of a population.

Table 2:-Heel ball index system

	Males value(in cm)	**Females value (in cm)**
Footprint width (mean)	9.17	8.126
Heel width(mean)	5.03	4.448
Heel ball index	5.03 x 100/9.17 = 54.85cm	4.44 x 100/8.12 =54.67cm

Heel ball index = Foot breadth at heel (BHEL) x 100/Foot print width

Foot index for females showed higher value than the males (Table: -3). Therefore Foot index can also helps in the sex estimation of any population. Results of Foot index were contrary to Standard Footprint Length and Heel ball index as in Foot index females had a higher value than in males.

Table 3:-Foot index

	Males value (in cm)	**Females value (in cm)**
Footprint length(mean)	25.10	22.17
Footprint width(mean)	9.17	8.126
Foot index	9.17 / 25.10 x 100 = 36.53cm	8.12 / 22.17 x 100 = 36.85cm

Foot index = Foot width / Foot length x 100

DISCUSSION

In the present study Standard footprint length, Heel ball index and Foot index were used to determine the sex of an individual. In the present study value of Standard Footprint Length and Heel ball index were higher in males which are 23.80cm and 54.85cm respectively. Value of Foot index was 36.85cm in females and 36.53cm in males.

In the previous study on footprints foot length, foot width and foot heel width and footwear (length and width) of the same subjects were measured. Univariate models correctly identified approximately 67-94% of individuals to their correct sex groups and multivariate models showed approximately 82-96% correct identification. In this way four variables: foot

length, shoe length, shoe width and shoe size were used to estimate personal identity or sex.[8]

In another study on individuals of Indian origin the breadth of the footprint at ball (BBAL) and the breadth of the footprint at heel (BHEL) were measured on the footprints.[9]

According to another study on individuals in a community from North India, the measurements of the foot dimensions can be used for the determination of age, sex and stature of an individual in forensic investigations.[10] The study was in favour of present study as the derived Heel ball index was larger in males in both feet. According to one more study from Western Australian population. Males showed significantly larger values than females for all foot and footprint measurements.[11]

In one earlier study on footprints the foot length to stature ratio and foot print length to stature ratio was used for identification. It was observed that the right foot showed accuracy in measurements therefore footprints were taken from right foot.[12, 13]Another study conducted on footprints showed the reliability and applicability of assessing sex identity by deriving FPR (foot print ratio) from foot prints and thereby provides additional evidence to the foot print study in sex identity.[14] In one earlier study conducted on Haryanvi jats in India the males showed a greater foot length as compared to females which is in favour of present study. [15]

CONCLUSION

In all the previous studies, conducted on the footprints only one formula was used for sex estimation. Hence in the present study to increase the probability of positive result two other factors like heel ball index and foot index was also used. The study has revealed positive outcomes of the measurements of footprint lengths of 102 subjects of both sexes between the ages of 17-26 years. The percentage accuracy of establishing sex by the standard foot print ratio method was reported to be 92%, which is quite significant for use. Similarly heel ball index system gives an approximate value of estimation of sex. So it can also be used in sex estimation. Foot index is also used to make an estimation of sex because foot index in females have a greater value than male so can be used for comparison and identification.

In this way more accurate results can be obtained using all the measurements and applying all the index systems and formulas.

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Aluminium Phosphide Poisoning - A Case Report

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ABSTRACT

Aluminium phosphide is a solid fumigant pesticide, insecticide and rodenticide. Aluminium phosphide is used as a poison either by inhalation or ingestion. Poisoning is usually suicidal, occasionally accidental and rarely homicidal. It is commonly known as an agent of sure death in the medical profession. A case of poisoning was brought by the police for postmortem examination. Postmortem findings, chemical analysis report and recovery of empty Quickphos container at the scene of death by police, confirmed it to be a case of aluminium phosphide poisoning.

Keywords *: Aluminium phosphide, phosphine, poisoning, grain fumigant.*

INTRODUCTION

Aluminium phosphide is a solid fumigant pesticide, insecticide and rodenticide. In India it is available as tablets of Celphos, Alphos, Quickphos, Phostoxin, Phosphotex, etc. On coming in contact with moisture, aluminium phosphide liberates phosphine, which is a systemic poison and affects all organs of the body.[1] It has rapidly become one of the most commonly used grain fumigants which are considered to be near ideal; it is toxic to all stages of insects, highly potent, does not affect seed viability, is free from toxic residues and leaves little residue on food grains.[2] Aluminium phosphide is available in the form of 3 gm tablets or 0.6 gm pellets. Tablets are dark brown or grayish in colour and contain two compounds : aluminium phosphide and aluminium carbonate in a ratio of 56:44.

Aluminium phosphide is the active component of the mixture whereas aluminium carbonate is added to prevent self-ignition of phosphine (PH_3) which is liberated when aluminium phosphide (AlP) comes in contact with moisture :-

$AlP + 3\ H_2O \rightarrow Al(OH)_3 + PH_3$ (In air)

$AlP + 3\ Hcl \rightarrow Alcl_3 + PH_3$ (In air and stomach)

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Each 3 gm tablet releases 1 gm and each 0.6 gm pellet releases 0.2 gm of phosphine gas on exposure to moisture and leaves behind a non-toxic grayish residue of aluminium phosphide. Phosphine gas is colourless and odourless. However on exposure to air, it gives a foul odour (garlicky or decaying fish) due to the presence of substituted phosphines and disphosphines.[3] It emerges as a poison of suicidal deaths as this pesticide has no effective antidote and is freely available in the market.[4] Here we report a case of Aluminium phosphide ingestion by a 26-year old man.

CASE REPORT

A 26 year old man was alleged to have consumed some poison due to disgust in life and was found lying unconscious in his house.The exact time of consumption was not known. He was declared dead on arrival, when brought to casualty and a postmortem examination was conducted. Police recovered empty Quickphos container from the scene of death.

Postmortem examination revealed a body of an adult male, averagely built and nourished, brownish complexion and measuring 165 cms in length. No external injuries were present. Rigor mortis present all over the body. Postmortem staining present over the back and fixed. Blood stained frothy fluid coming out from the nostrils. Lips, nose and forehead at places were smeared with thick black paste. On internal

examination, trachea showed black colour frothy fluid mixed with black colour particles with garlicky odour (Figure-1). Both the lungs were congested and oedematous. The stomach contained 180 ml of brownish - black coloured thick semi-solid substance with garlicky odour with severely congested and haemorrhagic mucosa (Figure-2). Other internal organs were intact and congested. Viscera and blood were sent to forensic science laboratory, Madivala for chemical analysis. Colour tests, Thin layer chromatography and UV - Vis spectrophotometric methods showed the presence of phosphide ions.

DISCUSSION

Following the ingestion of aluminium phosphide, it is decomposed into highly toxic phosphine gas by the action of dilute hydrochloric acid content of the stomach. Phosphine gas is rapidly absorbed throughout the gastointestinal tract, reaches the blood stream and a part of it is carried to the liver by portal vein. It is also rapidly absorbed through lungs. After peak exposure, most of the phosphine is excreted unchanged in expired air, while the residual quantity is oxidized to phosphite and hypophosphite ions which are excreted in urine. Phosphine acts as a respiratory poison. Even 20 : 100,00 part of phosphine in air is reported to be fatal.[5,6] It blocks the enzyme Cytochrome C oxidase as a result of which mitochondrial oxidative phosphorylation is inhibited. It also disturbs the mitochondrial morphology, inhibits oxidative respiration by 70% and causes a severe drop in mitochondrial membrane potential, causing, in turn, the cells to die rapidly. Mitochondrial cytochrome C oxidase inhibition may also lead to pulmonary and cardiac toxicity. Phosphine is also known to inhibit protein synthesis and enzymatic activity, particularly in the mitochondria of lung and heart cells. This can lead to a blockage of mitochondrial electron transport chain. Phosphine is responsible for the denaturation of oxyhaemoglobin molecule. It progressively converts oxyhaemoglobin to methaemoglobin and hemi chrome species. The reaction of phosphine with oxyhaemoglobin leads to formation of phosphite and phosphate ions, thus reducing the oxyhaemoglobin of blood.[7] Ingestion of aluminium phosphide leads to a high superoxide dismutase activity and low catalase levels that result in formation of a high quantum of free radicals and accelerate lipid peroxidation. The latter, in turn, results in damage to cellular membrane, disruption of ionic barrier, nucleic acid damage and finally, cell death.[8] Common presenting symptoms in aluminium phosphide ingestion include metallic taste, vomiting, garlicky (or fishy) odour of breath, intense thirst, burning epigastric pain, and diarrhoea. In severe cases, there are cardiovascular manifestations such as hypotension, tachy/bradycardia, and ECG abnormalities (sinus tachycardia, ST-T wave changes, bradycardia with heart block, etc). Coma supervenes in late stages. Respiratory distress is invariably present with cyanosis, and cold, clammy skin.[9]

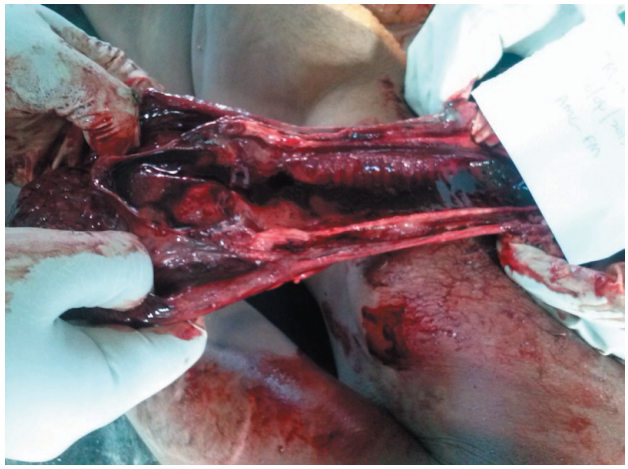

Figure-1 : Trachea showing black colour frothy fluid mixed with black colour particles.

Figure-2 : Stomach showing brownish - black coloured thick semi-solid substance with with severely congested and haemorrhagic mucosa.

CONCLUSION

After taking into consideration the postmortem findings, chemical analysis report and the presence of an empty Quickphos container at the scene of death, the opinion as to the cause of death was given as cardio-respiratory failure due to aluminium phosphide poisoning. Since death is rapid and survival after significant poisoning is rare, prevention

is the best option. The most effective way of prevention is to either ban or impose strict regulation on the sale of aluminium phosphide tablets. Cageing of tablets in smaller plastic with holes and spikes, so that they can't be swallowed as such, is likely to reduce the incidence of aluminium phosphide poisoning.

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A Critique on the Mental Health Care Bill 2013

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ABSTRACT

The Mental Health Care (MHC) Bill 2013 has its origin in the widespread presumption of inadequacy of Mental Health Act 1987 in protecting the rights of mentally ill persons. Central to this new Bill is the concept of "Advance Directives" which seeks primacy and respect for the 'in advance' stated wishes of the affected person on the line of treatment he/she prefers to be delivered. While this is noble, there could be serious concerns on the competency of the affected individual for making such directives. It is still uncertain whether this Bill can strike a balance between the practical needs of patients and caregivers in the Indian context, while complying with international conventions. Given the acute manpower shortage and the adverse ground realities existing in the current scenario, this expectation may be impractical. This article tries to address some of the pitfalls of the envisioned MHC Bill.

Keywords: *Mentally ill, rights, empowerment, MHC Bill, Advance Directives.*

INTRODUCTION

Mental Health legislation is essential for protecting the rights and dignity of persons with mental disorders and plays a crucial role in implementing effective mental health care services. The present Indian scenario calls for an urgent need for reorganisation of policies and programmes[1].The Indian Lunatic Asylum Act of 1858 was replaced by the Indian Lunacy Act of 1912 and the Indian psychiatric society drafted the Mental Health Act (MHA), which was submitted to Govt of India in 1950. This drafted Act received approval in 1987[2], but came into effect only in April 1993. The MHA was miles ahead of the anarchic Indian Lunacy Act 1912.

Reportedly, this modified Act posed its own set of drawbacks and hence a need for some rethinking to bring about suitable amendments was perceived. Apparently, it neither paid attention to WHO guidelines nor did it give much importance to family and community psychiatry. It was seen to have laid much stress on hospital and admission, increasing the cost of health care, without making provisions for home treatment and long term care. Hence most critiqued it to be the Mental Hospitals Act [1]. Although it has provided some respite to both the patients and the professionals, it has become inadequate with time, with various shortcomings making it difficult to provide holistic mental health care services [3]. The review processes or appeal processes for mentally ill persons are far from realistic and the procedures prescribed by the MHA (1987) for involuntary admission and treatment may be considered arbitrary and unaccommodating [4]. Though reportedly, the Act had certain drawbacks, the real issue could have been its ineffective implementation.

An attempt to address the lacunae of Mental Health Act led to the proposition of the amendments to the MHA. This required further revision, active participation and feedback from the Indian psychiatric Society, the major stakeholders representing service providers[5]. This paved the way for the proposition of the Mental Health Care (MHC) Bill 2013.

The MHC Bill 2013[6]: The Mental Health Care

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Bill is introduced with the objective of making changes in the MHA 1987 in accordance with the UN Convention on the Rights of Persons with Disabilities (UNCRPD). It seeks to provide affordable, good quality, easy to access services, equality of treatment, free legal services, access to medical records and also complain against deficiencies. The Central and State Mental Health Authorities assume a more definitive role. It lays stress on MHC establishments fulfilling the prescribed criteria and making the registration process easy. A Mental Health Review Commission and Board, a quasi-judicial body to periodically review the Mental Health Care delivery and to advise Government on protection of rights of mentally ill is another major proposal. Decriminalization of suicide, free treatment and insurance cover are some of the other positive features of the new Bill.

CURRENT MENTAL HEALTH SCENARIO

The direction and thrust of the MHC Bill 2013 is the assumption of responsibility by the state to provide adequate mental health care including maximum support to care-givers. At present the District Mental Health Programme operates in 123 districts across the country. Though the NMHP offers financial support to the State Government to increase the number of seats in medical colleges and nursing colleges in the appropriate disciplines, the progress has not been substantial. The number of psychiatrists in the country is about 4000 and thus there is a great need to increase that. The statistics reveal that at least 5% of our population live with a major mental illness, which are over 50 million people. A major impediment to recovery for a vast majority would be the non-availability of evidence based mental health care. The MHC bill does not clearly indicate how the State would mobilise the resources required to provide such desired medical care to the persons with mentally illness.

Ideally the State should be in a position to support the treatment and rehabilitation of the mentally ill. However, due to manpower limitations and keeping in mind the ground reality of the country, it looks highly unlikely and overly ambitious to believe that a balance could be achieved between the practical needs of users, caregivers and International Conventions & Framework.

MULTI PERSPECTIVE ANALYSIS

The Bill seems to have broadened the definitions of mental illness. Though it increases the clarity, the over inclusive definition may actually increase the number of so called 'mentally ill' persons and may contribute in increasing stigma and discrimination[7]. This may prevent many persons from seeking medical help due to fear of being labelled so. The act has provided due consideration to the rights of individual patients, however it has failed to provide a restrictive definition of mental disorders. It has to be more precise to include major mental disorders such as Schizophrenia, Affective disorders etc, which includes insight-less patients as it is this particular population that requires protection of their human rights and greater support during admission procedures. Also, care has to be taken to exclude certain rights to potential criminals who could come under the category of some personality, substance and certain sexual disorders. As there is a proven correlation between the crime rate and number of untreated mentally ill patients, increased patient autonomy and poor insight will aggravate the situation.

The Bill has included an altogether new concept of 'Advanced Directives' also known as living will. It is a document of legal entity that allows individuals to spell out their decisions in writing about their choice and wish to be treated or cared for ahead of time, if they are no longer able to make decisions due to illness or incapacity [8]. The provision of Advance Directives at times can be more harmful to the interest of the patient especially when it is in direct conflict with professional decision. In such a scenario, the stakeholder will have to take the recourse of approaching the redressing body leading to unwanted delays in treatment and denial of appropriate, timely intervention. Alternatively, the option of approaching a third party in such cases of conflict may defeat the purpose of autonomy[8].

Another important concern could be on the assumption that the affected person is actually competent enough to prepare the Advance Directives on one's own. Competence relies on an individual's cognitive abilities which are often at jeopardy in major mental disorders. Such cognitive abilities and affective states may play a major role when making an Advanced Directive e.g. feelings of helplessness

secondary to depression may lead individuals to underestimate the effectiveness of available treatment[9]. Another concern would be in a situation where a paranoid patient who in his Advance Directive, might have refused admission and ECT, in his bouts of aggressiveness may not be admitted complying with his preferences, would probably be deserted by family members and may also pose a threat to oneself and the society. This directive needs to be given a specified validity period and authorized by a psychiatrist as well. Further, it is essential to have registration processes for the Advance Directive with all information available in a central database.

The Bill lays great stress on ECT procedures. By making it mandatory for ECT to be given with anaesthesia, even though it is medically acceptable otherwise in certain circumstances, the bill might be unintentionally increasing the cost burden, also even deny the rightful treatment to poorer mentally ill. It is beyond the scope of this Act to prohibit a scientifically approved procedure.

The Bill essentially empowers the person with mental illness to nominate a person of one's choice to take care of him during his severe illness period. Nominated representative is similar to a legal guardian but differs in principle that the person with mental illness retains their full legal capacity and makes his or her decision most of the time. Right of choosing a nominated representative runs the risk of repeated amendments resulting in loss of confidentiality and increased conflicts with care-givers. The concept of guardianship seems better for an Indian scenario.

Nikolas Rose, 1985 has criticised 'rights-strategists' on the basis that Mental Health Laws based on rights simply switches the control of individuals with mental illness from doctors to attorneys[10].The composition of the Regulatory body i.e. The Mental Health Review Panel suffers from a lack of adequate representation of appropriate medical experts such as psychiatrists, as the remaining panel consists of people who are not part of the medical fraternity and lack awareness of scientific evidence needed to make medical and treatment decisions. This anomaly becomes all the more dangerous considering all the decisions are made on the majority ruling and hence could over rule medical and professional expert decisions, without having responsibility of the consequences. It thus becomes essential to empower medical practitioners to take independent medical decisions.

ROLE OF CAREGIVERS

The role of families and caregivers as primary stakeholders in supporting people with mental illness has to be recognized under the MHC. Especially in a country like India, where the collective goals of family are culturally considered at par with individual rights, a step to let a patient choose the line of treatment he/she desires could be in conflict with the choices of the caregiver. This would put the family and the patient on opposite sides of the legal fence as adversaries and could even lead to the families being less willing to be proactive in the treatment of their wards[11]. With increased care-giver burden, persons with mental illness may be abandoned. It is impossible to achieve adequate psychiatric treatment without family support.

The emerging clientele of today seems to be largely composed of well informed, highly rights oriented, poorly motivated and non compliant patients. They generally resist admissions and interventions, rendering the caregivers, mental health professionals and law enforcement agencies ultimately helpless, thereby defeating the purpose of optimal treatment of persons with mental illness. A critical analysis in this perspective would be questioning the need to include patients admitted with families, as they may not need the protection under the bill.

THE SERVICE PROVIDER- THE DEPOSED DOCTORS

The Bill seems to increase the patient's empowerment but does not take into account that the decision should involve the patient, caregiver and treating doctor. The Advance Directives can be at times not in line with the opinion of the expert doctor, thereby making them handicapped and at a loss to provide the rightful, appropriate line of management. This would lead to adverse pressure on practitioners when he has to follow the Advance Directives much against his own judgement based on experience and training. There is also a justified fear that in many cases there will be an aspect of adverse legal implications looming over a doctor's treatment decisions. The admission procedures may become tedious processes driving caregivers and patients away from the hospitals and doctors refusing admission.

The practice of Psychiatry in the Indian context has been based on responsibility and paternalistic attitude, largely driven by culture involving the patient and the caregiver. The management is based on less discussion, more decision oriented with emphasis towards the results. But the Bill might change all this. The management will turn more informed-consent oriented and less decision oriented. More of documentations and defensive practices will set in. Emergency and risk taking decisions will tend to be avoided and limited consultations will lead to long waiting lists for patients. Practitioners would thus resort to comfortable outpatient treatment avoiding inpatient care which might defeat the recovery goals.

The Bill seems to focus more on the rights and empowerment of the patients, discounting the inconvenience caused by certain patients at many levels of the society. Considering the case of a fully empowered vengeful paranoid patient, after having violated the rights of the family and also the treating team may go on to complain to various controlling bodies. The adverse result of which would be enough for the Mental Health Establishment and Psychiatrist to wind up. To enjoy the full rights under this bill, the patient should have a responsibility to comply with compulsory treatment decisions whenever appropriate.

Since NIMHANS is a declared institute of national importance and has the best relevant research, scientific and evidence based data, it is suggested that this premier Institution could be the head office of the review commission. NIMHANS could be actively involved in Bill's drafting, conceptualization, implementation and part of review boards. A multi-level structure for this review commission like a district level and a state level may be considered. Also, hospitals should have review boards constituted according to norms.

PHCs, Community centres, district hospitals, custodial setups such as orphanages, juvenile homes, prisons etc should be kept out of the limits of the 'mental health establishment' definition as it could result in their refusing care to those in need.

With a poor patient-mental health professional ratio in the country, to implement this Bill, 25000-35000 psychiatrists would be required. However with only few thousand practicing psychiatrists, any additional documentation work resulting from compliance to the new Bill will overburden the medical care system to the extent of choking it and compromising its quality. In India, with inadequate resources for mental illness care, the view of practitioner's and also caregiver's burden should also be kept in mind[12].

CONCLUSION

The Bill in its consonance with International laws and provision of Psychiatric Advanced Directive is aimed to be a progressive and far-sighted step. But there are significant barriers to the feasibility and acceptability of legally mandated Advanced Directives. There are logistical barriers to put them into force in a manner that guarantees quality assurance of the process with minimal possibility of misuse[13]. In an extensive meta-analysis of literature as part of Cochrane review, it was concluded that 'currently it is not possible to recommend Advanced Directive for people with severe mental illness due to lack of supporting data[9]. Sarin is of the view that it is an irrefutable argument on whether people suffering from severe mental illness may have difficulties in utilizing the provision of Advanced Directive[14].Even though it is a highly desirable clinical tool empowering the patients with rights and choices, it may be far too ahead of time to be implemented and benefits derived in India as we are at least 30 to 40 years behind. Moreover, in the Western countries, the Advance Directive has failed to achieve what it had set out to do. To conclude, the MHC Bill which seeks to empower patients appears to be utopian and farfetched in relation to ground realities in our country. We are still fighting social stigma attached to this illness, non adherence to prescribed medication, highly inadequate medical infrastructure and Government apathy. The law needs to be designed for the majority, therefore it is suggested that the new Bill be dropped and instead, effectively work towards a thorough implementation of the MHA 1987 with the appropriate modifications.

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Disease Burden of Coronary Artery Atherosclerosis - An Autopsy Study from Tertiary Health Centre in North India

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ABSTRACT

The incidence of coronary artery disease has been markedly increased in India. The present study was designed to assess the atherosclerotic lesions of coronary artery with wide age range in the semi-urban and urban population at tertiary health centre in north India. The study comprises heart specimens of 200 autopsy cases. The cases were divided into different groups according to age (0-10yrs, n=4), (>10-20yrs, n= 6), (>20-30yrs, n= 43), (>30-40yrs, n=40), (>40-50yrs, n= 39), (>50-60yrs, n= 43), (>60-70yrs, n= 20), (>70yrs, n= 5). There were 160 (mean age 45.59 years ±15.48) males and 40 (mean age 32.02 years ±13.42) females. The coronary vessels were examined grossly as well as microscopically for the presence of atherosclerosis in every case. Atherosclerotic lesions were categorized into VIII types. On data analysis frequency of advanced atherosclerotic lesions was seen increasing in early age group. Atheromatous change was noted from 3rd decade of life with maximum percentage seen in 5th decade, indicating that age for presentation of atherosclerosis is decreasing. Overall frequency of atherosclerosis was found to be 34.0%. And also, it was noted that atherosclerosis was less common in females younger than 40 years of age while no statistically significant difference was observed between males and females after 40 years of age.

It was concluded that an autopsy based study to assess frequency of atherosclerosis is cost effective procedure and is helpful tool to direct and transform the evolution of the coronary artery disease.

Keywords: *Atherosclerosis, autopsy, coronary artery disease, heart, coronary vessels.*

INTRODUCTION

Coronary artery disease (CAD) due to atherosclerosis has emerged as a major health burden worldwide, and is an epidemic in India. A total of nearly 6.4 crore cases of coronary artery disease are likely in the year 2015. Current prevalence of cardiovascular disease is to be between 7-13% in urban and 2-7% in rural India. The project death from CAD by 2015 is 2.95 million of which 14% will be < 30years, 31% will be < 40years.[1, 2] Also WHO has predicted that from years 2000 to 2020 Disability adjusted Life year Lost (DALYs) from coronary vascular disease (CVD) in India shall double in both men and women from the current 7.7 and 5.5 million respectively.[3] Advanced medical care, interventional and surgical therapy along with effective preventive measures, has shown an improvement in extended life expectancy as well as quality of life, but the prevalence of CAD seems to remain high in the developed countries.[2] In India, due to wide age variation of race, geographic factor, dietary habits, life style, tobacco and alcohol usage among population, epidemiological study of specific population is of great importance.[4] Because Indian population affected atherosclerosis with more advanced lesion at younger age than in other ethnic

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groups.[5] In the developing countries like India, atherosclerosis cannot be studied in living population especially due to limited amount of resources available in rural and semi-urban population. So in order to answer the burden and magnitude of the disease, especially in young population an autopsy study provides a good background.[6, 7]

MATERIAL & METHOD

The present study was conducted on heart specimens received of 200 post-mortem cases by department of pathology, at tertiary health care centre. The heart specimens were fixed in 10% formalin weighed and was examined grossly. The main coronary arteries were dissected out. Each coronary was then sectioned by multiple closely spaced cuts with a scalpel. The arteries were examined carefully for thickening, yellow streaks, plaque, calcification or thrombus. The ventricles were sectioned transversely at 10 mm intervals commencing from apex. Tissue were taken and processed, after paraffin embedding 4 micro-meter sections were cut and histopathological examination was done. The categorization of lesions was done on the basis of classification recommended by American Heart Association.

FINDINGS

Out of the 200 hearts examined and studied, 160 specimens (80%) were of male (mean age 45.59 years ±15.48) and 40 specimen (20%) were of females (mean age 32.02 years ±13.42), and average weight of the heart in males was 350gms and females was 250gms. All the cases were divided into the different age groups according to the age at death. (Table 1)

Table 1: Age wise distribution of cases

Age group	Males	Females	Total	Percentage
0-10	04	NIL	04	02%
>10-20	03	03	06	03%
>20-30	24	19	43	22%
>30-40	33	07	40	19%
>40-50	34	05	39	20%
>50-60	40	03	43	21.5%
>60-70	18	02	20	10%
>70	04	01	05	01%
Total	160	40	200	100%

Then atherosclerotic changes were observed (Figure 1), (Figure 2) and (Figure 3) and were categorized into various types according to classification given by AHA (Table 2).

Table 2: Coronary artery atherosclerosis according to AHA Classification based on histopathological examination

Type of lesion	No. of patients	Percentage (%)
Type I: initial lesion with foam cells	11	5.5%
Type II: fatty streak with multiple foam cell layers	18	9.0%
Type III: preatheroma with extracellular lipid pools	14	7.0%
Type IV: atheroma with a confluent extracellular lipid core	11	5.5%
Type V: fibroatheroma	5	2.5%
Type VI: complex plaque with possible surface defect, hemorrhage, or thrombus	1	0.5%
Type VII: calcified plaque	6	3.0%
Type VIII: fibrotic plaque without lipid core	2	1.0%
Total	68	34.0 %

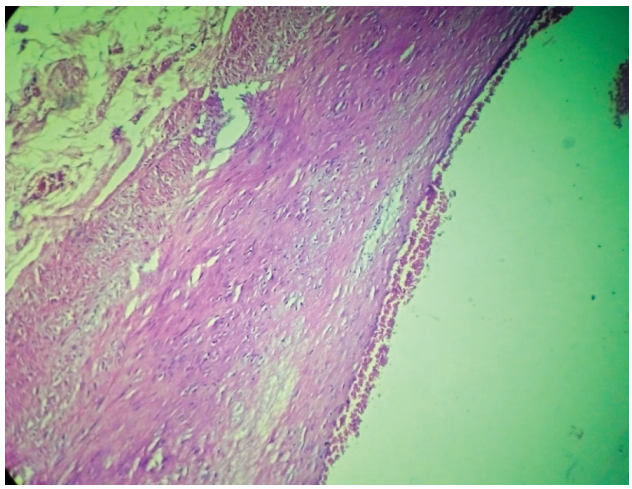

Figure 1: Type II atherosclerosis

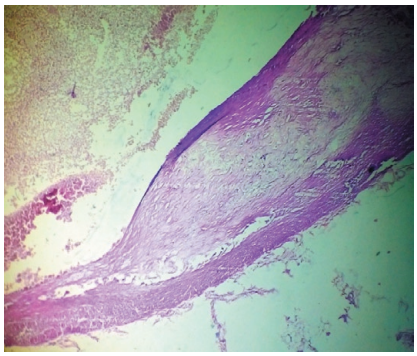

Figure 2: Type IV atherosclerosis

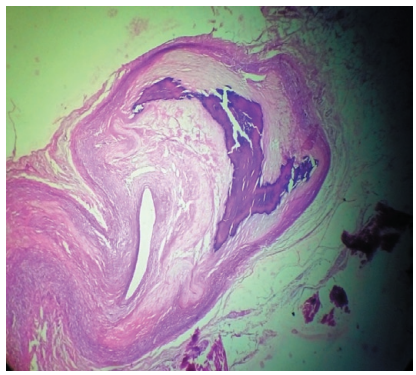

Figure 3: Type VII atherosclerosis

Table 3: Type wise distribution of atherosclerosis in different age groups

Age group	Type of atheros-clerosis									
	Type I	**Type II**	**Type III**	**Type IV**	**Type V**	**Type VI**	**Type VII**	**Type VIII**	**Total affected**	**Total Normal**
Less than 10	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	04
11--20	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	06
21--30	4	3	1	1	NIL	NIL	NIL	NIL	09	43
31--40	2	2	1	1	1	NIL	NIL	NIL	07	40
41--50	3	6	4	3	1	NIL	NILL	NIL	17	39
51--60	2	5	6	4	1	NIL	2	NIL	20	43
61--70	NIL	1	2	1	2	1	3	1	11	20
More than 70	NIL	1	NIL	1	NIL	NIL	1	1	04	05
Total	**11**	**18**	**14**	**11**	**5**	**1**	**6**	**2**	**68**	**132**

Furthermore, changes were correlated with different age groups as well gender also (Table 3)

Table 4: Gender wise distribution of atherosclerosis in cases above 40 and below 40 years of age

Gender	Total cases	Total affected cases	Percentage	Statistical significance (P-value)
Males				
40 yrs	64	14	21.87%	0.05
>40 yrs	96	48	50.00%	1.0
Females				
40 yrs	28	03	10.71%	0.05
>40 yrs	12	06	50.00%	1.0

DISCUSSION

Coronary artery disease is the main cause of death in the most developed countries. There is an alarming increase in the disablement and mortality due to coronary atherosclerosis in India. Atherosclerosis has been in existence as a disease for human beings for more than thousand years as seen in Egyptian mummies.[8] It is a common phenomenon which is seen with different races. Coronary artery disease has multiple etiological factors. In infants and children early lesions (Type I & II) can be seen, soon after puberty Type III lesions may evolve and in their composition they act like a bridge between

early and advanced atherosclerotic change.[9] Type IV lesions are frequent from 3rd decade onwards and after 3rd decade further progression of atherosclerosis begins to appear. The American heart association has characterized and classified atherosclerotic lesion from Type I to Type VIII.[10]

The greater cause for concern in the early age of CAD in the developing countries compared to the developed countries is that the progression of disease can be modified by taking simple preventive measures and burden of disease, which cripple the major work force of the nation can be reduced.[11, 12] As atherosclerotic change develop very early in life starting from age of 15 years onwards. In the present study done, 19.2% atherosclerotic change was seen in younger age group only (20-40yrs). It is in concordance with study done by Fausto et al which showed 10% young people with atherosclerosis in western population (15-34 yrs).[5] Yazdi et al, showed 25% in 21-30years population and 78.5% in older population in Iran.[13] Amongst 19.2%, Type I & II atherosclerosis was seen in 68.7% cases which is an early change and precursor of atherosclerosis. While bridge to early atherosclerosis and advanced atherosclerosis was seen in 31.2% cases. In study done by Bhanvadia VM and fellows, amongst the affected cases below 40 years of age early lesions were seen predominantly (76.2%). Whereas advanced lesions were seen in 23.7% of the cases. In addition to this, early change in 54.4% cases and advanced atherosclerotic change in 45.6% of the total affected cases after 40 years was seen. Where as in the current study 57.6% cases showed early change and 42.3% cases showed advanced atherosclerotic change in affected above 40 years age group.[14]

Overall incidence of atherosclerosis in the present study was found to be 34.0% which was comparable with the frequency given by Yazdi et al (40%) and Golshahi et al (28.9%).[13,15] Atheromatous change was noted from 3rd decade of life and incidence was seen increasing with increasing age, with maximum incidence seen in 5th decade of life. While according to Dhruva et al, maximum incidence was in sixth decade.[16] Whereas Kerala has the highest (82.8%) prevalence rate of coronary artery disease in patients above 60 years.[17]

Also in an age group more than 40yrs, atherosclerotic lesions especially advanced changes were found to be of equal frequency both in males and females cases, favoring that after this age risk of atherosclerosis is same for both the genders. On the other hand less than 40 years of age group showed statistically significant (P-value 0.05) differences in frequency of atherosclerosis. These finding were in support of the fact that females are still under-recognized for coronary artery diseases and still needs further evaluation.[18]

As, it was an autopsy study done with specimen received for medico legal purposes. Males are considered more vulnerable to violence and accidents. It may be the reason for lesser no of female cases (20% of the total cases). Various studied conducted in the past also showed more or less similar finding. Dhruva et al, also reported 73.6% males and 24.2% females in their autopsy study heart [16] Another study conducted by Bhargava et al shows 74.8% males and 24.2% female.[19] On the other hand study done by Murthy et al and Singh et al also showed 82% males, 18% females and 85% males, 15% females respectively, which were in favor of the present study.[20, 21]

There is some limitation of present study in the form of unequal sample size of females as compared with males. Also unavailability of complete history of associated diseases, like hypertension, diabetes etc.

CONCLUSION

Now days, CVD has become a ubiquitous cause of morbidity and a leading contributor to mortality in most countries like India. In addition to this, it causes crippling of work force also. So change in life style and dietary habits can be instituted early in third decade of life. Due to limited resources, investigations for atherosclerosis in living subject are not feasible in developing countries. Autopsy based studies to assess the increasing frequency of atherosclerosis especially in young population are cost effective procedure. Also it is helpful in estimating the further disease burden in developing nation and can helps in planning of preventive measures to control and modify the progression of the disease.

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Source of Support: No

Ethical Clearance: Not applicable

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A Cross Sectional Dermatoglyphic Analysis in Children with Dental Caries

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ABSTRACT

Dental caries is one of the commonest problems faced by children leading to loss of teeth. The present study correlates the relation between fingerprint and dental caries in children. Dermatoglyphic pattern variations in children between study (caries) group and control (non caries) group were analyzed. Results show increase incidence of whorl and arch in female caries group where as male caries group show mild decrease in ulnar loop. Dental caries being multifactorial in causation, the results were in contrast to the earlier studies. Hence more advanced studies with larger sample group and with environmental and bacterial factors as co ordinates are required.

Keywords*: Dermatoglyphics, Intra Uterine life, Caries, dmf score.*

INTRODUCTION

Dermatoglyphics or Fingerprint system is the study of ridge patterns in the skin. Fingerprints are impressions of patterns formed by the papillary or epidermal ridges of the fingertips[1]. Fingerprints study was first suggested by Galton and later modified by Edward Henry. Fingerprints are formed during intra uterine life and remain constant throughout life.They are highly individualistic even in monozygotic twins[2]. Fingerprints are classified into four major groups :1) Loop (65%) 2)Whorl(25%) 3)Arch(7%) 4)Composite(2-3%). In loop ridges start from one side, run in parallel lines and curve backward to terminate in same side of origin. If the ridges terminate in medial side of finger it is called ulnar loop, if it terminates on lateral it is called radial loop. In Whorl, there are multiple circular or oval ridges one around other. In arches, the ridges start from one side and proceeds for some distance and end in opposite side. In plain arch ridges make a wave like curve. In tented arch, ridges form a sharp or spike like rise at curving point. In composite, there is combination of more than one pattern[3].

Dental caries also known as tooth decay or a cavity, is an infection bacterial in origin, that causes demineralization and destruction of enamel, dentin and cementum. Dental caries is a major oral health problem in most industrialized countries, affecting 60 to 90% of school children and vast majority of adults. Early manifestation of caries process is small patch of demineralised enamel at the surface. The destruction spreads into the dentine. The weakened enamel then collapses to form a cavity and tooth is destroyed.[4]

The basis of considering dermatoglyphic pattern as genetic marker for dental caries is that primary plate develops during 6-13th week of intra uterine life. Epithelium of primary palate as well as finger buds develop from same site and are ectodermal in origin. Enamel and epithelium of finger bud have ectodermal origin and develop at same time in intra uterine life.[5,6] Palm and finger print are formed during 6th to 7th week intrauterine life completed by 10 to 12 weeks.[6]

Dermatoglyphics is considered as a window of congenital abnormalities and is a sensitive indicator of intra uterine anamolies[5]. Dermatoglyphics has drawn attention in the field of dentistry as it has been used to unveil oral diseases like dental caries , oral cancer, bruxism, anomalies of teeth , cleft lip and cleft palate.[7] Dermatoglyphics is a cost effective method and reliable criteria for quantifying disease process in dentistry, medicine, psychiatry and anthropology[8]. previous study has concluded that dermatoglyphics may serve as noninvasive reliable genetic marker for dental caries[9]. Dermatoglyphics could indicate genetic susceptibility to dental caries in children[10].

MATERIAL & METHOD

A cross sectional study of fingerprints was done by using Cummins and Midlo method[11]. Study of finger prints was done in 100 children of age group 6-12 years. Samples were selected from department of Pedodontics, Rajarajeswari Dental College, Bangalore. Samples were divided into two groups: Study(Caries) group and Control(noncaries) group. Method of fingerprinting: Rolled method(one side of inked finger tip is gently pressed on paper, then rolled on paper without lifting finger)[3]. Fingerprint thus obtained are examined with help of magnifying lens and findings are recorded. Dental Caries were detected clinically using mouth mirror and probe in daylight.

Inclusion criteria: Children with age group of 6-12 years and dmf (decay, missing, filled) score more than 3.

Exclusion Criteria: Children with special healthcare need. Example: Cleft lip, Cleft palate, physically challenged.

RESULTS AND DISCUSSION

A total of 100 students were studied out of which 50 were study(Caries) group and other 50 were control(noncaries) group. Results are tabulated as below:

Table 1: Distribution of samples based on gender and group

Sex	Caries Group	Noncaries Group
Male	24	26
Female	26	24

Table 2: Dematoglyphic pattern in Caries group (including right and left hand)

Sex	Whorl	Ulnar loop	Radial loop	Arch
Male	110	108	2	20
Female	112	104	2	42

Table 3: Dematoglyphic pattern in NonCaries group (including right and left hand)

Sex	Whorl	Ulnar loop	Radial loop	Arch
Male	120	118	2	20
Female	84	132	4	10

Table 4: Dematoglyphic pattern in Caries group (right hand)

Sex	Whorl	Ulnar loop	Radial loop	Arch
Male	60	50	0	10
Female	58	52	2	18

Table 5:Dematoglyphic pattern in Caries group (left hand)

Sex	Whorl	Ulnar loop	Radial loop	Arch
Male	50	58	2	10
Female	54	52	0	24

Table 6: Dematoglyphic pattern in NonCaries group (right hand)

Sex	Whorl	Ulnar loop	Radial loop	Arch
Male	52	64	2	12
Female	42	60	4	4

Table 7: Dematoglyphic pattern in NonCaries group (left hand):

Sex	Whorl	Ulnar loop	Radial loop	Arch
Male	68	54	0	8
Female	42	72	0	6

WHORL STUDY

Incidence of whorl is more in caries group than in non caries group.It is observed that male caries sample group shows decrease in percentage of whorls compared to noncaries control group but in female caries sample a reverse trend is seen that is whorls are higher in caries group than in control group which is similar to study done in Bengali children[12].The occurrence of whorl among caries group is more common in fourth digit in males and in females it is highest in right index finger in contrast with earlier study[13] where it is highest in left third digit. In caries samples, whorl pattern is more often seen in right hand than in left hand in both males and females. In male non caries sample there is increase in whorl pattern in left hand than in right hand.

ULNAR LOOP STUDY

Occurrence of ulnar loop is more among

noncaries sample than in caries sample. We infer from the present study that ulnar loop show increase incidence among female noncaries group than in female caries group concurrent to earlier study[13] but in contrast to study on Bengali children[12].Male control group show mild increase in ulnar loop pattern than in caries group but not stastically significant. The left middle finger in female control group show increased incidence of ulnar loop. In male caries group ulnar loop pattern is more often seen in left hand than in right hand. In male non caries group ulnar loop is more common in occurrence in right hand, whereas in female noncaries group, ulnar loop is more common in left hand.

RADIAL LOOP STUDY

The incidence of radial loop is very less in both study as well as control group, with slightly greater incidence in female control group. Radial loop pattern was absent in right hand of male caries group, left hand of female caries group and in both male and female noncaries group in left hand.

ARCH STUDY

Incidence of arch is more among caries group than in control goup.female caries group has maximum arches with increase incidence in left index finger which is in contrast to earlier study[12] where there was absence of arch pattern in caries group and in study[14] on deaf-mute children where no significant difference in control and sample group was observed. In female caries group, arch pattern is more in incidence in left hand. In male non caries group arch pattern has increased incidence in right hand. In female non caries group, arch pattern is frequently seen in left hand.

CONCLUSION

Correlation of dermatoglyphics with dental caries is still in nascent stages. Earlier studies have yielded varying results when compared to present study. Multifactorial etiology in causation of dental caries is the hinderance factor for dermatoglyphics being the clear indicator of dental caries. Environmental factors and bacterial infection play a major role in dental caries. The role of genetic factor is relatively lower than other factors in dental caries . The present study may form a stepping stone for future advanced studies with larger study sample and with environmental and bacterial factors as coordinates. Never the less dermatoglyphics remain a cost effective method of studying the relation between genetics and dental diseases. Dermatoglyphic variation may be an important tool to identify people at risk of dental caries and take adequate precautions to prevent the same. From this study we can conclude that dental caries susceptibility of an individual increases with increase in whorl pattern and arch pattern in females and in males with decease in ulnar loop pattern.

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A Six Year Retrospective Study of Custodial Deaths due to Natural Causes

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ABSTRACT

Numbers of deaths in custody are increasing every year. Contrary to the popular belief, deaths occurring in custody could be due to natural causes along with the unnatural ones. The autopsy allows for proper certification of the cause and manner of death and ends speculation about other causes of death and possible injuries. Many of these deaths are premature deaths and can be prevented with proper care and treatment. In the present six year retrospective study, total 118 custodial deaths brought to the mortuary for autopsy were studied. Of them 96 (81.35%) cases had died of natural causes. Study showed male preponderance with most of the cases from the age group 31 to 35 years when both sexes were considered collectively. As far as the type of custody was concerned almost all cases were held in jail when the terminal symptoms that led to their death appeared first. Ischaemic heart disease (23.95%) was by far the most common cause of death among the natural custodial deaths followed by pneumonia (21.87%).

Keywords: *Custodial deaths, Natural causes, Human rights, Ischaemic heart disease*

INTRODUCTION

The label "custodial death" refers to all deaths that occur while an individual is a prisoner or ward of the state. Although people most commonly envision it as "death in prison cells," any death that occurs during arrest, in the backseat of a police car, in a rehabilitation facility or even in a hospital, days, weeks or months after an altercation qualifies as a custodial death.[1]

According to the National Crime Records Bureau, 1,418 deaths in police custody took place in India between 1999 and 2013, and around 23% of these (or 333) were reported from Maharashtra. Of the total 360 deaths in police custody reported in India between years 2011 to 2103, natural deaths accounted for 114 (31.66%) cases.[2]

Contrary to the popular belief, deaths occurring in custody could be due to natural causes along with the unnatural ones.[3] Many people who die while in custody die suddenly and unexpectedly of natural disease processes, the most common of which are atherosclerotic cardiovascular disease and hypertensive cardiovascular disease. The autopsy allows for proper certification of the cause and manner of death and ends speculation about other causes of death and possible injuries. The autopsy is also important from the infectious disease standpoint, because it may uncover tuberculosis, meningitis, or other infectious diseases that might have been transmitted to others in close quarters.[1]

Many of these deaths are premature deaths and can be prevented with proper care and treatment. In addition, having knowledge and data regarding such deaths is important to focus attention on prison

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medical services and can facilitate the implementation of preventive programs. Such studies would also guide the prison authorities in setting priorities for the allocation of their healthcare services and budget.[4]

To serve this purpose mortality and morbidity data is needed which is lacking to a great extent in India. Therefore, we undertook this study to examine the mortality patterns among the custodial deaths in this part of the country.

MATERIAL & METHOD

The present study is a six year retrospective study carried out at Department of Forensic Medicine and Toxicology, B.J. Government Medical College and Sassoon Hospital Pune, India during January 2008 to December 2013. The details of all the custodial deaths that were reported during the study period were obtained from the inquest reports, hospital treatment records, autopsy reports, laboratory investigation reports and chemical analyzers reports. The data was analysed for demographic profiles, cause of death, pre existing illness and other relevant findings.

OBSERVATIONS

During the six year study period total 118 custodial death cases were brought to the mortuary for autopsy. Of them 96 (81.35%) cases had died of natural cause and 18 cases had died of some unnatural cause. Manner of death was not ascertained in 4 cases.

Of the total 96 cases that died of natural cause, 87 (90.62%) were males and 09 (9.38%) were females. Most of the cases were from the age group 31 to 35 years when both sex were considered collectively. However among females the age group 61 to 65 got the maximum representation. (Table 1)

As far as the type of custody was concerned almost all cases were held in jail when the terminal symptoms that led to their death appeared first. While only one case was reported that had died in the police lockup.

It was noted that ischaemic heart disease (23.95%) was by far the most common cause of death among the natural custodial deaths followed by pneumonia (21.87%). Disseminated tuberculosis and pulmonary tuberculosis collectively accounted for 21 (21.87%) cases. (Table 2)

DISCUSSION

People with significant known and documented natural diseases that die while in jail or prison should also be autopsied, even though the likely cause of death may already be known. The autopsy is important not only to exclude unknown injury, but also to document the nature and extent of the known natural disease. Toxicological analysis of these individuals is important not only to evaluate for drugs of abuse, but also to determine if they were consuming their prescribed medications while in custody. These factors are important to document, because family members may question whether or not they were receiving proper care while in jail or prison.[1]

The custodians are bound by the law to provide adequate necessary amenities to ensure the health and safety of persons in their custody, including medical assistance and treating the inmates in a humane manner.[5] The person who is held in custody is totally dependent on his or her custodian for proper care and enough medical attention.[6]

Our observation that natural custodial deaths are more common than unnatural custodial deaths is in accordance with the previous studies in this context.[5,6,7] However Wobster et al in their study in Canada had reported that custodial deaths due to unnatural causes exceeded those due to natural ones.[8]

As many as 90.62% of the cases of natural custodial deaths were males. Similar findings were noted by different authors in their corresponding studies.[5, 6, 7, 9]

When the ages of the victims were taken into consideration it was observed that most of the cases (14.58%) belonged to age group 31 to 35 years, the finding being consistent with that of existing literature.[7] However Jhamad et al had reported that most commonly the cases were from the age group 25 to 35 years.[3]

When the cause of death was considered we observed that ischaemic heart disease (23.95%) was the most common cause of death followed by pneumonia

(21.87%). Bardale et al in their study of natural custodial deaths had reported that tuberculosis was by far the most common cause if death in prison inmates followed by ischaemic heart disease.[9] In our study we observed that disseminated tuberculosis and pulmonary tuberculosis had collectively accounted for 21 (21.87%) cases. High incidence of tuberculosis among inmates can be attributed to overcrowding, closed living conditions, insufficient ventilation, poor living conditions and poor nutrition.[10]

An important fact responsible for the deaths occurring in custody is the condition of the jails in India. [11] Overcrowding, unhygienic environment, malnutrition and non-availability of health facilities are the conditions which cause spreading of various communicable diseases such as various vector-borne diseases, blood- borne diseases and sexually transmitted diseases. Besides these, inmates are also prone to various non-communicable diseases such as cardio-vascular diseases, respiratory diseases, mental disorders, neurological disorders, substance abuse disorders and cancers. These are mainly due to physical inactivity, unhealthy and stressful environment, unhealthy food, physical and sexual violence, deliberate self- harm, various drug abuse and mental health problems mainly depression, anxiety, adjustment problems and psychosis.[3]

TABLES

Table 1: Age and Sex wise distribution of cases

Age group	Male cases	Female Cases	Percenatge
21 – 25	3	00	3.12
26 – 30	7	01	8.33
31 – 35	13	01	14.58
36 -40	11	01	12.5
41 – 45	10	01	11.45
46 – 50	11	00	11.45
51 – 55	6	00	6.25
56 – 60	11	01	11.45
61 – 65	5	02	5.2
66 – 70	6	01	5.93
Above 71	4	01	4.23
Total	87	09	-

Table 2 : Cause of death wise distribution of cases

Cause of death	Male	Female	Total	Percenatge
Acute pyelonephritis	01	00	01	1.04
Carcinoma lung	02	00	02	2.08
Cardiac tamponade	02	00	02	2.08
Cerebral malaria	00	01	01	1.04
Chronic renal failure	02	01	03	3.12
Chronic obstructive pulmonary disease	00	01	01	1.04
Diabetic ketoacidosis	01	00	01	1.04
Disseminated intravascular coagulation	01	00	01	1.04
Disseminated Tuberculosis	07	01	08	8.33
Encephalitis	01	00	01	1.04
Hepatic encephalopathy	01	00	01	1.04
Ischaemic heart disease	22	01	23	23.95
Intracranial heamorrhage	04	00	04	4.16
Liver cirrhosis	01	00	01	1.04
Meningitis	02	01	03	3.12
Myocardial infarction	05	00	05	5.20
Pneumonia	19	02	21	21.87
Sepsis	04	00	04	4.16
Pulmonary Tuberculosis	12	01	13	13.54
Total	**87**	**09**	**96**	**-**

CONCLUSION AND SUGGESTION

This is how we conclude the custodial authorities should responsibly perform their duties towards the inmates and should regularly review causes and rates of death among people in the custody and take appropriate preventive measures.

It is evident that most of the deaths occurring in custody are natural ones; where previous history of medical, surgical and psychiatric illness is present but authorities are unaware of them. Hence following recommendations are being made by us:

1. Complete pre arrest medical check up as per NHRC guidelines. This must include screening of diseases like HIV, HBV, Tuberculosis, Diabetes, Hypertension and previous psychiatric illness.

2. Custodial authorities should maintain proper registers regarding health issues of each inmate.

3. Timely education and training program should be organised by custodial authorities with the help of nearest government medical college to address the health issues of jail inmates and to increase health awareness. This should also include health check up by medical professionals.

4. Awareness cum training programs should be undertaken by NHRC to make prison inmates aware about human rights.

5. Appreciating the problem of overcrowding of jail inmates, it is needed to increase number of jails to accommodate extra burden.

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Femur Length from Femoral Fragments: Regression Equations for Fragments of Unknown Sex – A Regional Study

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ABSTRACT

Establishment of identity of individuals whether alive or dead, remains to be the centre of all medico legal investigations. In cases of fragmented skeletal remains, metric traits are helpful in determination of stature. Studies have been conducted to determine maximum length of femur from its fragment for both sexes. As the fragments recovered in disasters are usually of unknown sex, the equations specific for either of the gender would not be of much use. Hence, this study aims at deriving a regression equation from pooled data of both sexes.

The variables used in this study showed higher degree o f correlation, proving the efficiency of the equation.

Keywords: *Forensic Anthropology Population Data, Fragmentary Femur, Morphometry, Regression equation, Unknown sex.*

INTRODUCTION

Establishment of identity of individuals whether alive or dead, remains to be the centre of all medico legal investigations. The importance of identification of an individual or remains is often reiterated by the increasing incidence of mass disasters like aviation accidents, floods, earthquakes.

In most of the cases, definitive identification can be done with DNA finger printing, which is the gold standard technique. In cases where the body is in advanced decomposed state or fragmented, these techniques have lesser role. Thus in many conditions forensic investigators have an uphill task to analyze whatever skeletal remains are found and draw inferences of biological and medicolegal importance[1, 2,3]. We reiterate that proper analysis of the skeletal remains includes determination of the species, races, sex and the stature of the individual as well as the possible cause of death and time since death. [2, 3, 4, 5.]

All the human beings occupying this globe belong to the same species i.e. Homo sapiens. No two individuals are exactly alike in all their measurable anthropometric traits, even genetically identical twins (monozygotic) differ in some respects. These traits tend to undergo change in varying degrees from birth to death, in health and disease. As a number of factors influencing the skeletal development, skeletal proportions differs between different geographic areas. Hence it is desirable to have some means of giving quantitative expression to variations which such traits exhibit.[6]

Determination of some of these parameters requires the presence of one or more complete long bones, a condition that frequently eludes the investigator.

There are various ways to estimate stature from

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bones but the most easiest and the reliable method is by regression analysis[7, 8] In the past, scientists have all reached a common conclusion that stature can be estimated with great accuracy even from the smallest bone like metacarpal, although, they have encountered a small error of estimate in their studies.

By studying the femur, one can get fair idea about the age, sex, stature and sometimes the race of the individual[7] This with other corroboratory evidences would be essential in the identification the deceased.

From the results of all previous studies, the femur in the intact state is one of the bones with highest correlation with stature. It has also been shown to yield the best accuracy in the estimation of stature for any individual skeletal element.

However, the femur is not always recovered intact in forensic cases thereby rendering the equations derived from the whole bone inappropriate for analysis. This has necessitated the derivation of regression equations from the fragments of femur.

Studies have been done to estimate the maximum length of femur from femoral fragment in both sexes independently. But in practice, skeletal fragments are recovered mostly with the sexes unidentified.

In this study, effort has been made to derive regression equations for the reconstruction of the length of the femur from it fragmentary remains in unknown sex.

The Objectives of the study are

- To correlate various measurements of fragments of femur with its maximum length,
- To assess the feasibility of estimation of maximum femoral length from metric study of its fragments
- To derive regression equations for calculating maximum length of femur from its fragments.

MATERIALS & METHOD

120 adult femora for the study were collected from unidentified, unclaimed bodies coming for routine medico legal postmortem examination to the Institute of Forensic Medicine, Chennai, during the period from 1st August 2008 to 31st July 2010. Only completely ossified and intact femur are included for the study. Deformed, diseased or fractured femur, which will hamper the study of femur length measurement were excluded.

REMOVAL OF FEMUR

Removal of femur is done by a long lateral skin incision extending from hip joint to knee joint. The knee joint is exposed by flexing the knee and cutting the quadriceps tendon, the joint capsule, and the cruciate ligaments. The muscular attachments are dissected from the shaft of the femur, starting at the distal end and continuing towards the hip. The capsule of the hip joint is palpated and then incised by flexing and rotating the femur. The femur is dissected out by incising the other ligaments. The soft tissues are removed by treating the femur with antiformalin solution.

The maximum length of femur is measured by osteometric board. Other femoral measurements were taken by vernier calipers.

FRAGMENT	DESCRIPTION
FML- maximum length of femur	linear distance between the most superior part of the head of the femur and the most inferior part of the medial condyle.
VHD- Vertical diameter of the femoral head	linear distance between the highest and lowest points of the head in the equatorial plane
VHA- upper breadth of femur	linear measurement between the most superior point on the fovea capitis to the inferior aspect of the greater trochanter
VND- Vertical neck diameter	minimum linear distance between the superior and inferior points on the neck of the femur
FDL- Epicondylar Breadth	linear distance between the most projected points on the epicondyles. The measurement is taken right angle to the shaft axis.

The maximum length of femur is measured by osteometric board. Other femoral measurements were taken by vernier calipers. (Cont...)

BCB- Bicondylar Breadth	most lateral and posterior projection of the lateral condyle, to the most medial and posterior projection of the medial condyle
MCL- Medial condyle length	linear distance between the most anterior and the most posterior points on the medial condyle.
LCL- Lateral condyle length	linear distance on the lateral condyle measured in an anteroposterior direction.

The data were collected and placed into excel sheets, statistical analysis carried out on the male and female groups using SPSS software.Descriptive statistics including means and standard deviation were obtained. FML was regressed on individual measurements and combination of measurements.

Then, correlation coefficients and standard error of estimate (SEE) were obtained. Regression equations were formulated from these coefficients.

RESULTS

Table – 1: Descriptive Statistics of all the femora

Measurements	N	Minimum	Maximum	Mean	Std. Deviation
FML	120	36.4	47.8	42.2	3.0
VHD	120	3.35	5.11	4.2	0.5
VND	120	2.19	3.9	2.9	0.4
VHA	120	7	10.55	8.7	1.0
BCB	120	5.3	8.27	6.7	0.7
FDL	120	5.91	8.47	7.3	0.7
LCL	120	4.9	7.35	5.8	0.6
MCL	120	4.67	7.44	5.7	0.7

NOTE: All the measurements are in cm.

Table -2 : Correlations of Measurements of Fragments of Femur with Maximum Length of Femur (FML)

Fragments	VHD	VND	VHA	BCB	FDL	LCL	MCL
FML (Overall)	0.913(**)	0.873(**)	0.927(**)	0.870(**)	0.922(**)	0.844(**)	0.915(**)

** Correlation is significant at the 0.01 level (2-tailed)

** Correlation is significant at the 0.05 level (2-tailed)

Table- 3 presents the slopes, intercepts and standard errors of estimates

- All the measurements showed positive degree of correlation.(table -2)
- All the parameters showed a high degree of correlation.

Table-3: Regression Constants for estimating FML from Femur Fragments

Fragment	Slope (b)	Intercept (a)	S.E.E.
VHD	6.0	17.0	1.251
VND	6.26	23.89	1.492
VHA	2.96	16.31	1.144
BCB	3.83	16.61	1.510
FDL	3.88	13.84	1.185
LCL	4.48	16.08	1.643
MCL	3.92	19.71	1.234

Table – 4: Equations for estimation of maximum length of femur (with correlation and SEE) from individual fragments of femur

Equations	Correlations	SEE
16.307+2.961(VHA)	0.860	1.144
19.706+3.924(MCL)	0.837	1.234
13.841+3.884(FDL)	0.850	1.185
17.006+6.004(VHD)	0.833	1.251
23.894+6.264(VND)	0.762	1.492
16.612+3.828(BCB)	0.757	1.510
16.084+4.483(LCL)	0.712	1.643
16.647+1.773(MCL)+1.760(V HA)	0.890	1.021
14.975+1.279(VHA)+1.289(FDL) +1.157(MCL)	0.900	0.974

- Among all the fragments of both ends, the proximal fragments (vertical diameter of head and upper breath of femur) correlated well with the femoral length. The measurements of the proximal fragments' consistently showed the best correlation with FML.

- While considering the proximal end, measurement of the upper breadth of femur (VHA) showed better correlation (Table – 2,4).

The equations were obtained by linear regression analysis of the individual measurements with the FML.(table -3)

Table – 5: Equations for estimation of maximum length of femur (with correlation and SEE) from proximal fragments of femur

EQUATIONS	CORRELATIONS	SEE
16.284+2.060(VHD)+0.78 2(VND)+1.713(VHA)	0.879	1.074

Table – 6: Equations for estimation of maximum length of femur (with correlation and SEE) from distal fragments of femur

15.605-0.077(BCB)+2.242(FDL)-0.085(LCL)+1.960(MCL)	0.880	1.073
15.486-0.081(BCB)+2.237(FDL)+1.90 6(MCL)	0.880	1.068
15.435+2.195(FDL)+1.873(MCL)	0.880	1.064

- The equations regressed to determine the FML using independent variables showed high degree of correlation (Table-4). The regression equation from the individual fragment upper breath of femur(VHA) showed the highest correlation 0.860.

- The equations regressed to determine the FML using combined measurements of different femoral fragments showed higher degree correlation than with individual measurements (Table -5).

DISCUSSION

Intact long bones of the upper and lower extremities have been used in the derivation of regression equations for the estimation of stature in different population groups. Many studies presented regression equations derived from segments of bones. These bones are sometimes presented to forensic anthropologists in different states of fragmentation. Experts found it difficult to demarcate the segments, thereby making such derived equations unusable. This has necessitated the need to assess the usefulness of measurements of fragments of long bones (e.g. femur). Hence, special attention has been given to femoral fragments at the ends. Moreover, bones are usually recovered in advanced stage of fragmentation making sex determination from fragments difficult. Thus it is desirable to derive regression equations based on pooled data, which can be used for unknown sex.

In the present study,120 adult femora were collected from the unknown bodies coming for postmortem in the Institute of Forensic Medicine. In the present study, Seven variables (VHD, VND, VHA, BCB, FDL, MCL and LCL) were selected and measured from 120 adult femora and analysed. In the study, the mean maximum length of femur was observed to be 42.2 cm (Table- 1). This result is also similar to the results as reported by Pearson & Bell8,

Steele and MC Kern(9) and by Schroff A G et al [10].

As a thumb rule, we shall consider correlation coefficient between 0.00 and 0.30 as weak, those between 0.300 and 0.700 as moderate and coefficients between +0.70 and 1.00 as considered high.

The correlation of the femoral fragmentary measurements to the maximum length of femur was studied. Comparing the correlation, the general trend of measurements of our study had a higher correlation with corresponding measurements of Simmons et al and Bidmos [11, 12, 13].

The proximal fragment VHA showed the highest correlation 0.927 and the second best is the distal fragment, epicondylar length FDL with 0.922.

Correlation of the measurements of the proximal femoral fragments individually and in combination, to the maximum length of femur was studied. Similarly Correlation of the measurements of the distal femoral fragments individually and in combination to the maximum length of femur was studied.

The high degree of correlations obtained in the present study confirms the usefulness of fragments of femur in the estimation of maximum length of femur. The upper breath of femur VHA showed the highest correlation. (Table-2)

This proves the usefulness of fragmentary measurements for deriving regression equations for the femoral length. Therefore it is prudent to derive simple linear regression (y = a + b x) by univariate regression analysis against the individual measurements to calculate FML from anyone of these markers.

Regression equations were formulated from these coefficients. Regression equation with the maximum length of femur as dependant variable and other measurements as the independent variables were obtained using the total sample. FML was regressed on both individual measurements and combination of measurements.

When the sex is unknown, the maximum length of femur can be best calculated from the metric evaluation of the proximal fragment VHA and the distal fragment, epicondylar length FDL.

- **16.307+2.961(VHA)+- 1.144**
- **13.841+3.884(FDL)+- 1.185**

The regression formulae using combination of fragmentary length show much better correlation with femoral length than using single fragments.

The samples showed high degree of correlation (0.890 to 0.900) and the SEE range from 1.021 to 1.643.

The maximum length of femur can be obtained from the equation

- **14.975+1.279(VHA)+1.289(FDL)+1.157(MCL) +- 0.974**

In cases where only proximal end of the femur is recovered, only three measurements are present

- Upper breadth of the femur (VHA)
- Vertical diameter of the head (VHD)
- Vertical diameter of the neck. (VND)

Thus, if only the proximal segments are considered, the regression equations

- **16.284+2.060(VHD)+0.782(VND)+1.713 (VHA)_+ 1.074 showed the best correlations (table-5)**

Thus if only the distal segment of femur is recovered, the FML can be best calculated from the equations 15.435+2.195(FDL)+1.873(MCL) _+ 1.064.

The calculated maximum femoral length can be used to estimate the stature of the individual by the regression equations, tables or the multiplication factors already established by the various studies

CONCLUSION

Regression equations were derived for estimation of maximum femoral length from measurements of fragments of the femur. All the fragmentary measurements in our study showed positive correlations with the femoral length (FML). Therefore the maximum femoral length can be estimated from fragmentary remains of the femur. More authoritative equation can be obtained by analyzing big samples size. In the absence of intact long bones, equations presented in this study can offer a reasonable estimate of maximum femoral length from which the stature can be estimated.

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Child Sexual Abuse- An Area of Emerging Concern

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ABSTRACT

The subject of child sexual abuse is taboo in India. There is a conspiracy of silence. Large percentage of people feel this is a western problem. Part of the reason of course lies in a traditional conservative family and community structure that does not talk about sex and sexuality at all.(1)

In May 2012, India's parliament took a major step by passing the Protection of Children from Sexual Offences Act. Under the law, all forms of child sexual abuse are now specific criminal offenses for the first time in India.(2)

Keywords: *Child sexual abuse, POCSO Act.*

INTRODUCTION

Child sexual abuse is involvement of dependent, developmentally immature children and adolescents in sexual activities, they do not truly understand and to which they unable to give informed consent or which violate social taboos or family roles.(3)

Children are sexually abused by relatives at home, people in their neighborhoods, at school and residential facilities for orphans and other at-risk children. Such cases are not reported. Fear of stigma or lack of faith in institutions prevents people from reporting.(2)

The prevention of child sexual abuse, protection of victims, justice delivery and rehabilitation of victims are not isolated issues. Achievement of these requires a co-ordinated response of all the key players, which include police, prosecution, courts, medical institutions, psychologists, counselors and social service institutions.(4)

CHILD SEXUAL ABUSE

Child sexual abuse is evidenced by activity between a child, adult or another child who by age or development is in a relationship of responsibility, trust or power, the activity being intended to gratify or satisfy the needs of the other person. This may include but is not limited to:

- The inducement or coercion of a child to engage in any unlawful activity
- The exploitation of a child in prostitution or other unlawful sexual practices
- The exploitation of children in pornographic performances and materials
- Severe sexual abuse and other forms of sexual abuse.

Severe forms of sexual abuse include

- Sexual Assault
- Touching, fondling a child, making the child fondle the adult's genitals
- Exhibitionism- Forcing a child to exhibit his/her private body parts
- Photographing a child in nude

Other forms of sexual abuse include

- Forcible kissing
- Sexual advances towards a child during travel
- Sexual advances towards a child during marriage situations

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- Exhibitionism- exhibiting before a child
- Exposing a child to pornographic materials [1]

TYPES

Child sexual abuse includes variety of sexual offenses, including:

- Sexual assault–in which an adult uses a minor for the purpose of sexual gratification
- Sexual exploitation –in which an adult victimizes a minor for advancement, sexual gratification or profit.
- Sexual grooming– defines social conduct of a potential child sex offender who seeks to make a minor more accepting of their advances (online chat room)[5]

WHO REPORT

The WHO estimates that 150 million girls and 73 million boys under 18 have experienced forced sexual intercourse or other forms of sexual violence involving physical contact, though this is an_underestimate. Much of this sexual violence is inflicted by family members or other people residing in or_visiting a child's family home- people normally trusted and often responsible for care.

A review of epidemiological surveys from 21 countries, mainly high- and middle- income countries, found 7% of females (ranging up to 36%) and 3% of males (ranging up to 29%) reported sexual victimization during childhood. According to these studies, 14% - 56% of girls and 25% of boys was sexually abused by relatives or step parents.[1]

GLOBAL PREVALENCE

Global prevalence is 19.7% for females and 7.9% for males according to a 2009 study published in Clinical Psychology Review that examined 65 studies from 22 countries. Highest prevalence found in Africa (34.4%) followed by America and Asia (10.1% and 23.9%) while Europe had lowest prevalence (9.2%).

Most sexual abuse offenders are acquainted with victims; approximately 30% are relatives of the child, most often brothers, fathers, uncles or cousins; around 60% are other acquaintances, such as "friends" of the family, babysitters, neighbour and stranger offender in 10% of cases.[5]

INDIAN SCENARIO

Nineteen percent of the world's children live in India, which constitutes 42 percent of India's total population. In 2007 the published the "Study on Child Abuse: India 2007." It sampled 12447 children, 2324 young adults and 2449 stakeholders across 13 states.

Main findings included: 53.22% of children faced sexual abuse. Among them 52.94% were boys and 47.06% girls, Andhra Pradesh, Assam, Bihar and Delhi reported highest percentage of sexual abuse among both boys and girls, as well as the highest incidence of sexual assaults. 21.90% of them faced severe forms of sexual abuse, 5.69% had been sexually assaulted and 50.76% reported other forms of sexual abuse. Children on the street, at work and in institutional care reported the highest incidence of sexual assault.(5)

Why a child may not disclose abuse :-

- He/she is embarrassed.
- He/she don't know if what is happening to them is normal or not
- The abuser is a known person and the child does not want to get them in trouble
- The abuser told the child to keep it a secret
- The child is afraid that no one will believe him/her
- The abuser bribes or threatens the child
- He/she thinks you already know[4]

PROVING SEXUAL ABUSE

When sexual abuse occurs the child victim may be the only witness and child's statements may be the only evidence. In such cases, central issue sometimes becomes whether child's statements can be trusted. Child welfare experts feel children never lie about sexual abuse and their statements must always be believed.

These cases can be very difficult to prove because cases where definitive, objective evidence exists are the exception rather than the rule. The first indicators of sexual abuse may not be physical but rather behavioral changes or abnormalities.

Sexual abuse is usually discovered in one of two ways:

- Direct disclosure (e.g. the victim, victim's family member or parent seeking help makes a statement)

- Indirect methods (e.g. someone witnesses the abuse to the child, the child contracts a sexually transmitted disease or becomes pregnant)

Sometimes the child may be so traumatized by sexual abuse that years pass before he or she is able to understand or talk about what happened.[6]

INDICATORS OF CHILD SEXUAL ABUSE

1. Behavioral Indicators :

- Abrupt changes in behavior such as self harm, talks of suicide or attempt to suicide
- Sexualized behavior or acting out sexually
- Low self-esteem
- Recurrent nightmares or disturbed sleep patterns and fear of the dark
- Regression to more infantile behavior like bed-wetting, thumb-sucking or excessive crying
- Poor peer relationships
- An increase in irritability or temper tantrums
- Fears of a particular person or object
- Poor school performance
- Knowing more about sexual behavior than is expected of a child of that age

2. Physical Indicators:

- Sexually transmitted diseases
- Pregnancy
- Complaints of pain or itching in the genital area
- Difficulty in walking or sitting
- Repeated unusual injuries

EFFECTS OF CHILD SEXUAL ABUSE

- Feeling of powerlessness
- Anger
- Anxiety
- Fear
- Phobias
- Nightmares
- Difficulty in concentrating
- Flashbacks of the events
- Fear of confronting the offender
- Loss of self esteem and confidence
- Feelings of guilt
- If childhood sexual abuse is not treated, long-term symptoms can go on through adulthood.[4]

INTERNATIONAL LAWS

- The United Nations Convention on the Rights of the Child (CRC) is an international treaty that legally obliges states to protect children's rights. Articles 34 and 35 of the CRC require states to protect children from all forms of sexual exploitation and sexual abuse. This includes outlawing the coercion of a child to perform sexual activity, the prostitution of children and exploitation of children in creating pornography. States are also required to prevent the abduction, sale or trafficking of children. As of November 2008, 193 countries are bound by the CRC, including every member of the United Nations except the United States and Somalia.

- In the European Union, child sexual abuse is subject to a directive which deals with several forms of sexual abuse of children, especially commercial sexual exploitation of children.

- A 2000 World Health Organization – Geneva report, "World Report on Violence and Health (Chap 6 – Sexual Violence)" states "Action in schools is vital for reducing sexual and other forms of violence. In many countries a sexual relation between a teacher and a pupil is not a serious disciplinary offence and policies on sexual harassment in schools either do not exist or are not implemented. In recent years, though, some countries have introduced laws prohibiting sexual relations between teachers and pupils. Such measures are important in helping eradicate sexual harassment in schools.[5]

INDIAN SCENARIO

- Before the POCSO Bill was passed, child sexual abuse was dealt under following sections and

acts like IPC 375 (Defines rape), IPC 376 (Punishment of rape), IPC 377 (Unnatural sexual offenses , IPC 354 (Outraging the Modesty of a woman or a girl), IPC 509 (Insulting the modesty of woman), Young Persons Harmful Publications Act, 1956 (Obscenity and pornography) and Section 67 of the Information Technology Act, 2000 (Publication and transmission of pornography through the internet).

- But these ordinary criminal laws were totally inadequate to protect the children, who are victims of sexual abuse.[7]

The Protection of Children from Sexual Offences (POCSO) Act, 2012 :-

The Protection of Children from Sexual Offences Act, 2012 has been passed by the Lok Sabha on 22nd May 2012.POCSO Act, 2012 has been drafted to strengthen the legal provisions for the protection of children from sexual abuse and exploitation. POCSO Act, 2012 defines a child as any person below the age of 18 years and provides protection to all children under the age of 18 years from the offences of sexual assault, sexual harassment and pornography. These offences are clearly defined for the first time in law. The Act provides for stringent punishments as per the gravity of the offence. The punishments range from simple to rigorous imprisonment of varying periods. There is also provision for fine, which is to be decided by the Court. An offence is treated as "aggravated" when committed by a person in a position of trust or authority of child such as a member of security forces, police officer, public servant, etc.

Punishments for Offences covered in the Act are:

- Penetrative Sexual Assault (Section 3) – Not less than seven years which may extend to imprisonment for life, and fine (Section 4)

- Aggravated Penetrative Sexual Assault (Section 5) – Not less than ten years which may extend to imprisonment for life, and fine (Section 6)

- Sexual Assault (Section 7) – Not less than three years which may extend to five years, and fine (Section 8)

- Aggravated Sexual Assault (Section 9) –Not less than five years which may extend to seven years, and fine (Section 10)

- Sexual Harassment of the Child (Section 11) – Three years and fine (Section 12)

- Use of Child for Pornographic Purposes (Section 13) – Five years and fine and in the event of subsequent conviction, seven years and fine [Section 14 (1)]

The Act provides for the establishment of **Special Courts** for trial of offences keeping the best interest of the child as of paramount importance at every stage of the judicial process. The Act incorporates **child friendly procedures** for reporting, recording of evidence, investigation and trial of offences. These include:

- Recording statement of the child at the residence of the child or at the place of his choice, preferably by a woman police officer not below the rank of sub-inspector

- No child to be detained in the police station in the night for any reason.

- Police officer not be in uniform while recording the statement of the child

- The statement of the child to be recorded as spoken by the child

- Assistance of an interpreter, translator or an expert as per the need of the child

- Assistance of special educator or any person familiar with the manner of communication of the child in case child is disabled

- Medical examination of the child to be conducted in the presence of parent of the child or any other person in whom the child has trust or confidence

- In case the victim is a **girl child**, the medical examination shall be conducted by a woman doctor

- Frequent breaks for the child during trial

- Child not to be called repeatedly to testify

- No aggressive questioning or character assassination of the child

- In-camera trial of cases

The Act recognizes the **intent to commit an offence**, even when unsuccessful for whatever reason, needs to be penalized. The **attempt to commit an offence** under the Act has been made liable for punishment for upto half the punishment prescribed for the commission of the offence. The

Act also provides punishment for **abetment of the offence**, which is same as for the commission of the offence. This would cover trafficking of children for sexual purposes. For the more heinous offences of Penetrative Sexual Assault, Aggravated Penetrative Sexual Assault, Sexual Assault and Aggravated Sexual Assault, **burden of proof** is shifted on the accused.

For speedy trial, Act provides evidence of the child to be recorded within a period of 30 days. Also directed the Special Court to complete the trial within a period of one year, as far as possible. The **media** has been **barred from disclosing the identity of the child** without permission of the Special Court. The punishment for breaching this provision by media may be from six months to one year.

To provide **relief and rehabilitation of the child**, as soon as complaint is made to the Special Juvenile Police Unit (SJPU) or local police, these will make immediate arrangements for care and protection such as admitting the child into shelter home or to the nearest hospital within twenty-four hours of the report. The SJPU or the local police are also instructed to report the matter to the Child Welfare Committee within 24 hours of recording the complaint, for long term rehabilitation of the child.

The Act casts a duty on the Central and State Governments to spread awareness through media at regular intervals to make the general public, children as well as their parents and guardians aware of the provisions of this Act. The National Commission for the Protection of Child Rights (NCPCR) and State Commissions for the Protection of Child Rights (SCPCRs) have been made the designated authority to monitor the implementation of the Act.[8]

Guidelines on Interviewing a Child: Forensic Interview Protocol :-

There are two distinct aspects to the gathering of information from the child (or attending adults) in cases of alleged child sexual abuse: (a) the medical history and (b) the interview.

A) Emergency Medical Care :-

Where an officer of the SJPU, or the local police receives information under section 19 of the Act that an offence under the Act has been committed, and is satisfied that the child against whom an offence has been committed is in need of urgent medical care and protection.

No medical practitioner, hospital or other medical facility centre rendering emergency medical care to a child shall demand any legal or magisterial requisition or other documentation as a pre-requisite to render such care.

B) Medical Examination:

Medical examination is to be conducted as per the provisions of Section 27 of the POCSO Act, 2012 and Section 164A of the CrPC, 1973.[4] Here medical professional has dual role to play including not only medical examination but also extract child friendly medical history and forensic evidences as well.

CONCLUSION

The responsibility of supporting children who have been sexually abused should be embraced by the whole community but it is the professionals that work in this field who play an important role in enabling the healing process. Their objective is to foster better response mechanisms involving coordination amongst these professionals, so as to result in the evolution of a multi-sectoral, multi-disciplinary approach that will go a long way in achieving the objectives of the POCSO Act, 2012.[4]

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Attitude of Medical Students of NIMS Medical College and Hospital Towards Medicolegal Autopsy

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ABSTRACT

Autopsy is a research tool which has been used for centuries for various purposes. It is derived from the autopsia which is a Greek word means "to see with one's own eyes". This study is done to know the knowledge and attitude of medical students towards post mortem examination. One hundred medical students were selected from 5th and 7th semester, 50 boys and 50 girls, and a questionnaire containing 19 questions regarding autopsy is distributed among the students. It was regarded their response towards autopsy, should number of autopsies they watch during their medical curriculum which according to MCI guidelines is 10, be increased. More than 50% students responded positively towards seeing autopsies so that they will be able to conduct when they will become medical practitioner.

Keywords: *Medical students, Autopsy, Forensic Medicine, Attitude.*

INTRODUCTION

An autopsy also known as post mortem examination, necropsy and autopsia cadeverum .Autopsy is of two type's medico legal and clinical or academic autopsy. Autopsy is highly beneficial to the society in terms of determining the cause of death, time since death, potential medico legal issues about death, validity of therapeutic modalities and providing data on disease and injury [1]. Now a days, in medical education there is declining trend of autopsy [2, 3, and 4]. In undergraduate medical education, the training of autopsy on dead bodies might develop strong emotional feelings that would interrupt the intended learning goals [5]. In India according to MCI guidelines medical students should watch at least 10 autopsies during the medical curriculum so that they could conduct a medico legal autopsy after being appointed as a medical practitioner. But now a days there is marked decline in the number of autopsies. There are now technological alternatives such as videos and CD-ROMS for learning autopsies [6]. There are undergraduates and junior doctors who have never attended autopsy[7]. Little number of studies have been conducted on attitude of medical students towards clinical/medico-legal autopsy. The main aim of this study is to evaluate the general attitude of medical students towards autopsy.

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AIM OF THE STUDY

To study the knowledge and attitude of medical students towards autopsy.

MATERIAL & METHOD

The study was conducted among the medical students of NIMS Medical College and Hospital, Jaipur. 5th and 7th semester students were selected as 7th semester students have passed the Forensic Medicine and Toxicology and 5th semester students are going through. A questionnaire of 19 questions is prepared which was then distributed among the aforementioned students. 100 students were selected by random sampling and given with this questionnaire, 50 boys and 50 girls. Students came voluntarily and participated. The questionnaire is

regarding the knowledge of the post mortem and their attitude and perception towards autopsy, whether they prefer autopsy to be performed on them or their near relatives. Students were asked not to disclose their identity. The comments given by the students were analysed properly regarding the necessity and use of autopsy in medico-legal field, the student's personal distaste for the procedure, is attendance at an autopsy compulsory during medical course.

RESULT

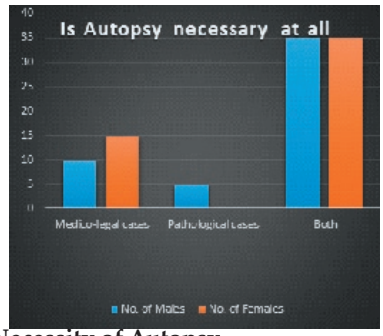
The result of my study has been elaborated in table-1, which constitutes a questionnaire of 19 questions. Out of 19 questions, result of 13 are shown in table 1 and result of 6 questions are represented in form of graphs and pie chart. The post mortem examination demonstration is quite informative and students listen to the demonstration given by the professor and learn how to do autopsy. Students of our college showed a positive response not only towards post mortem but also towards attending practical lectures in museum.

Questionnaire was regarding the view of the medical students towards autopsy. I received 100% response from the sample. Response rate regarding the questions is shown in table -1 in terms of yes or no.

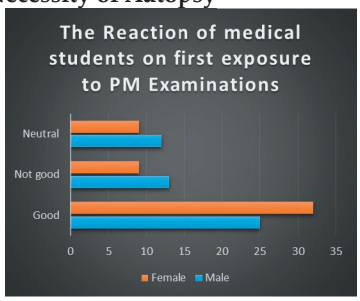
TABLE NO. 1: QUESTIONNAIRE (13 Questions)

S.NO.	QUESTION	YES	NO
1	Medico legal examination is mandatory in all unnatural and sudden unexpected and suspicious deaths?	99	01
2	Do you think the number of autopsies you watched were enough	17	83
3	Would you like autopsy to be performed on you or any of your near relative after death.	66	34
4	Given a chance would you have chosen not to watch autopsy at all?	15	85
5	Disfigurement by post mortem examination.	48	52
6	Post mortem examination is disrespect to human body.	18	82
7	Should medical students actively participate in performing autopsies?	92	8
8	Did you learn anything from autopsies you watched?	91	9
9	Does autopsy have a role in health care delivery system of India?	84	16
10	Do you believe in reincarnation?	33	67
11)	Will organs and tissues alter when person comes back to life?	18	82
12)	Would you like to specialize in forensic medicine and toxicology?	44	56
13)	Students should witness more PM examinations in addition to 10 as per MCI requirement.	85	15

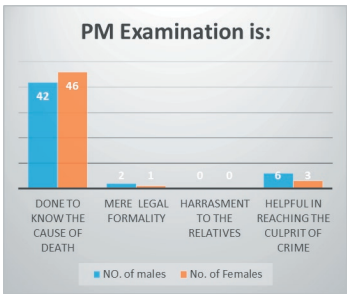
Autopsy should be considered important by the medical students during the course of medical curriculum either for medico legal cases or pathological cases or both is shown in graph-1. Most of the student showed good response towards the first exposure of PM examination which is shown in graph-2. Out of 100 medical students 88 know that PM is done to know the cause of death shown in graph-3. PM examination not only enables the students to learn anatomy rather it delivers the knowledge of the pathology subject as well so not to be scrapped from the medical curriculum shown in graph-4. Graph-5 clearly depicts the present scenario that Medical curriculum is the only channel through which students educate themselves regarding the autops. 85% of the students regards it necessary to take out viscera especially for histopathological examination and most importantly in cases of poisoning to detect the cause of death due to which poison. It is clearly shown in graph-6.



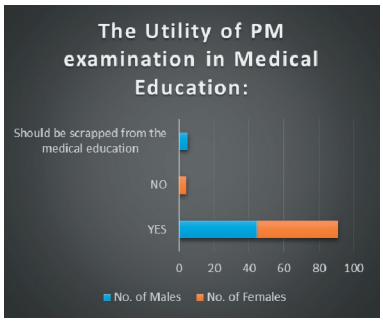
Graph 1: Necessity of Autopsy



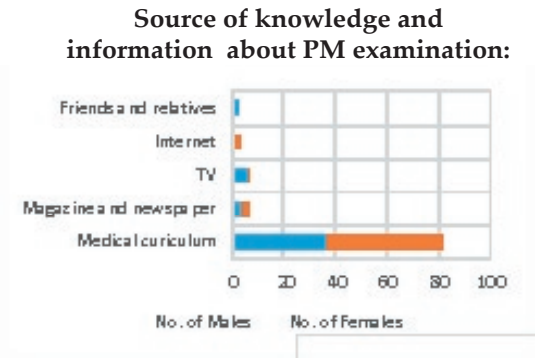
Graph 2: showing reaction of medical students towards first exposure to PM examinations



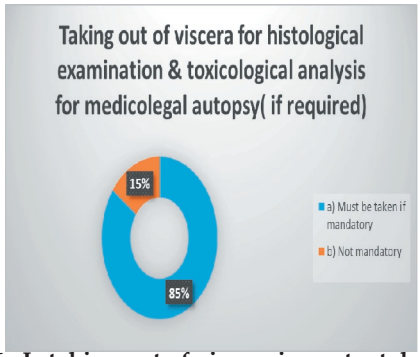
Graph 3: Utility of PM Examination



Graph 4: Is PM Examination important for Medical curriculum



Graph 5: Source of Knowledge and information about PM Examination



Graph 6: Is taking out of viscera important during PM examination

DISCUSSION

Autopsy helps in absolute establishment of the cause and manner of death in both clinical and medico legal cases. Autopsy correlates the ante mortem diagnosis as well as confirms it and helps in the identification of the new and re-emerging diseases [8]. The physiological processes in diseases is better illustrated with the help of autopsy[9].

The autopsies in the hospital continues to decline, no doubt, there is good evidence of its clinical value and relevance. The autopsy rate are declining throughout the world e.g. in the U.S.A, the autopsy rate have dropped over the decades from 60% to 41% in 1960, 22% in 1970 and to less than 10% currently[10]. In china, autopsy has been nearly vanished from the regular medical curriculum in order to accommodate the upcoming modern medical education during the medical teaching program throughout the five year course. This revolution in medical education is quite worrisome for both medical teachers and the medical students[11]. This decline not only draws a debate on the need of the medical students to learn their subject regarding post mortem, but also reduces their opportunities to do so. Many medical colleges nowadays graduate their students without even showing them a single autopsy. There is considerable decrease in the number of PM examinations which in turn makes Autopsy education program impractical as a result of which the hidden truth of unnatural death remains unanswered.

In 1993, the Royal College of pathologists recommended that at least 10% of hospital deaths should be autopsied for audit purposes. It was later amended in 2002 as it was recognised that hospitals were unable to reach the set target[10].

The present study which was conducted amongst the medical students of NIMS Medical College &

Hospital, Shobha nagar, Jaipur. Students showed a considerable interest towards the autopsy and regarded autopsy demonstration as a learning experience. 82% students believed that they gained knowledge of autopsy through medical curriculum and TV, internet, friend & relatives are the least source of information (graph 5). Students (66%) are willing to perform autopsies on their near relatives to know the cause of death where there is any unnatural death (table 1). 70% of students regarded autopsy necessary during the medical curriculum. Students of NIMS Medical College showed positive response and most of them showed a good and energetic approach towards the autopsy. 56% students would not like to do specialization in Forensic Medicine and Toxicology (table 1). Though few students are showing negative response but majority are in favour of autopsy. Educational benefits of autopsy based teaching included greater understanding of anatomy and physiology[12.]Teaching pattern should be improvised so as to make understanding better. Mortuary must be facilitated with the cameras so that the students present in the demonstration room are able to observe the ongoing procedure on LCD, this will enhance their understanding of autopsy.

CONCLUSION

In conclusion, Autopsy should continue to remain as part and parcel of the medical curriculum because it is a source of true learning process to the medical students. The declining trend of autopsy during the course of medical education shall deprive the medical students of the exposure to the actual medical knowledge. Hence, the autopsies should be demonstrated to all medical students whether they are studying in government or private medical institution.

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Ethical Clearance: Not Mandatory in this type of study.

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A Study of Morphometric and Medico-legal Aspect of Human Clavicle in Ahmedabad City

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ABSTRACT

Age, Sex and Stature are determined from human clavicle. So it is helpful in Identification. Bones are heavier, larger and prominent marking for muscles attachments are more pronounced in male than in the female.

Keyword- *Clavicle, Ossification.*

INTRODUCTION

Clavicles are important typical modified long-bones in human body because all long bones in upper limb are placed vertically but this is the only bone which is placed horizontally. It extends horizontally from sternum to acromion in shoulder (pectoral girdle). Clavicles are called collar-bones and also clivus as it resembles the shape of "Roman Key"[1]. Clavicles are long, sinuously curved, somewhat resembling the letter "f". Clavicles are important landmarks long bone in human body because it is superficial below skin palpable immediately[2].

In short, it position forms on important bony points between important regions of body. It is subcutaneous throughout its whole extends. It acts as a prop which strut[1] the shoulder and enables the limb to swing clear of the trunk. It transmits weight of limb to axial skeleton.

When a dead body has been dismembered, the stature from the dismembered parts of the body may be determined approximately by certain mathematical calculations or formulae as stated- Length of one arm X 2 + 30 cm for 2 clavicles + 4 cm for the sternum is equal to height (Stature) [4.]

OSSIFICATION

This is first bone to ossify in the body and the ossification begins in membrane. It also ossifies from two primary centers for body and one secondary centre for sternal end. Two primary centres appear in the body separately between the fifth and sixth weeks of the fetal life and fuse together at about forty-fifth day. One secondary centre for the sternal end appears at fifteenth year in males and fuse with the body at twenty-first year in females and males. Occasionally a small secondary centre may appear at acrimal end between eighteenth and twentieth year and soon fuse with the rest of bone.

Age in years of the appearance and fusion of some of the epiphysis are observed by different authors as follows[5],

Clavicle at sternal end	**Galstaun(Bengalis)**		**Flecker(Australians)**		**Davies & Parsons(England)**
	Female	**Male**	**Female**	**Male**	
Appearance	14-16	15-19	21	21	17
Fusion	20	22	22	22	25

Ossification help in, (01) Sex differentiation of adult clavicle,

(02) Imperfection of ossification in the clavicle and other primarily intra-membranous skull

Bones are occasionally encountered together in the condition of CLEIDOCRANIAL

DYSTOSIS

(03) The clavicle is absent in animals[1] in which forelimbs are used principally or entirely for

Progression e.g. the ungulates and carnivores. But it is present and well developed in

Animals which use the limb for prohension e.g. many rodents' primates and man[6].

ANATOMY

Knowledge of Anatomy and development of clavicle are important for differentiation of right and left clavicle and also for sex determination.

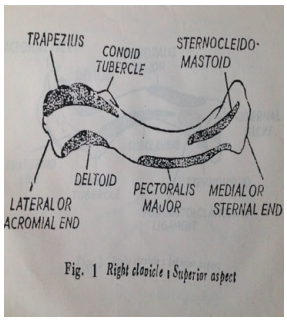

Fig. 1 Right clavicle : Superior aspect

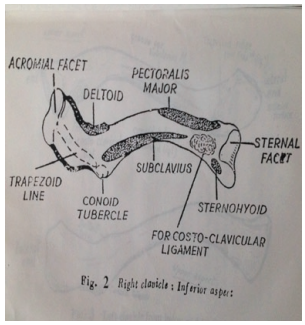

Fig. 2 Right clavicle : Inferior aspect

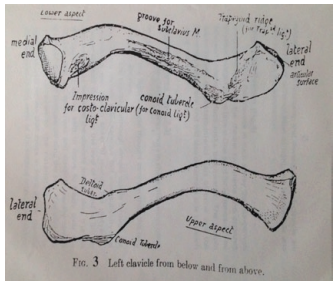

Fig. 3 Left clavicle from below and from above.

The clavicle is the bone that connects the trunk of the body to arm, and it is located directly above the first rib. There is a clavicle on each side of the front, upper part of the chest. The clavicle consists of a medial end, shaft, and a lateral end.Clavicle has two parts- Lateral 1/3rd and Medial 2/3rd of clavicle.Anatomical position hold the clavicle in such a way that its conves anterior surface of the medial 2/3rd and concave anterior margin of the lateral 1/3rd looks forward. The grooved inferior suurface looks downwards. The conoid tubercle lies on posterior-inferior part of bone and flattened anatomical end will also determine side to which bone belong.

Pecularities of clavicle[3],

(01) Having no medullary cavity,

(02) Only long-bone that lies horizontally,

(03) It is subcutaneous throghout,

(04) It is first bone to ossify in human body,

(05) only long-bone which ossifies in membrane,

(06) Only long-bone which ossifies from primary centers &

(07) It is occassionaly pierced by the middle supraclavucular nerve.

Anatomy of clavicle help in,

(01) Clavicle is longer in the broad-shoulder male and its curvature are usually more pronouced than in female ,

(02) The right clavicle thought stronger than the left, is usually shorter in length than left because it has more curve to make shorter in lenth[1].

(03)Borders, grooves, fossae(Subclavian) point of the attachment of muscle are more well-marked in male as also compared to female.

(04) Female clavicle was shorter, slender and border surface other impression for muscle and ligament are less conspicuous.

(05) To differentiate from adult clavicle from childeren clavicle.

OBJECTIVES

To study of normal anatomy, general and particular features peculiarities, function and ossification of bone.

To determine study of clavicles by statically analysis of length (mm), weight (gm) and midcalvicular circumference (mm) are important for the purpose of sex determination for medico legal aspect.

REVIEW OF LITERATURES

(01) Dimorphism in clavicle has been subject of

detailed study both in western countries and India.

(02) Terry (1932) and Oliver (1951) observed that the midclavicular circumferences were a good parameter for determining sex clavicle.

(03) Several workers (Jit and singh) (1966), Singh ET. Al. 1972, Jit and Sahni 1983, Sayee et.al. 1992 recorded that midclavicular circumference was a good criterion for sexing the clavicle.

(04) Jit and Sahni (1983) also recorded different measurements of the clavicle in Chandigarh zone.

(05) Armitage (1971) - It was considered approximate that the multivariate analysis be used to determine sex of clavicle which also elicited zonal difference.

MATERIAL & METHOD

The material for present study consisted of 200 of clavicles (Right and Left) and was collected from anatomy department in the college.

As complete sets are available in sufficient number, no attachment has been done to find out symmetry but as the material contained sufficient number of both sides a comparative study has been tried. The incidence of right and left sides has been noted separately.

The bones were dried and macerated, damage, incomplete and unossified belonging the the adult persons. The bone having pathology naked eye discarded.

The length was measured with a verier caliper ignoring the curve of the bone. The length was measured in mm. The middle point of this length was taken as point was midclavicular circumference was measured with a graph paper strip in mm.

The weight of clavicle was recorded with help of a single pan electrical balance in gm.

All results and their average are noted in Tabulated form.

A statically analysis of three parameter of clavicle was undertaken.

OBSERVATION

Following table showing side- right or left, length in mm, weight in gm and midclavicular circumference in mm clavicles of 200 cases -

Features	Right clavicle Male	Right clavicle Female	Left clavicle Male	Left clavicle Female
Length in mm	155	119	157	120
Weight in gm	25	11	25	10
Midclavicular circumference in mm	39	26	39	26

Statically analysis of Length of clavicle (Table-1):

The left clavicle was longer than right in 60% instances and both clavicle were equal in length in 30% instances. The greater curves in right clavicle are shorter than left.

RIGHT CLAVICLE: The range of length of right clavicle was 113.00 mm to 166.00 mm. The mean length of male clavicle was 140+/- 9.00mm. The mean length of female clavicle was 132+/- 7.00 mm. Only 20% male bones which were longer than 155.00 mm. Only 10% female bones were shorter than 122.00 mm. The demarking point for male and female is Male – 155 mm and Female – 119 mm.

LEFT CLAVICLE: The range of length of left clavicle was 116.00 mm to 169.00 mm. The mean length of male clavicle was 148+/- 9.00mm. The mean length of female clavicle was 133+/- 7.00 mm. Only 20% male bones which were longer than 156.00 mm. Only 7% female bones were shorter than 123.00 mm. The demarking point for male and female is Male – 157 mm and Female – 120 mm.

According to observation study of length: length of clavicle was applied to 80% of right and 80% of left clavicle male and that of 90% of right and 90% of left female clavicle accurately. So sex determination from length of clavicle for 80% in male and 90% in female possible.

Statically analysis of weight of clavicle (Table-2):

Female clavicles are slender than male clavicle. So female clavicle is less weight than male.

RIGHT CLAVICLE: The range of weight of right clavicle was 9.00 gm to 32 gm. The mean weight of male clavicle was 25.00+/- 4.00gm. The mean weight of female clavicle was 16+/- 3.00 gm. Only 40% male bones which were heavier than 23.00 gm. Only 25% female bones were weighted less than 15.00 gm. The demarking point for male and female is Male – 25 gm and Female – 11gm.

LEFT CLAVICLE: The range of weight of left clavicle was 9.00 gm to 32 gm. The mean weight of male clavicle was 24.00+/- 4.00gm. The mean weight of female clavicle was 16+/- 2.00 gm. Only 45% male bones which were heavier than 24.00 gm. Only 25% female bones were weighted less than 14.00 gm. The demarking point for male and female is Male – 25 gm and Female – 10gm.

According to observation study of weight: Weight of clavicles is important criteria for identification of male and female clavicles.

Statically analysis of midclavicular circumference (Table-3):

RIGHT CLAVICLE: The range of midclavicular circumference was 28.00 mm to 39.00 mm. The mean midclavicular circumference of male clavicle was 36.00 mm +/- 3.00 mm. The mean midclavicular circumference of female was 30.00 mm +/- 2.00 mm. 10% of male right clavicle was more than 41.00 mm. 10% of female right clavicle was less than 26.00 mm. The demarking point for male and female were, Male – 39.00 mm and Female – 26.00 mm.

LEFT CLAVICLE: The range of midclavicular circumference was 28.00 mm to 39.00 mm. The mean midclavicular circumference of male clavicle was 30.00 mm +/- 3.00 mm. The mean midclavicular circumference of female was 30.00 mm +/- 2.00 mm. 5% of male right clavicle was more than 42.00 mm. 8% of female right clavicle was less than 26.00 mm. The demarking point for male and female were, Male – 39.00 mm and Female – 26.00 mm.

According to observation study of midclavicular circumference of clavicle – only 6% right and 5% of left male clavicle and also 8% of right and 5% of left female clavicle sexed perfectly.

DISCUSSION

From anatomical consideration and observation of clavicle are study and following discussion and analysis derived from it as under below-

(01) The borders, grooves, fossae (Subclavian), points of the attachment of muscles and ligaments were more conspicuous and prominent in male as compared to female clavicle.

(02) The borders and surfaces have an impression better marked in case of male clavicles as compared to female clavicle.

(03) In contrast to male clavicle, female clavicles are shorter, slender and impressions are less marked than male clavicle.

(04) The contour of shoulder is different for male and female because of anatomical position.

(05) In male, clavicles are longer, so shoulder are square while in female clavicle is short because of short clavicle, shoulders are round or drooped.

(06) The delicacy of female clavicle makes it more fragile and is more vulnerable to fracture as compared to male clavicle.

(07) Clavicle is an important bone linking upper limb with shoulder girdle and help in transmission of weight. The junction of two curves (medial two third and lateral one third) is a common site for fracture because of that it is most commonly fractured bone in the body. And any breach in continuity of bone result in loss of above mention function.

(08) One measurement alone could not be satisfactory for sexing clavicle.

Sex determination- Length, weight and midclavicular circumference of clavicle gave us approximate idea for determining sex. In case of MALE- length-20%, weigth-40% & midclavicular circumference-15% and FEMALE- length-10%, weigth-25% & midclavicular circumference-05% could be sexed. The demarking point gave us idea according to them it gave us 99% accuracy.

CONCLUSION

A study of 200 human clavicles was undertaken on basis of observation pertaining to length, weight and midclavicular circumference. General and particular features following conclusion were drawn,

(01) It is important for sex determination useful in medico legal aspect.

(02) Intact normal clavicle is necessary for normal functions like- maintenance of contour of shoulder joint, linking upper limb with shoulder girdle and help in transmission of weight or thrust and protect underlying structures like blood vessels, subclavian vein and arteries and cord of brachial plexus.

(03) Clavicles were selected for studies as it is superficial bone as compared to other bones of upper limb. It is more likely to get damage or injured or fractured in day to day practice.

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Conflict of Interest: Nil

Source of Funding: Nil

Ethical Clearance: The study is based on dissertation done during residency programmed. Also no patients were Interviewed and nor were any interventions done. Hence ethical clearance was not required.

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Acute Poisoning due to Organophosphate Contaminated Cherries

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ABSTRACT

Background: Organophosphate (OP) poisoning caused by pesticide-contaminated food is seldom reported.

Case report: We report an incident of OP poisoning, in an 18 year old female. She had consumed a large amount of unwashed cherries from the garden, after a religious fast whole day. Next morning she was found unconscious, soiled in stools and urine and had frothing at mouth and nostrils. Patient had developed "Hypersecretory syndrome" with bilateral pin point pupils. She was in shock with GCS of $E_1V_1M_5$ (7/15). She had type 1 respiratory failure (sO2=50%), requiring intubation. After aggressive supportive management and atropine patient recovered from shock and was able to maintain oxygen saturation on room air. Later, patient developed "Intermediate syndrome" in the form of peripheral neuropathy and areflexia. She also developed Atropine psychosis, during treatment.

On further investigations it was found that Dichlorvos (Nuvan) was sprayed on cherries few days back and her plasma cholinesterase levels were < 1 micro U/L (Normal range – 3.93 – 7.80 řU/L).

Keywords *– Organo-phosphorus poisoning, OP contaminated cherries, intermediate syndrome, hyper-secretory syndrome, atropine toxicity.*

INTRODUCTION

Kashmir valley, being ideal for fresh fruit production and horticulture, also is exposed to high use and easy availability of OPs. Acute exposure to OPs is well known, but chronic exposure of these chemicals has also been linked to increased incidence of brain cancer in orchard farmers in valley. [(1)]

OPs like Dichlorvos (Nuvan) & Phosphamidon (Dimecron) are used commonly & form the most common cause of poisoning. We are getting about 650 cases of OP Poisoning cases admitted in our Institute yearly. We have cases where OP compounds were consumed for suicidal intent or accidentally; or even given as homicidal agents. OP poisoning by parental route has been reported by only few authors. [(2-7)]This is our first case of poisoning by OP contaminated food; survey of literature reveals only few such case reports. Interestingly, the collective worldwide data by Food & agriculture organization of UN showed that "following foliar application at recommended or double rates, the residues in most of the plant commodities tested (apples, avocados, beans, Brussels sprouts, cacao beans, cabbages, cauliflower, chilli peppers, cotton seed, cucumbers, dates, egg plants, lettuce, onions, peanuts, peas, rice, sorghum, soya beans, strawberries, tea, tomatoes, witloof chicory) were below the limit of determination (0.01-0.04 mg/kg, except tea 0.1mg/kg). Detectable residues were reported in four commodities with maximum values of 0.05 mg/kg in cherries, 0.15 mg/kg in peaches, 0.08 mg/kin grapes and 0.04 mg/kg in kale.[8]"

Dichlorvos exerts its toxic effects in humans and animals by inhibiting the enzyme, Acetyl-

cholinesterase. Acute exposure causes perspiration, nausea, vomiting, diarrhea, drowsiness, fatigue, headache, and even convulsions & coma[9,10,11]. The chemical formula for Dichlorvos is $C_4H_7Cl_2O_4P$, and its molecular weight is 220.98 g/mol[10,11]. Dichlorvos occurs as an oily colorless to amber liquid that is slightly soluble in water[10,12]. Dichlorvos has an aromatic chemical odor; the odor threshold has not been established.[10,12] The vapor pressure for Dichlorvos is 0.012 mm Hg at 20 °C[10,11]. The log octanol/water partition coefficient for Dichlorvos is 1.16[11].

CASE REPORT

We present a case of 18 year old un-married female, who was in her usual state of health, until 14th June 2014, when she was on religious fast. In the evening after the fast was over, patient consumed cherries from her garden, in large quantities (almost 1 Kg). Patient went to bed that night, without any complaint.

Patient was found in an unconscious state, with frothing at mouth and nostrils, with soiling of bedding due to profuse diarrhea (Hypersecretory syndrome). She was immediately rushed to local hospital, where she was found in an unconscious state. On receiving patient, in our hospital emergency, Patient was drowsy, (GCS- $E_1V_1M_5$ (7/10)), with frothing at nostrils, pulse was 64bpm, systolic BP was 60mmHg, SaO2 - 50% on room air, respiratory rate of 16/min(gasping), pin point pupils & chest auscultation revealed diffuse creptations. Investigations are tabulated as under

INVESTIGATION TABLES

Table 1 Baseline Investigations

DATE	Hb(g/dl)	TLC(×10³/uL)	DLC(%)	PLT(×10³/Ul)	MCV(fL)	PCV (%)	ESR(mm/Hr)	PBF	INR	aPTT(sec)
15/6	8.8	16.78	N_{94} $L_{1.8}$	92	90	30	-	-	1.2	24.5
18/6	9.4	7.73	N_{78} L_{12}	130	90.1	30.1	20	NC/NC -no abnormal cells -Platelet changes		

Table 2

Date	Urea (mg/dL)	Creatinine (mg/dL)	Na+ (mmol/L)	K+ (mmol/L)	pH	PCO_2 (mmHg)
15/6	21	0.68	144	4.1	7.07	61
17/6	28	0.65	163	2.4	7.36	23
19/6	31	0.57	145	3.5	7.33	43

Table 3 Serum Chemistry Cont.

BIL (mg/dL)	ALT (U/L)	ALP (U/L)	PRO (mg/dL)	ALB (mg/dL)	Glob (mg/dL)	Sugar (mg/dL)	LDH (U/L)	CK (U/L)	U.acid (mg/dL)	Amylase (U/L)
0.54	15	72	5.3	3.44	-	96	-	-	-	-
0.63	14	50	5.41	3.05	2.04	62	377	145	2.01	48
Plasma cholinesterase levels (spectrophotometry)					**<1.0 micro U/ L** (N=3.93 – 7.80)					

Table 4 : Radiological investigations

CXR	Right lower zone infiltrates, distended gut loops seen below diaphragm
NCCT Head	Normal study
USG Abdomen	Distended gut loops, rest unremarkable study
Abdominal roentgenogram	Distended gut loops, without any air-fluid levels

Table 5: Nerve Conduction velocity Motor NCS

Nerve/Sites	Latency ms	Ampl mV	Distance Cm	Velocity m/s
R MEDIAN – APB				
1.Wrist	3.60	7.0		
2.Elbow	8.10	7.3	21	46.7
R LUNAR – ADM				
1.Wrist	3.05	8.2		
2.Elbow	7.05	7.7	22	55.0
R COMM PERONEAL- EDB				
1.Ankle	4.10	2.8		
2.Fib Head	12.30	2.6	31	37.8
L COMM PERONEAL – EDB				
1.Ankle	3.60	1.9		
2.Fib Head	11.50	1.7	29	36.7
R TIBIAL(KNEE) – AH				
1.Ankle	4.35	15.4		
2.Knee	12.90	12.2	36	42.1

Table 6 : SENSORY NCS

NERVE/Sites	Rec.Site	Latency ms	Peak Ampl mV	Distance Cm	Velocity m/s
R MEDIAN – Digit II					
1.Wrist	II	2.90	42.5	13	44.8
R ULNAR - Digit V					
1.Wrist	v	2.25	23.5	12	53.3
R SURAL – Lat Malleolus					
Calf	Lat Malleolus	3.35	25.0	13	38.8

Nerve	Min F Lat Ms	Max F Lat ms	Mean F Lat Ms	% F %
R COMM PERONEAL – EDB				
R TIBIAL (KNEE) – AH	52.70	54.00	53.40	100
R ULNAR – ADM	25.60	27.00	26.65	100

IMPRESSION : 1. Comm peroneal nerve b/1 shows delayed mncv and low amplitude cmap.

2. Right median nerve shows delayed mncv.

3. Right tibial nerve and ulnar nerve shows normal mncv.

4. Right sural nerve and median sensory nerve shows delayed sncv.

Chest roentgenogram (**fig.1)** revealed bilateral infiltrates and **abdomen roentgenogram** revealed distended gut loops with no air fluid levels **(fig 3). NCCT Head** was normal **(fig 2)**. **USG Abdomen** done showed Gut gases ++, Bowel loops dilated with mild inter-loop free fluid & sluggish peristalsis.

Patient was immediately intubated, and Atropine 6mg in N/2 saline, was given slowly. Later 3mg of atropine was repeated, followed by atropine infusion @2mg/hour and the dose was titrated as per the clinical response and signs of atropinization. Gastric lavage was done and the sample was sent for chemical analysis. Injection ringer lactate @150ml/Hr was started, with Intravenous antibiotics – Piperacillin + Tazobactam & Levfloxacin, along with pressor support.

Figure 1 – Chest roentgenogram (PA view) showing distended gut loops left side and right lower zone fine infiltrates

After intubation, patient maintained Oxygen saturation @fiO_2 of 1. Her **P_{CO2} = 61mmHg** with severe Respiratory acidosis (**$_pH$=7.07**), which recovered after resuscitation and patient was continued on ambu ventilation. Patient was extubated after 14 hours (GCS = 15/15). Patient was able to maintain Oxygen saturation on Venturi Mask (15L/min, fiO_2 of .60). Bilateral Plantar reflex showed Extensor response (up going) which normalized on second day. Deep Tendon Reflexes in both upper and lower limbs were absent.

Patient continued to be drowsy and pass loose stools and had hypotension (BP=90/60mmHg), **pin point pupils** up to day 2 of admission. On day 3, patient showed behavioral abnormalities in the form of in appropriate emotions, snatching objects (mobile, torch, stethoscope) and became febrile. **Atropine Psychosis** was thought as a possibility in view of dilated pupils, dry mucosa and normalization of behavior after 12 hours. Nerve conduction tests were done for areflexia, which revealed bilateral common peroneal nerve & right median nerve showed delayed mncv and low amplitude cmap. Right sural nerve and median sensory nerve showed delayed sncv, suggestive of **sensory-motor neuropathy** (tab. 6)

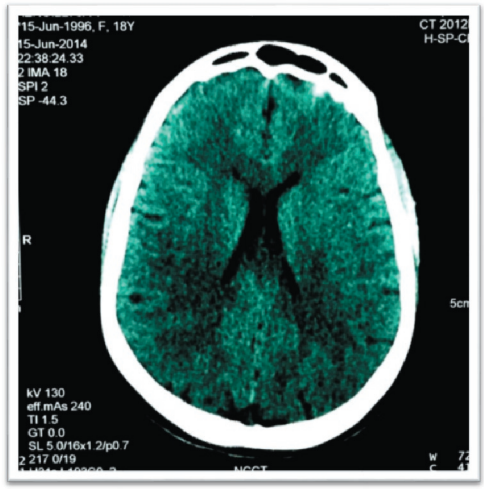

Figure 2 NCCT Head showing no brain edema or ICSOL or hemorrhage

Figure 3 abdominal roentgenogram revealing grossly distended gut loops

On 5th day, patient was fully conscious, well oriented to time, space & person. Pupils were normal in size and reacting normally to light. Chest

examination was normal. She was accepting orals normally and was discharged. On follow up after 2 weeks no abnormality was detected in physical examination and psychiatric consultation was also reported normal.

FINAL IMPRESSION

Acute poisoning due to Organophosphate contaminated Cherries.

DISCUSSION

The clinical presentations & outcome of OP poisoning depend not only on pesticide but also on dose, route & time between poisoning & start of treatment. Our series of OP Poisoning patients mainly consists of suicidal or accidental intake of OP pesticides, till now. This is first case of OP poisoning occurring due to, ingestion of cherries contaminated with Dichlorvos. As discussed already, detectable residue was reported in four commodities with maximum values of 0.05 mg/kg in cherries, 0.15 mg/kg in peaches, 0.08 mg/kin grapes and 0.04 mg/kg in kale."[8]

There is no case mentioned in the literature, as OP poisoning after ingestion of contaminated cherries. There have been some case reports of OP poisoning by intake of contaminated food. Wu ML, Deng JF et al reported three incidents of food poisoning that resulted from exposure to OP insecticide methamidophos in vegetables. These outbreaks caused cholinergic syndrome in 4 patients. The cholinergic over-activity led to suspect OP poisoning. The clinical diagnosis of OP poisoning was confirmed by reduced levels of erythrocytes and plasma cholinesterase and the presence of methamidophos in the vegetable leftovers. (14).Laynez Bretones F, Martínez García L et al reported a case of family food poisoning by OP parathion. Poisoning was involuntary, affecting four brothers in one family who ate eggplant floured with parathion, which was mistaken for flour. The clinical diagnosis of poisoning was confirmed by the below-normal levels of plasmatic cholinesterase. (15) Goh KT et al reported an outbreak of food poisoning in which 105 persons from various parts of Singapore. Roots of cases who were affected was traced to one type of imported Brassica alboglabra. The clinical symptoms were generally mild and the incubation period short (median 2.5 h). The etiology was confirmed when excessive levels of two OP pesticides-methamidophos (Tamaron/Monitor; 2.4 ppm-31.7 ppm) & profenofos (Selecron/Curacron; 1.1 ppm-5.4 ppm) were detected in implicated food &blood cholinesterase levels of the hospitalized patients were depressed by 26.1%-81.4% based on the lower limit of the reference range.(16)

The clinical features of OP poising are as follows: (i) **Acute cholinergic crisis**, which manifests within **24 to 72 hours** due to accumulation of acetylcholine at muscarinic and nicotinic sites and accumulation in CNS leading to headache, giddiness, seizure, and altered sensorium (ii) **Intermediate syndrome**, which manifests after **24 to 96 hours** due to prolonged activity of acetylcholine at nicotinic receptors resulting in weakness of ocular, neck, limb and respiratory muscles. The diagnosis of OP poisoning is made from history of ingestion or mucocutaneous exposure, clinical features, and plasma cholinesterase levels. The depressed plasma cholinesterase levels confirm the diagnosis of OP poisoning and the levels continue to be depressed for 4 to 7 weeks. The estimation of red blood cell cholinesterase is more specific. Atropine acts as physiological antidote as it antagonizes muscarinic receptor-mediated actions. Atropine is given as the initial loading dose of 2 to 5 mg and repeated every 5 to 10 minutes until signs of atropinization appear. After this, it is given as infusion at the rate of 0.02 to 0.08 mg/kg/min and the dose is titrated as per the clinical response.[17,18]

Role and dose of oximes are controversial. Pralidoxime is generally used in dose of 1 gm every 6 to 8 hours; recent studies have shown better outcome with high-dose infusion, 18 to 24 gm/day.[19] Pralidoxime is specific biochemical antidote for OPC poisoning, However its clinical efficacy at present is questionable. Obidoxime crosses blood brain barrier more than pralidoxime. Oximes are not recommended for carbamate poisoning. [20]Legal issues are of concern while managing these kinds of cases. We registered this case in medico legal registry and notification was sent to the police.[21]

Literature search revealed few cases of parenteral OP poisoning, by Raina *et al,*[3] Nishioka,[4] Guven *et al*,[5]Zoppellari *et al*.[6]

In our case, only clue from history was ingestion of fresh unwashed cherries from garden, followed by acute cholinergic syndrome, in the form of profuse diarrhea, frothing at nostrils and mouth, shock, along with other symptoms like pin point

pupils, type 1 respiratory failure. Further history revealed that some days back, spraying was done, using Dichlorvos. Frothing at nostrils and mouth with bilateral pin point pupil & characteristic smell of gastric lavage (kerosene like) & reduced levels of plasma cholinesterase levels confirmed diagnosis.

FINDINGS

Patient had developed "**Hypersecretory syndrome**", and was in shock with GCS of $E_1V_1M_5$(7/15), with type 1 respiratory failure (S_{O2}=50%), requiring intubation. After aggressive management patient recovered from shock and was able to maintain oxygen saturation on room air. During recovery, patient developed "**Intermediate syndrome**" – peripheral neuropathy and areflexia & also **Atropine psychosis**.

CONCLUSION

OP poisoning following intake of contaminated fruits is rarely mentioned in literature. The presentation can be misleading as the patient is unable to give history. Diagnosis needs great vigilance and careful history taking and administration of proper treatment in the event of suspicion of OP poisoning. Onset of symptoms may be delayed and complications after recovery can happen, like intermediate syndrome and atropine toxicity.

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Conflict of Interest – None

Source of Funding- Self

Ethical Clearance: Institutional Ethics Committee, Skims.

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A Rare Case of Calotropis Poisoning

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ABSTRACT

Calotropis procera commonly known as Madar is a common shrub found all over India. It has been used to treat various medical conditions by traditional practitioners. Its chemical component Calotropin, which is derived from the latex, is known to cause injury to the eyes and oral mucosa. It has also been used recently to treat Carbon tetrachloride poisoning and for wound healing in animal models. We report a case of accidental consumption of latex of *Calotropis* presenting with self-limiting gastrointestinal symptoms and metabolic acidosis. This case is being reported due to lack of adequate literature regarding toxic manifestations of *Calotropis* intoxication. In view of scarcity of literature we recommend further clinical research.

Keywords: *Calotropis, latex, calotropin, poisoning, India.*

INTRODUCTION

Shrub *Calotropis procera* is commonly found all over India. The toxic component Calotropin which is derived from its latex is known to cause injury to eye and oral mucosa. Toxic manifestations following accidental ingestion are mostly gastrointestinal. Details of systemic manifestations are still unreported.

CASE REPORT

26 year old married housewife from Vellore was brought to casualty with history of consuming 5 - 6 ml of the latex of *Calotropis procera*. She complained of epigastric discomfort and mild giddiness within half an hour of consumption of the same. Her epigastric discomfort persisted and she developed episodes of vomiting within 2 hours of consumption of the same. Neither did she give any history of exposure of latex in her eyes nor did she have any eye symptoms. She did not give any history of seizures, loss of consciousness or altered behavior. She did not complain of increased salivation, hematemesis, diarrhea, blood in stool, melena, chest pain or palpitations. Patient was not a known diabetic or hypertensive. She did not have any major illness in the past. She did not give history of using illicit drugs or herbal preparations.

On arrival at casualty she was conscious, oriented and her vital signs were stable. Examination of her eyes and skin was normal. Her cardiac, respiratory and central nervous system examination was unremarkable. On examination of her oral cavity there were no abrasions, discolorations, ulcerations or mucosal injury. Abdominal examination did not reveal any localized tenderness or organomegally or free fluid.

Investigations done (Table 1) revealed only mild metabolic acidosis. Her Electrocardiogram (ECG) and Chest X ray was normal. She was admitted to the ward and was started on intravenous fluid and proton pump inhibitors. Her abdominal symptoms and vomiting subsided over next 24 hours and her bicarbonates also normalized. She had no other systemic complications and showed rapid clinical improvement. Her symptoms completely resolved after 2 days of symptomatic management and she was observed in the hospital for 4 days before discharge.

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DISCUSSION

Calotropis procera is one of the two species of the milkweed of **Asclepiadeae** family and the second being *Calotropis gigantean*. *Calotropis procera* is commonly known as: French cotton, Alarka, Rooster tree, Sodom apple or Madar shrub. [Image – 1 and 2] It is found all over Asia and Africa. Though it is found all over India, it is particularly rampant in the wastelands of Assam, West Bengal, Rajasthan and Punjab.[1] These perennial shrubs produce either white or pink flowers. It also produces milky latex which is rich in various chemicals. The chemical components of the latex are: Calotropin, Calotoxin, Calactin and Uscharidin. Extracts from the flowers of *Calotropis procera* are known to have a cytotoxic activity. On crushing the leaves and stalk a thick milky juice is obtained which on heating produces an extremely toxic serum which at a volume of 0.05 ml is enough to kill a frog. [2] Exposure to extracts has been shown to have harmful effects to eye and oral mucosa in some case reports. The extract is thought to have corrosive properties and has been called as vegetable mercury. Most parts of the plant are known to have cardio steroid resembling digitalis. However postulates of various cardiac abnormalities secondary to the same is not substantiated in clinical practice so far. Various parts of the plants has also been used by traditional practitioners in order to treat conditions like painful tooth cavities, tooth ache, leprosy, syphilis, gum bleeds, tinea corporis, dry skin and edema**.** They have also been used for abortion, homicide, suicide and as a cattle poison. [2] In spite of details regarding its toxic effects, it is still being used as remedies for several conditions

On the other hand lack of literature of the contrary has instilled a fear which might hinder the further utilization of its components in scientific research. Earlier Calotropin was reported to have antibacterial, anti- inflammatory, pro wound healing properties [3]. Recently Calotropin has been found to be useful in Carbon Tetrachloride poisoning in rat models[4]. It has shown to have anticancer effect against non-small cell lung cancer, glioblastoma and prostate cancer in in vitro studies[5]. It has also been postulated to have anti influenza virus activity, hemostatic effect, anxiolytic effect and prevention of free radical mediated injury.

Oral mucosa injury following ingestion of latex has been reported. Our patient presented immediately following ingestion of the toxic dose of latex. She manifested with features of gastritis. Mild metabolic acidosis present can be attributed to recurrent vomiting secondary to her gastritis which resolved spontaneously. Immediate decontamination in the form of irrigation with copious clean water and gastric lavage is practiced routinely despite any clinical evidence regarding the same. Management mostly is supportive and symptomatic. Need of antidote is questionable due to lack of significant systemic manifestations. Toxic manifestations following ocular injury has been reported by various authors. There is lack of literature regarding details of clinical manifestation following ingestion. This is either due to lack of reporting or due to lack of significant systemic involvement. *Calotropis* still continues to be used in various herbal remedies and has several medico-legal implications. Judicial use, optimization of reporting and facilitating further research is warranted.

Table 1: Laboratory investigations

Heamatological	
Heamoglobin	12.6 g/dl
Total count	9880 cells /cumm^3
Platelet count	251000 cells/cumm
Differential count	P – 61, L – 29, M – 4, E – 6
Biochemical	
Blood sugar	94 mg /dl
Blood urea	29 g / l
Serum Creatinine	0.53 mg%l
Serum Sodium	137 m mol/l
Serum Potassium	3.7 m mol/l
Serum Chloride	107 m mol/l
Serum Bicarbonate	19.9 m mol/l
Serum Calcium	8.6 mg /dl
Serum Lactate	0.9 mmol/L
Total Bilirubin	0.4 mg /dl
Direct	0.1 mg/ dl
Indirect	0.3 mg /dl
SGOT	16 iu / l
SGPT	10 iu / l
Alkaline Phosphatase	60 iu / l
Total Protein	7.7 g /l
Albumin	4.2 g/l
Globulin	3.5 g/l

Image 1: Calotropis flower

Image 2: Calotropis plant with flower

Acknowledgement: Nil

Ethical Clearance: Taken from Institutional Review Board of Christian Medical College and Hospital, Vellore.

Conflict of Interest: the authors declare that they do not have any conflict of interest

Patient Consent: Obtained

Source of Funding: Self

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A Case of Sudden Natural Death Alleged as Death due to Medical Negligence

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ABSTRACT

In these modern days of increased awareness of knowledge at the tip of finger by a click, there is increasing litigation on doctors and widening of gap between patient and doctor relationships. Also the tendency of public to fall onto hype and hungama created by mass media of such news of such events fashioned every time to make it attractive and more boisterous to increase their ratings and popularity, without minding the affects they would create among the general public and the doctor's community. And in many instances the general public demanding an early quick and complete remedy to all medical ailments irrespective of stage of disease are posing dangerous situation to patient doctor's relationships leading to rapidly raising of number of medical negligence cases against the doctor. In present scenario doctor cannot be sure enough that they will never be threatened with an action for negligence, particularly by urbanities mainly amongst educated and affluent classes, as they are health conscious and aware of defects in medical managements. Patients are ready to sue even though they had received excellent care and needed treatment to do best for patient in a good faith and belief.

Keywords: *Medical negligence, sue, disease, seizures, aspiration pneumonitis.*

INTRODUCTION

Medical negligence can be defined as omission or commission to do something which is a reasonable and competent practitioner guided by prevailing standard of medical knowledge and regulate his/her conduct, would or would not do, leading to some harm or damage to the patient.[1] For medical negligence to be proved, the following must be there – 1. The doctor owed a duty of care to the patient 2. There was a breach of the duty. 3. The patient suffered a damage.[2] The doctor is innocent until proven guilty and the prosecution must prove the case against him. The patient bears the burden of proof and must convince the judge by a preponderance of the evidence that its case is more plausible.[3] The following points could lead to reasonable reduction in number of allegations of negligence being brought against doctors – Be sure and spent time in maintaining rapport with one's patient. Always obtain complete history. Examine the patient completely and thoroughly. Seek appropriate investigations and laboratory support. Apply reasonable degree of skill and knowledge. Do not guarantee for treatment. Maintain adequate legible signed notes recorded in patient's sheet.[4]

CASE REPORT

A 20 year old male taken to a private hospital with history of sudden disorientation, slurred speech, unable to recognize blood relatives and friends since one week. During the examination doctor found that he had one episode of seizure one week back. The doctor diagnosed the case as "Hypoglycemia with epilepsy for evaluation" patient admitted in hospital on 17.08.2013 at 11: 30 pm as per doctor's advice. The patient succumbed to death on 18.08.2013 at 09:15 am. Case has been filed against the doctor for negligence in treatment and body sent for postmortem examination. Cause of death as per hospital records - 'Seizures with aspiration pneumonitis leading to cardio-respiratory arrest'.

Autopsy findings include no evidence of any ante mortem external and internal injuries. All visceral organs are congested. Larynx, trachea and

bronchi shows presence of whitish froth in lumen. Heart enlarged with left ventricular hypertrophy. Histopathological examination of brain, heart and lungs preserved revealed nil particular. No poisonous substance found on toxicology report given by APFSL.

INVESTIGATIONS

Viscera sent for poison analysis to APFSL. Brain, heart, lungs preserved and sent for histopathogical examination to pathology department.

DISCUSSION

In this case, the 24 year old male after doctor's examination and undergoing necessary investigation's found to be alcoholic, have been suffering from hypoglycemia with epilepsy. The treating doctor advised them to admit in acute medical care, but the patient relatives were not willing for admission. After explaining the condition of patient and need for admission they admitted the patient. While undergoing treatment on 18.08.2014, at 08:30 am patient had an episode of seizure and died.

Postmortem examination done, viscera preserved for chemical analysis, Brain and heart sent for histopathological examination, all being negative without any significant findings. Typically the individuals dying suddenly and unexpectedly of epilepsy are young and show no pathological findings at autopsy. The deaths that are unwitnessed, victims are often found dead in bed in the morning. If the death is witnessed there may be no seizure or only one seizure with collapse. The individuals are commonly found dead in bed is probably because sleep predisposes to epileptic attack. Most epileptic deaths are natural. The mechanism of death in epilepsy is due to cardiac arrhythmia precipitated by autonomic discharge.

CONCLUSION

In this case the death was due to seizures. No medical negligence can be applied. All antiepileptic drugs cause conductive defects in heart functioning.

Acknowledgement – Nil

Ethical Clearance – Department of forensic medicine & toxicology, Osmania, Medical College, Hyderabad, Telangana

Source of Funding – Self

Conflict of Interest – Nil

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Comparative Analysis of Equations to Estimate Stature with Foot Length

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ABSTRACT

Background: Estimation of stature is an important parameter in identification of human remains in forensic examinations. There are various studies carried out in different states and have various formulae to calculate stature from available parameters.

Objective: In this present study we attempted to have a comparative analysis of regression equations to estimate stature from foot length and a unique equation for stature estimation if we have footprint as a sole parameter available at scene of crime.

Study Design: Cross sectional study.

Place of Study: Department of Forensic Medicine at R. D. Gardi Medical College, Ujjain, M.P.

Method: The present study was carried out to establish the regression equation and correlation co efficient between individual's height and foot length and to have a comparative analysis of regression equation. It was conducted on the Medical students of second year, 147 subjects were selected irrespective of their caste, religion, dietary habits & socio -economic status.

Observation: Regression equation for estimation of stature from foot length for both sex Y= 82.934+ 3.404 x Foot length, for individual male sex Y= 138.59 + 1.35 x Foot length and for Female sex Y= 119.50 + 1.604 x Foot length. The correlation coefficient between height & foot length is + 0.688 in Male & +0.587 in female which is highly significant.

Conclusion: It can be concluded that, with difference of ± 3 any equation from the study can give approximate height of an individual with the help of foot length. Foot measurements have a strong relationship with stature; hence, the stature of an individual can be successfully estimated from the foot length regression model derived in the study.

Keywords: *Foot length, Forensic Anthropology, Stature, Regression analysis.*

INTRODUCTION

The use of anthropometry in the field of forensic science and medicine dates back to 1882 when Alphonse Bertillon, a French police expert invented a system of criminal identification based on anthropometric measurements. Since then, anthropometry has continuously been used in forensic examinations of unknown dismembered human remains. Anthropometry helps in reconstruction of the biological profile of the deceased such as age, sex, ethnicity and stature[1,2].

Studying foot pattern and foot dimensions can reveal information regarding surgical and pathological conditions like talipes equinovarus, flat foot or varus metatarsal and other familial or acquired anomalies. It also plays a vital role in medical rehabilitation,

sport sciences and foot wear design. Foot dimensions also exhibit sexual dimorphism[2,3].

The foot has been studied widely and has been proven to be able to provide information about an individual when only the foot of the individual is recovered. Attempts have also been made to estimate stature and sex from foot length and foot width based on statistical equations and formulae (Kanchan et al. 2008a). For stature estimation researches, different nutrition types and physical activities may cause variations in populations. Many studies are successfully performed on this topic despite a wide range of ethnics and races through the populations[4,5].

Estimating height of unknown individual has been an important parameter of identification, either with the help of dismembered body parts, bones or impressions left at the scene of crime. In this present study we attempted to have a comparative analysis of regression equations to estimate stature from foot length and a unique equation for stature estimation if we have footprint as a sole parameter available at scene of crime.

MATERIAL & METHOD

The present study consists of a cross-sectional sample of 147 subjects (68 males and 79 females) aged from 18 to 25 years. Amongst them 102 belonged to Madhya Pradesh and 45 from rest of the India. As there were no subjects available from North East region, we could not include them in study. As such subjects were selected irrespective of their caste, religion, dietary habits and socio-economic status.

Sufficient permissions and consents are procured before the measurements of the students are taken and clearance from the Institutional Ethical committee is obtained in advance. Stature; using the stadio-meter, the subject was made to stand barefoot in the standard standing position on its baseboard. Both feet are in close contact with each other and head oriented in Frankfurt's plane. The height was then recorded in centimeter from the standing surface to the vertex in the weight bearing position of foot.

The length of the foot was measured by a foot caliper. It was measured by making the subject sitting in a relaxed position with equal weight on both foot, ankle was perpendicular to the foot, after taking off the shoes and the stockings. The fixed jaw of the caliper was placed on pternion (most posterior and prominent point of the heel) [13] and the sliding jaw was fixed on acropodion (tip of the most protruded first or second toe). Caliper was kept parallel to the long axis of the foot10. Length of both right and left foot were measured. The measurement of height and foot length was carried out at a particular period of time 10am to 1pm to avoid diurnal variations.

EXCLUSION CRITERIA

Students morphologically showing the congenital malformations, Dwarfism / Achondroplasia, features of nutritional deficiencies and injuries to extremities were not included in the present study.

DATA ANALYSIS

In vernier caliper, Length = reading of the main scale + vernier coincidence x vernier constant + mechanical error. (Here vernier constant = 0.01 and mechanical error = 0) Calculation of stature using regression equation: Stature = value of constant + regression coefficient x foot length. Value of the constant and regression coefficient was calculated using SPSS Version 19 program. The regression equation thus calculated, to find significant difference between estimated and predictive value. Regression Equations of other studies selected for comparison with our data. The statistical data so obtained i.e. Mean SD, p value and t test were compared to see validity of equations. For this we have selected only right foot length from these selected studies to minimize variation.

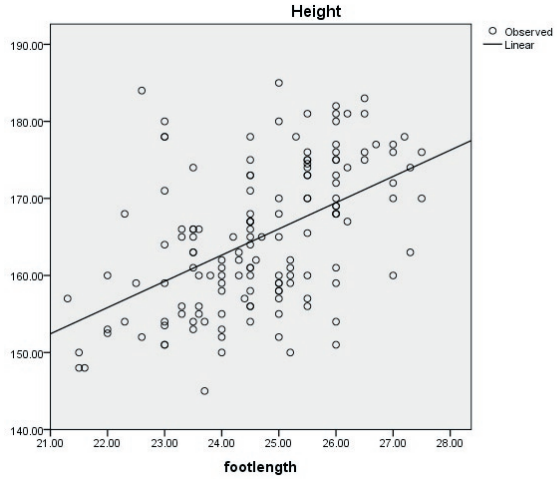
OBSERVATION

Table 1: Observed Mean height and Footprint Lengths

Total Subjects	Mean	Sd. Deviation	Total Subjects
Height	164.9388	9.37040	147
Left Foot length	19.7837	3.86450	147
Right Foot Length	19.7694	3.55579	147
Male	**Mean**	**Sd. Deviation**	**Total Male**

Table 1: Observed Mean height and Footprint Lengths (Cont...)

Height	172.7279	6.42432	68
Left Foot length	20.6721	3.36930	**68**
Right Foot Length	20.6735	3.77939	68
Female	Mean	Sd. Deviation	Total Female
Height	158.2342	5.52084	79
Left Foot length	19.0177	3.54870	79
Right Foot Length	18.9924	3.7946	79
Madhya Pradesh	Mean	Sd. Deviation	Total Female
Height	164.2990	9.51998	102
Foot length	24.5627	1.38942	102
Rest of India	Mean	Sd. Deviation	Total Female
Height	166.3889	8.95626	45
Foot length	24.9289	1.36725	45



Graph 1: Linear Graph Showing Body height of total subjects with respect to Foot length observed.

In present study, the formula i.e. Regression equation for estimation of stature from foot length for both sex Y= 82.934+ 3.404 x Foot length, for individual male sex Y= 138.59 + 1.35 x Foot length and for Female sex Y= 119.50 + 1.604 x Foot length. The correlation coefficient between height & foot length is + 0.688 in Male & +0.587 in female which is highly significant. From the above facts, it is clear that if either of the measurement (foot length or total height) is known the other can be calculated & this fact may be of practical use in Medico-legal investigations.

Table 2: Comparative Analysis in Female

Sr No.	Name of study	N	Mean	SD	S.E
1.	Our Study	79	158.22	2.08055	.23408
2.	Patel S M ,et al	79	158.2163	4.44905	0.50056
3.	Arti Narde, et al	79	155.8439	5.52564	0.62168
4.	Mansur D I, et al	79	160.6171	3.45028	0.38819
7.	Ilayperuma, et al	79	160.7641	5.11575	0.57557
8.	Khairulmazidah,et al	79	161.7556	4.04046	0.45459

Table 2 : Comparative Analysis in Male

Sr No.	Name of study	N	Mean	SD	S.E
1.	Our Study	68	172.731	1.66290	0.20166
2.	Patel S M ,et al	68	167.5206	4.48367	0.54373
3.	Arti Narde, et al	68	159.7629	7.34140	0.89028
4.	Mansur D I, et al	68	169.4059	3.37507	0.40929
7.	Ilayperuma, et al	68	169.8479	4.42208	0.53626
8.	Khairulmazidah,et al	68	168.6648	4.09074	0.49607

DISCUSSION

Our study was conducted on a population group where students studying in the Medical College belonging to various religious and regions were studied. We devised the linear regression equations as well as multiplication factors for estimation of stature from foot length in both the genders. In this study foot length is found to be good parameter for predicting stature in both the genders. The linear regression equation derived from foot length for estimation of stature showed a statistically significant relationship in both the genders.

Other regression formulae selected for comparison of studies are as follows: Mansur D I , Nepal, 2012[9] Y = 2.74 (x) + 100.1 (for Right foot male), Y = 2.66 (x) + 96.40 (for Right foot Female), Y = 3.179 (x) + 87.65 (for Both Male & Female). Abdi Ozaslan, et al, Turkey 2012[16] S= 840.88 +3.52 (x) +/- 49.40 (for Male), S= 941.95 + 2.96 (x) +/- 55.95 (for Female) Ingrid H.E, et al,1967, Uganda[11] Height =(6.23 X x) + 4.66. Khairulmazidah, et al ,2013, Malaysia[12] Male RFL→ Y= 84.663 +3.321 (x)+/- 4.93 Female RFL→ Y= 86.554 +3.115 (x)+/- 4.483. Patel S.M.et al 2007, Gujarat[13] Male Y= 75.45+3.64 (x) Female Y = 75.41 + 3.43(x) ArtiNarde, et al 2013, Nagpur Male Y=9.01+5.96 (x) +/-1.738 Female Y=53.0+4.26 (x) +/- 0.992. I.Ilayperuma ,et al 2008[3] Male H=79.042 +3.590(x) Female H= 65.549+3.944(x) Both H= 44.107+4.922(x), Kewal Krishnan at at Chandigarh, (2011)[15] S= a + b (x) +/- SE Where a = constant, b = regression coefficient, x= Foot length, SE= Std. error.

The stature obtained by different researchers such as, Deopa et al[4], Barnadas et al[5], Tharmar et al[6] & Ozaslan A et al[7] varies due to Geographical variations & variation in the morphology of different population group, however they had noticed that males have greater mean value of stature as compared to females. Similar results are seen in Mansur DI e al[9], Jitender et al[10].

Nishat Ahmed Sheikh et al studied 170 school going children of Telangana region the regression equations for estimation of stature from right foot length (RFL) and left foot length (LFL) were 144.01+0.126 x RFL and 145.07 + 0.176 x LFL respectively[20].

Ozaslan et al[8] studied on 356 randomly selected subjects in Turkey & developed a regression equation for stature estimation from the foot length obtained from the foot impression. Bhavna et.al[16] have studied on 503 male Shia Muslims of Delhi, India & reported a body dimensions which correlates highly with the stature. Patel et al[13] in their study on 502 medical students between 17 to 22 years of age belonging to various regions of Gujarat & reported a regression formula between foot length & height of an individual.

Gordon *et al*. (1992) estimated stature from foot dimensions and models containing both foot length and foot breadth were found to be significantly better than those containing only foot length. Nishat Ahmed Sheikh *et al.* (2014) estimated stature from forearm length, the ratio fall between 3.49 and 3.88 for boys with a mean of 3.67 and SD + 0.090; and between 3.45 and 3.88 for girls with a mean of 3.68 and SD 0.093 [21]. From above analysis, it is found that Mean height of our study is 158.22 in Females and 172.71 in Males. In the studies compared here we found that mean heights of these equations ranges from 155 to 161 cm in Females and 159 to 172 in males. This may be interpreted as with the difference of $\pm$ 3 the equations can be applied to estimate height of person by the given foot length. Study by Patel et al[13] has very close result. Inference could be drawn that the stature of an individual can be estimated from the foot length in both sexes. This method of stature estimation can be used by law enforcement agencies and forensic scientists. The only precaution which must be taken into consideration is that these formulae are applicable to the population from which the data have been collected due to inherent population variations in these dimensions, which may be attributed to genetic and environmental factors like climate, nutrition etc. The results obtained in our study correlates with the previous studies.

CONCLUSION

The present study revealed that foot length dimensions are strongly correlated with stature & can be used for predicting the stature in the Forensic Examination. We have found that, there is not much difference between statures of subjects from Madhya Pradesh & Non- Madhya Pradesh. It has been found similar as far as male & females are concerned. By above study, it can be concluded that, with difference of $\pm$3 any equation from above study can give approximate height of an individual with the help

of foot length. Also that formula can be standardized with inclusion of other parameter like age along with foot length. It is highlighted here that the findings of the present research apply to a very specific population and hence, should not be generalized. We further would like to continue to work on estimating stature by unique formula which can be utilized irrespective of gender and region, at least for India.

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A Study of Electrocardiographic Abnormalities in Patients with Scorpion Sting

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ABSTRACT

The objective of this study is to examine the electrocardiographic features of patient stung by scorpions. Thirty six patients stung by scorpions were gathered in the study. 12 lead derivations electrocardiography (ECGs) was performed to all patients. The determined parameters were: PR segment and QRS duration, QTmin, QTmax, QTc, QT dispersion (QTd) intervals, minimum P wave duration (PWmin), maximum P wave duration (PWmax) and P wave dispersion (PWd). Thirty six patients (17 males and 19 females, mean age: 35.7±13.7 years) were included in this analysis. Heart rate (84,5±13,8 beat/min), QRS (98,8±11,8 msn), QTc (412±27,4 msn), QTd (412±27,4 msn), PWmin (412±27,4msn) and PWd (41,4±19,7 msn) were found. Scorpion sting lead electrocardiographic variability. The most common changes were ST changes, sinus tachycardia, atrial ectopic beat, bradycardia, and ventricular ectopic beat.

Keywords: *Electrocardiographic variability; Heart rate; Scorpion sting.*

INTRODUCTION

Scorpion envenomation is common in tropical and subtropical regions. A direct effect of scorpion venom on the myocardial has also been shown in several studies. Finally, cardiac dysfunction might be due to myocardial ischemia, whether related to massive catecholamine outpouring or coronary abnormality [1].

Electrocardiographic abnormalities are frequently recorded on admission or several hours later[2]. Sinus tachycardia is initially recorded in the majority; however sinus bradycardia may be present in 24% of the victims. Bizarre, broad notched, biphasic T wave changes with additional ST elevation or depression in the limb and precordial leads are recorded, sometimes accompanied by beat-to-beat T wave abnormalities[3] followed by the appearance of tiny Q waves in the limb leads, consistent with acute myocardial infarction like pattern; occasionally electrical alternant of the QRS was recorded; the QTc was prolonged in the majority of patients and a transient deviation of the QRS frontal axis to the left or right accompanied by incomplete RBBB was also observed [4].

India is the most affected, with a reported incidence of 0.6%.1 A retrospective analysis of the calls received by the national poison information center (NPIC) between April 1999 and March 2002 showed that, out of 995 calls, 6 involved scorpion sting.14 During hot months March to June and September to October daily cases of sever scorpion sting are received at endemic areas western Maharashtra, Karnataka, Andhra Pradesh, Sauraahtra and Tamil Nadu.

The aim of this study was to examine the electrocardiographic changes in patients presenting with envenoming following a scorpion sting.

METHOD

This is a retrospective study of 36 consecutive patients with scorpion stings admitted to Rajiv Gandhi

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Institute of Medical Sciences (RIMS), Adilabad from June 2012 to July 2013. The protocol was approved by the institutional ethics committee Repeat 12 derivation electrocardiography (ECGs) were obtained per 6 h during admission from all patients. Only the ECG that was obtained from the patients when their pain was at the highest level was recorded for determination. Minimum QT duration, maximum QT duration and QT dispersion were measured. QT dispersion was calculated as the difference between maximum QT duration and minimum QT duration (QT dispersion= maximum QT duration – minimum QT duration). Increased QT dispersion (QTd) is an indicator of heterogeneous ventricular repolarization and is useful for prediction of lethal arrhythmia such as ventricular tachycardia [5]. Minimum P wave duration, maximum P wave duration and

P wave dispersion was calculated. P wave dispersion was calculated as the difference between maximum P wave duration and minimum P wave duration (P wave dispersion= maximum P wave duration-minimum P wave duration). The P wave of the electrocardiogram may show alterations that can be associated with atrial arrhythmias[6]. Prolonged P wave duration and increased P wave dispersion have been reported to an increased risk for atrial fibrillation[7]. Corrected values (QTc, QpTc) were calculated from these values according to the Bazett formula: (QTc=QT/QR-R, Q peakTc=QpT/R-R (sec). Additionally, Q peakT values were found by measuring the interval between the initial point of the QRS complex and the highest point (peak) of the T wave.

STATISTICAL ANALYSIS

SPSS software package (SPSS 15; SPSS Inc., Chicago, IL, USA) was used for statistical analyses. The data were analyzed using Student's t-test and the numeric data were expressed as the mean ± standard deviation. Chi-square test and the results were expressed in percentages.

RESULTS

The mean values and statistical comparisons of 36 patients are presented in Table 1. Thirty six patients (17 males and 19 females, mean age; 33,7±14,7 years) were included in this analysis. The ECG which were performed when the patients had maximum (grade 3) pain were obtained for determination.

Heart rate (84,5±13,8 beat/min), QRS (98,8±11,8 msn), QTc (412±27,4 msn), QTd (412±27,4 msn), PWmin (412±27,4msn) and PWd (41,4±19,7 msn) were found. In patients, sinus tachycardia, atrial ectopic beat, ventricular ectopic beat, sinus arrhythmia, ST changes, LBBB, RBBB, first-degree AV block, LAHB, LPHA that were not needed treatment were 17,1%, 2,6%, 13,2%, 2,6%, 7,9%, 13,2%, 1,3%, 2,6%, 6,6%, 6,6%, and 2,6% respectively.

DISCUSSION

The scorpionism and its consequences are an actual public health problem in several parts of the world; especially in north-Saharan Africa, Sahelian Africa, South Africa, Near and Middle-East, South India, Mexico and South Latin America, east of the Andes[9]. Approximately 1500 species of scorpions are described. About thirty of them are recognized as potentially dangerous for humans[9]. Approximately 94% of the accidents occur during the night at homes especially in rural areas, and 88% do not require any hospitalization[8].

Climatic conditions, dryness and heat, are also important risk factors[10]. The effects of the stings depend on the delivery dose of the scorpion, the age of the offender, the season, and the size of the victim[11].

Adults and among them males are most frequently stung by scorpions. However, envenomations are more severe in children in whom mortality is dramatically higher than in adults [3]. The death can occur early due to cardiovascular collapse. The incidence is underestimated resulting in the absence of exhaustive report of the cases; mortality is probably better known. More than 1,200,000 scorpion stings occur annually while the number of deaths could exceed 3250[9]. Average case fatality rate is 0.27%[9]. Soker et al[12] reported a higher mortality rate (12.5%) from west and southeastern part of Anatolia among 64 children patients with scorpion stings. In contrast, in our study no deaths were recorded among the 36 cases from our region.

The pathogenesis of cardiac dysfunction and myocardial damage secondary to scorpion envenomation had largely been the subject of debate in the past. The most accepted hypothesis was the increased catecholamine circulating secondary to a direct stimulatory effect of the venom on the

adrenals and on sympathetic nerve endings. This hypothesis was confirmed by some clinical and experimental [13] studies. In effect, it is possible that the venom affected the myocardial cell membranes directly, altering its permeability as well as electrical properties, and through abnormal electrolytes fluxes and shifts, causes functional damages [1]. However the myocardial dysfunction may be due to myocardial ischemia [14]. This hypothesis was advanced on some clinical, electrocardiographic, echocardiographic[15], and radionuclide [20] studies.

It was reported in this study that, the incidence of pulmonary edema ranged from 7% to 46% and cardiac arrest rate was 7%[3]. It is reported in many studies[17] that, the clinical signs of involvement of cardiovascular system are tachycardia (rarely bradycardia with hypotension) with hypertension, in a large number of the victims. Alpay et al[18] evaluated the ECG findings in two cases; in first case they had shown sinus rhythm with normal PR and QT intervals, presented 1 mm ST depression on precordial and extremity derivations where 2 mm ST elevation was found on aWR. Sinus tachycardia, U wave and mild QTc elongation (QTc=0.46 sn) was found in ECG of the second case.

QTd is related to serious arrhythmia and sudden cardiac death[19]. In many studies, it is accepted that regional differences in repolarization (QTd) of the heart triggers these events[20]. QT disturbed regional repolarization of ventricle[20], namely, it reflects homogeneity disturbance (inhomogeneity) in the repolarization process[21] Alan et al[19] thought that, persons who have been bitten by scorpions, myocarditis could develop, homogeneity of myocardium could be disturbed due to inflammation or toxic effects in myocardium, and arrhythmias may occur through QTd. Therefore they examined QTd in patients. They did not detect a significant difference in QT and QTd value patients and control group. In our study QRS, QTd, and PWd were found to be statistically significant.

There were no cases of hypersensitivity reactions, cardiogenic shock and pulmonary edema in present study. All

patients were discharged with recovery. Cheema et al [22] reported that epinephrine and norepinephrine extended the maximum period of P wave. It was reported by Tukek et al [23] that, the increase in sympathetic activity causes increasing in P dispersion. The P wave of the electrocardiogram may show alterations that can be associated with atrial arrhythmias[6]. The P wave dispersion was not determined in previous studies due to scorpion stings. Our study is the first in this subject. We think that, the significant different between P wave dispersion and minimum P wave period is related to both increased early atrial beat number and also increased sinus arrhythmia. This condition is related to the sympathetic activity that caused by scorpion venom.

Bouaziz et al[24], reported that, the most observed abnormalities in electrocardiogram were sinusal tachycardia

(84.8%) (>120/min in children and 90/min in adult patients) and T-Wave changes (17.8%). Other ECG abnormalities were also observed including ST segment depression or elevation (15%), and sinusal bradycardia (0.4%). Also, it was determined in this study that, of patients, 61.5% had a pulmonary edema, while 20.5% had a cardiogenic shock [24].

Bahloul and his colleagues[14] made a study to determine the myocardial ischemia in six patients with severe scorpion envenomation. In this study the most common abnormalityobserved in ECG was tachycardia (>110 beat/min) (100%). 1/3 of patients improved cardiogenic shock. Other ECG abnormalities were also observed, including ST segment depression or elevation observed in two patients, T-wave change was observed in four patients and right bundle branch block in one. In our study, the most common ECG abnormality was sinus tachycardia. The rate of patients with bradycardia and ST-T changes were similar to the literature.

In Blum and his colleagues's [4] study the ECG demonstrated a normal sinus rhythm. There were deep large inverted T waves in leads II, III, and AVF, with huge U waves in precordial leads V1-V4 [4]. In another study that was made by Bentar et al. [25], cardiac problems rate and ECG abnormalities was reported as 23,1% and 13,7% respectively.

Table 1. Comparison of ECGs findings of the patients

Sinus tachycardia (n/%)	13/ %17,1
Heart (Rate beat/min)	84,5±13,8
Atrial ectopic beat (n/%)	10/ %13,2
Ventricular ectopic beat (n/%)	2 /%2,6
Bradycardia (n/%)	2 /%2,6
Sinus arrhythmia (n/%)	6 /%7,9
ST changes (n/%)	10 /%13,2
LBBB (n/%)	1/ %1,3
RBBB (n/%)	2 /%2,6
1. AV block (n/%)	5 /%6,6
LAHB (n/%)	5/ %6,6
LPHB (n/%)	2/ %2,6
PR duration(msn)	159,1±34,1
QRS duration(msn)	98,8±11,8
QTmin (msn)	342,4±32,8
QTmax(msn)	377,1±33,4
QTc(msn)	412±27,4
QTd(msn)	36,3±21,5
Pmin wave duration (msn)	68,4±19,3
Pmax wave duration (msn)	105,9±21,1
PWd (msn)	41,4±19,7
QpeakT (msn)	87,1±20,1

QTd:QT dispersion, PWd:P wave dispersion

CONCLUSION

The majority ECG abnormality was sinus tachycardia. Other ECG abnormalities were also observed, includes ST segment changes, bradycardia, AV block, LBBB, and RBBBT. QRS, QTd, and PWd were found to be statistically significant. The most common changes are ST changes, sinus tachycardia, atrial ectopic beat, bradycardia, and ventricular ectopic beat.

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Determining Cause of Death in Skeletonised Remains - A Case Report

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ABSTRACT

In the examination of skeletal trauma, meticulous analysis of the skeletal remains is essential. In this paper we discuss a case where an autopsy was conducted on skeletonised remains of a body scattered in a grove. Some tell tale sign of injuries were present on the skull of the skeletonised remains, which indicated blunt and sharp force trauma sustained, but the samples taken at the site of injury sent to the forensic science laboratory for analysis turned out to be inconclusive. The focus of this paper is to highlight the fact that the fracture patterning in combination with fractured edge characteristics can be more useful for the assessment of perimortem skeletal trauma and that skeletal trauma is usually the only available source of information on cause and manner of death of skeletal remains.

Keywords: *Skeleton, Skeletal remains, homicide, blunt force trauma, sharp force trauma.*

INTRODUCTION

Associating an injury to the skeleton with the time of death is one of the most important considerations in a forensic evaluation of trauma. Whether the lesion is a fracture, cut mark or blunt force trauma, it is critical to know whether it occurred prior to, around the time of, or after death.[1] Meticulous analysis of the skeletal remains is essential to help determine whether skeletal injuries are temporally associated with the events surrounding death and the mechanisms that were involved in their production.[2] Sharp blades such as knives, will often leave nicks and grooves on the surfaces of any bones they come into contact with and may give some indication as to the type of weapon, whereas blunt force trauma to the skull may leave a pattern of radiating fractures around the point of impact.[3] The distinction between perimortem and postmortem injuries however, is challenging, as it depends on more subtle attributes of bone tissue.[2] Perimortem sharp force lesions were identified based on characteristics such as sharp and straight edges, V-shaped injury profiles, hinging or lipping at lesion edges, and radiating fractures.[4] Postmortem damage displays rough and irregular edges and surfaces and a clear difference in colour from the adjacent unaltered cortical surface, they also lack clear injury profiles.[4]

The necessity of the highlighting this case is that skeletal trauma is usually the only available source of information on cause and manner of death from skeletal remains.

CASE REPORT

Skeletonised remains of a body were found scattered in a grove and was brought by the police for post mortem to be conducted. The case was booked under sec. 174(1) IPC. Skeletal remains comprised of 49 bones and several bone fragments (fig.1). Several bones especially the long bones were gnawed by predatory animals. Partially burnt clothing with dried reddish brown stains (fig. 2) was also discovered along with the remains. Some tell tale signs of injuries were present on the skull when the fragments were put together, (1) a comminuted fracture of the fronto-parietal bone with reddish brown stains at the fracture site (fig.3) and (2) a vertical fracture with clean cut edges extending from the right frontal bone along the zygomatic arch up to the mandible on the right side (fig. 4). The nasal bone with part of the maxilla was missing. Sex of the individual was determined to be male from the features of the skull, mandible and

hip bone. The age of the individual was determined to be around 20 to 30 years based on the fusion of the secondary centres of the bones, fusion of the cranial sutures and teeth attrition. The following was sent to the forensic science laboratory for investigation/ analysis -1. Skull for superimposition, 2. The upper end of femur for DNA fingerprinting. 3. Upper end of tibia for detection of any poison. 4. Pieces of bone for blood grouping and cross matching. 5. Scraping of clotted blood at the fracture site (to determine if the injuries are perimortem). Unfortunately the analysis of samples 4 and 5 turned out to be inconclusive. It was clear that this was most probably a case of homicide and there was also an attempt to conceal the body. However the opinion on the cause of death, since the forensic science laboratory report turned out to be inconclusive, was given as: Cause of death could not be determined as the body was skeletonised. A follow up of the case on further investigation by the police revealed that it was indeed a case of homicide and the accused were apprehended. At the court trial, the following weapons were produced 1. A sharp heavy weapon (aruval) and 2. A heavy metal spike used to harness the shoulder rest of a bullock cart, both of which correlated with the fractures produced on the skull. As the cause of death given in this case was inconclusive the odds weighed heavily in favour of the accused to be acquitted.

DISCUSSION

Staining of fractured edges by hemorrhage, decomposition fluids, or occasional postmortem contaminants such as soil, dirty water or leaf stains indicates that the injury preceded particular postmortem events.[2] In this case the following gross findings could have been used as reliable features of perimortem injuries.

1. In the comminuted fracture of skull, the edges of the fractured bones shows bevelling at places with sporadic sharp projections (fig.5) and uniform correlation are associated with perimortem trauma[2] , which is also seen radiating from the point of impact. It can also be noted that the colour at fracture site was the same as the adjacent unaltered cortical surface whereas in bones with post mortem breaks appear 'clean' and lighter in colour in comparison to the adjacent unaltered cortical surface.[4]

2. The vertical fracture with clean cut edges (fig.6) was most probably produced by a sharp heavy weapon and could not have been a post mortem artefact. Sharp force trauma results from injury with a bladed weapon, such as a knife, hatchet, sword, or bayonet. These injuries typically manifest in bone as straight, incised lesions with very sharp edges.[3] Where the blade has passed cleanly through bone, will produce a wound with straight, clean-cut edges which may be almost perpendicular with the bone surface.[6]

3. The brownish stains (haemorrhage) over and between the fracture sites with adherent straw and mud particles. Consideration should be given to possible latent impact sites on the cranium in the form of dark stains resulting from entrapped blood and fat within crushed diploë .[5]

The other facts in this case such as partially burnt clothing along with reddish brown stains on the shirt add up as corroborative evidence in committing and trying to conceal a crime.

Fig.1. Skeletal remains

Fig. 2. Partially burnt clothing with dried reddish brown stains.

Fig. 3. Comminuted fracture of the fronto-parietal bone with reddish brown stains at the fracture site with (1) bevelling at places with (2) sporadic sharp projections.

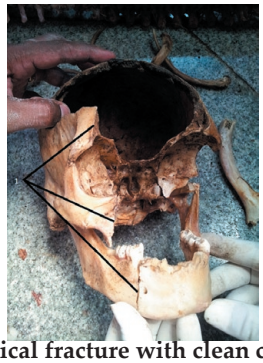

Fig.4. A vertical fracture with clean cut edges extending from the right frontal bone along the zygomatic arch up to the mandible

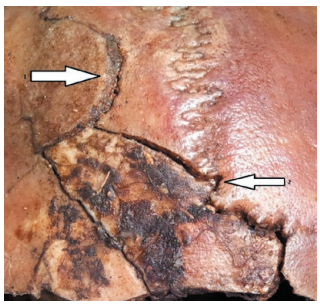

Fig.5. shows (1) bevelling at places with (2) sporadic sharp projections.

Fig.6. Vertical fracture with clean cut edges.

CONCLUSION

The identification of perimortem trauma is essential in skeletal trauma analysis. In this case a direct opinion on the cause death due to sharp and blunt force trauma to the skull could have been given based on fracture patterning in combination with fractured edge characteristics which also proved to be the most useful method for the assessment of perimortem skeletal trauma. As laboratory reports for analysis of samples taken from the fracture site may turn out to be inconclusive because of the prolonged period of exposure, skeletal trauma is usually the only available source of information on cause and manner of death.

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Study of Pattern of Traumatic Brain Injury in a Series of 50 Cases of Head Injuries

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ABSTRACT

Traumatic brain injuries are posing high burden of mortality and morbidity in the world with particular threat to developing nation like India, which is heading towards ultra-modernization at rapid pace. The major load of such injuries lies on road Road Traffic accidents, industrial Accidents, Domestic accidents, fall from height and physical assaults. Methodology: The present study was carried out in the Mortuary, of Bowring and Lady Curzon Hospital, Bangalore attached to the Department of Forensic Medicine, Bangalore Medical College, Bangalore, over a period of two year from January 2003 to January 2005. A total of 57 cases of deaths due to TBI have been studied. The study was a cross-sectional study. Results: RTA is leading cause of traumatic brain injuries among all with 71.93% followed by fall 22.81%. All the causes showed male predominance with males involved being 92.68% and most vulnerable age group was those in 3rd, 4th and 5th decade of life.

Keywords: *Traumatic brain injury, Road traffic accident, Assault, intracranial hemorrhage, etc.*

INTRODUCTION

Traumatic brain injury, also called acquired brain injury, occurs when a sudden and violent trauma to head causes damage to brain. It is a non-degenerative, non-congenital, insult to the brain from an external mechanical force, possibly leading to permanent or temporary impairments of cognitive, physical and psychological functions with an associated diminished or altered state of consciousness[1]. Our country in heading towards ultra-modernization at rapid pace, every developmental process has its own advantages and disadvantages and the people have to pay a price for the same. A large number of deaths are occurring now a day due to Road Traffic accidents, industrial Accidents, Domestic accidents, fall from height and physical assaults. There are several other natural calamities which increase the burden of accidents such as cyclones, tsunamis, floods and earth quakes[2]. Head is the most prominent of the exposed part of the human body by virtue of its situation, so it is the target of choice in the great majority of situations involving blunt trauma. Traumatic brain injuries are a leading cause of morbidity, mortality disability and socio economic losses in India and other developing countries. Road traffic injuries are the leading cause of TBIs, followed by falls.

The exponentially increasing number of automobile vehicles, poor adherence to traffic rules and regulation by public, bad and congested roads, use of alcohol and new generation of high speed vehicles are all together responsible for accidents.

METHODOLOGY

The present study was carried out in the Mortuary, of Bowring and Lady Curzon Hospital, Bangalore attached to the Department of Forensic Medicine, Bangalore Medical College, Bangalore, over a period of two year from January 2003 to January 2005. A total of 57 cases of deaths due to TBI have been studied. The study was a cross-sectional study.

Inclusive Criteria; Cases showing brain changes suggestive of TBI of both sexes, all age groups, treated and untreated, irrespective of duration of survival was included in the study.

Exclusive- Criteria: Deaths due to TBI occurring in Bangalore City during the same period but autopsy conducted at other medical colleges were excluded from the present study. Relevant information was collected from police, relatives and friends of the deceased.

After thorough external examination of the body, particular reference to head. The thorax and abdomen was opened using I incision and examination of viscera was done using Rokitansky en mass evisceration technique, the Scalp was opened by using coronal incision from one mastoid region to the other and was reflected forwards and backwards with a search for injuries and extravasation of blood in the layers of scalp. Then the skull was examined for fractures. After the skull cap was sawed and removed, a look for extradural haemorrhage was made above the duramater. Then the duramater was stripped off and brain was removed, the duramater from the base of skull was also stripped off to look for any basal skull fracture.

Coronal section of cerebral lobes of brain from front to back, of one cm thickness were sliced to analyse any parenchymal pathology. Cerebellum and brain stem were cut horizontally into multiple slices in search of any parenchymal pathology. Then with all these findings, post-mortem conclusions as to the cause of death in each case were drawn and analysed.

RESULTS

All cases of deaths due to traumatic brain injury were autopsied in the Bowring and Lady Curzon Hospital Mortuary, Bangalore attached to Bangalore Medical college, irrespective of sex, age groups, treated and untreated and duration of survival for a period of 2 years from January 2003 to January 2005.

Table-1: In regard to sex distribution with respect to mode of trauma, the proportion of male victims are more compared to female.

Mode of trauma	Male		Female		Total	Percentage
RTA	38	66.67 %	03	5.26%	41	71.93
Fall	11	19.30 %	02	3.51%	13	22.81
Assault	01	1.75 %	Nil	0	01	1.75
Occupational	02	3.51%	Nil	0	02	3.51
Total	52	91.23 %	5	8.77%	57	100

Table -2: Age wise and sex wise distribution of the cases with the percentage.

Age groups in year	Male		Female		Total	Percentage
0-10	02	3.51	-	0.0	02	3.51
11-20	03	5.26	-	0.0	03	5.26
21-30	19	33.33	02	3.51	21	36.84
31-40	12	21.05	01	1.75	13	22.81
41-50	10	17.5	01	1.75	11	19.30
51-60	03	5.26	01	1.75	04	7.02
61-70	02	3.51	-	0.0	02	3.51
71-80	-	0.0	-	0.0	-	0.0
81-90	01	1.75	-	0.0	01	1.75
Total	52	91.23	05	8.77	57	100

Table-3: Showing the relation of alcohol consumption with incidence of accidents.

Mode of trauma	Total No. of cases	H/o Alcohol	Percentage
RTA	41	09	15.79
Fall	13	03	5.56
Total	54	12	22.22

Table-4: Showing the type of skull fracture and percentage of fractures in all cases.

Fissure fractures	Basal skull fractures	Total	%
18 (31.58%)	07 (12.28%)	25	43.86

Table -5: Extradural haemorrhage and sub dural haemorrhage.

	Extra-dural haemorrhage		Sub-dural haemorrhage	
	Total no. of Cases	Percentage	Total no. of Cases	Percentage
With skull fracture	8	14.03%	20	35.1%
Without skull fracture	4	7.02%	14	24.56%

Table -6: types of brain injuries seen in all cases.

Age In (year)	Total cases in the group	Contusion	laceration	Brain oedema
0-10	2	1	-	-
11-20	3	2	-	1
21-30	21	15	6	9
31-40	13	4	2	4
41-50	11	2	1	2
51-60	4	1	1	3
61-70	2	-	-	1
71-80	-	-	-	1
81-90	1	-	-	1
Total	57	25	10	22

This table shows, patterns of brain damage analysed with respect to age groups. Contusion 43.86%, laceration 17.54% and Oedema 38.60%.

DISCUSSION

The results of our study on pattern of traumatic brain injury were analysed and compared with the studies in India and other countries. Road traffic accidents are the main reason for most of the fatal head injuries. In this study they constituted 71.93% cases. Author Segun T Dawodu[1] observed that motor vehicle accidents were the leading cause of TBI in the general population of United States followed by falls. The increase in RTA could be attributed to increase in number of vehicles on the road with modernizations, bad and congested roads, poor adherence to traffic rules and regulation by public, alcohol abuse and increase in the number of people using road due to increase in population. From above given data it is clearly depicted that there is male predominance in all cases which is in accordance with the study conducted by Ramamaruthy B[3], Maloney et al[4] and Freytag[5]. Such low occurrence of fatal head injuries amongst the female population could be due to the fact that they are less exposed to the vagaries of road traffic accidents when compared to males, as males travel more and are more adventurous.

Most vulnerable age groups sustaining fatal head injuries were those persons of third, fourth and fifth decades, that is the active population of the society resulting in huge socio-economic losses. Similar findings have been reported by studies conducted by Klayanraman et al[6], Freytag[5] and Teasdale et al[7]. It is universal truth now to say that Alcohol consumption has a major role in causing road traffic accident, falls and assault. In this study alcohol consumption was seen in 12 cases (22.22%) which were in accordance with the study conducted by Taylor et al[8] who observed that alcohol intoxication increases the risk of TBI and may affect the morbidity and mortality associated with head injury. Skull fractures are not a dictum to be present in all fatal head injury cases. In this study Skull fractures were present in 43.86% cases compared to 70% of cases in the study by Freytag[5], 79% cases of Adams et al[9].

Extradural haemorrhage is usually associated with cases of skull fracture and it was associated with 14.03% cases of skull fracture in this study, as compared to 22% causes of study of Freytag[5], Extradural haemorrhage was Present in 7% cases without a skull fracture. Sub dural haemorrhage was present in 59.6% cases of this study as compared to 30.5% cases of Devadiga et al.[10] and 12 % cases Freytag[5] showing its association with trauma to the head. This

is the commonest type of meningeal haemorrhage. SDH was present 35.1% of cases with skull fractures and 24.5% of cases without Skull fracture. Brain damage was noted in form of contusion in 43.86% cases, laceration in 17.54% cases and oedema in 38.60% as compared to study of Devadiga et al[10] who in his study says that contusion of brain was seen in 16.7% cases, laceration of brain was seen in 33.3%.

Though the statistics of this study are in agreement with earlier studies still further detailed studies are needed to substantiate few aspects like alcohol consumption, non- human factors in causing accidents and in ending with fatal head injuries.

CONCLUSIONS

Traumatic brain injuries are posing high burden of mortality and morbidity in the world with particular threat to developing nation like India, which is heading towards ultra-modernization at rapid pace. RTA forms the major cause of TBI which is high time to have strict traffic rules, such as compulsory wearing of helmets and seat belts etc. alcohol consumption has shown a marked relation with such accidents so say no to alcohol at work places and during driving. Few safety majors on our part can reduce the mortality and morbidity to a large level.

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WARRANTY

The undersigned author / authors hereby declare that the article entitled as **"Study of pattern of traumatic brain injury in a series of 50 cases of head injuries"** is original, neither the article nor a part of it is under consideration for publication anywhere else and has not been previously published anywhere. We have declared all vested interests. We have meticulously followed the instructions. The article, if published, shall be the property of the Journal and we surrender all rights to the Editors. We agree to provide the latest follow up of cases prior to the publication of case reports when requested.

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Attention Deficit Hyperactive Disorder (ADHD) - A Brief Review with its Medico-legal Aspects

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ABSTRACT

Attention Deficit Hyperactive Disorder (ADHD) is a common developmental psychiatric disorder which usually begins in childhood and may continue to adulthood in some 10% cases. ADHD is of three types-predominantly hyperactive, predominantly inattentive, and combined hyperactive and inattentive. In this article we have tried to consider the Etiology of ADHD, the factors contributing to rising trend of ADHD, the effect of early diagnosis & treatment on the course of disease. We have also reviewed the relationship between untreated ADHD and criminality. In the end we came to the conclusion that correct, continuous and timely management of ADHD can significantly reduce crime rates.

Keywords: *Attention Deficit Hyperactive Disorder (ADHD); Forensic psychiatry; crime.*

INTRODUCTION

Attention Deficit Hyperactivity Disorder (ADHD) is a developmental psychiatric disorder with characteristic symptoms starting in childhood and frequently continuing into adult life. ADHD is one of the most prevalent chronic health disorders affecting school children. It is also one of the commonest neuro-psychiatric disorder in children.[1,2] According to DSM-IV-TR criteria for ADHD, there is classic triad of inattention, impulsivity and hyperactivity.[3] Other symptoms which are important for forensic psychiatric assessment include anger management difficulties, distractibility, mood lability and problems with concentration, memory leading to poor education resulting in occupational and relationship problems.[4,5] We have tried to consider the prevalence of ADHD in India and its relation with tendency towards deviation to criminal behaviour.

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ETIOLOGY

ADHD is primarily caused due to a defective gene leading to thinner brain tissue in the frontal lobes and decreased levels of dopamine.[6,7] Dopamine D3 receptor gene polymorphism is considered to be related to impulsiveness and violent behaviour in ADHD.[8] Serotonin transporter promoter gene polymorphism is also linked with violence in ADHD individuals.[9] Researchers have pointed out the influence of food additives, refined sugar, and omega -3-fatty acid deficiency in exacerbation of ADHD symptoms.[10,11,12] Smoking, high lead exposure and head injury also known to cause ADHD like symptoms.[13,14,15]

INCIDENCE/PREVALENCE

The prevalence of ADHD in children between 6 and 12 years is approximately 4 to 12%, highest in age group 9-11 years. It is more commonly seen in males, the male female ratio is 5:1.[16] According to a study done on primary school children in India, the prevalence of ADHD among children aged 3-12 years attending Psychology Outpatient services in the Department of Paediatrics was 8.1%.[12,16] The worldwide prevalence of ADHD is- India 5.2 – 29% China 6.1 – 8.9% New Zealand 6.7% Australia 7.5

– 8.8% Canada 1.1 – 8.9 % Brazil 5.8% Holland 1.8 – 3.8% Germany 4.2%.[15]

Treatment: ADHD affected individuals and their families should be adequately informed about the disease, its impact, and the advantages and disadvantages of the available treatment options. Multimodal therapy with psychosocial and pharmacological management and special educational intervention is recommended depending upon the requirement of ADHD affected individual.[18] Medication should only be used when there is significant impairment in social behaviour and learning capability. Stimulant medication like methyl phenidate [MPH] and dexamphetamies [DEX] and mixed amphetamine salts [MAS] should be considered as first line of treatment in severe ADHD cases. Non stimulants like Atomoxetine [ATX] should be used in severe ADHD cases where stimulants fail to give response.[19] Other drugs like clonidine, modafinil, selegiline, guanfacin, buproprion, are also used in some resistant cases.[20]

Atomoxetine and the stimulant amphetamines are known to increase aggression and suicidal tendencies; hence the treating doctor should carefully monitor the medication effectiveness and its side effects at three to six month intervals.[21]

MEDICO LEGAL ASPECT OF ADHD

While treating the ADHD patients, the principles of ethical medical practice i.e. autonomy, beneficence and non-maleficence should be followed. Though the consent is to be taken from the parents or guardian, the child depending upon his age should have a say in the manner and course of treatment. The treatment for ADHD is considered safe, therefore the issue of beneficence which means doing good or preventing harm to the patient is covered. Lastly non-maleficence means doing no harm to the patient or balancing the effects and side effects of treatment.[22]

According to Disability Discrimination Act [DDA] there should be inclusion and integration of students with learning disorders like ADHD in normal schools. Therefore the school management should have special support strategies like extra classes for children with ADHD.[23]

As ADHD is associated with symptoms of in attention and lack of concentration, therefore there is high probability of road accidents in untreated ADHD individuals. Treatment with stimulants like methyl phenidate is known to increase driving performance in ADHD affected individuals.[24]

ADHD AND CRIME

There appears to be a strong association between childhood ADHD and criminality. Mannuzza reported that 17% of men with ADHD were involved in violent crimes like murder, rape, burglary, arson.[25] Hyperactive ADHD is said to be strongly associated with crimes like murder, rape. Inattentive ADHD is said to be linked with crimes which require a little bit planning like robbery and drug dealing. The combined type is least likely to commit crimes.[26] However if an adult with untreated ADHD commits a violent crime, it is usually impulsive or reactive aggression which worsens if there is simultaneous presence of any other co-existing conduct disorder. Barkley, reported crime rates are significantly lower with the start of treatment of ADHD. [26]

JUVENILE OFFENDERS WITH ADHD

According to the juvenile justice act [JJ Act 2000], a juvenile is a person who has not attained his eighteenth birthday. Juvenile delinquency is any unlawful act committed by a juvenile which would have otherwise been regarded as a crime if done by an adult. As we have already discussed the close association between ADHD affected adolescents and crime, they are likely to land up in juveniles homes. However the juvenile offender shall enjoy special protection and shall be given opportunities and facilities to enable him to develop physically, mentally, morally, and socially in a normal manner. Appropriate treatment of ADHD that is consistent with the child's sense of dignity and worth is the important fundamental principle of juvenile jurisprudence. Revealing the identity of children in need of care and protection [CNCP] is a criminal offence punishable with a fine of twenty five thousand rupees.

CONCLUSION

ADHD affected children have to deal with symptoms of distractibility, hyperactivity, impulsivity leading to their alienation from society, which can divert them to fall into a bad company and commit crimes to seek attention. Punishment of such juvenile offenders in reformatory schools can sometimes start a destructive cycle as there is

further exposure to troubled teenagers in juvenile homes. Early and effective treatment of ADHD in children and young adults reduces substance abuse and aggressive behaviour which are closely associated with criminality. Thus early diagnosis and treatment of children with ADHD can be a preventive measure to decrease crime rates and thus benefitting the individual and the society. Even in adults with ADHD, proper treatment may reduce criminal behaviour and the relapse into crimes.

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A Fatal Case of Whistle Blow in a Child

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ABSTRACT

Death due to choking is observed in all age group but small children below 4 years of age are the common victims. Choking is commonly seen in children when objects such as small toys, table tennis ball and coins are placed in mouth or inhaled. Children younger than 1 year of age are more likely to aspirate food; whereas older children tend to choke on non-food items. We hereby report a case of death due to choking which was brought to the mortuary of SCB Medical College, Cuttack for autopsy. A 7yr old male child of southern part of Odisha sent for autopsy to the medical college with a history of an impacted foreign body (whistle) in the respiratory tract. The deceased accidentally swallowed the whistle 2 days back and after proper investigation failed to remove it by the local doctors. Then he died on the way to our medical college for treatment. On autopsy the place of sticking of the whistle within the larynx was noticed. The autopsy findings along with its treatment aspect are discussed in the paper.

Keywords: *Choking, death, autopsy, foreign body (whistle), larynx.*

INTRODUCTION

Choking is a leading cause of morbidity and mortality among children, especially those aged 3 years or younger. Food, coins, and toys are the primary causes of choking-related injury and death. Certain characteristics, including shape, size, and consistency of certain toys and foods increase their potential to cause choking among children. Choking is commonly seen in children when objects such as small toys, table tennis ball and coins are placed in mouth or inhaled. Food is the most common cause of choking and food which is the life provider can become an asphyxiating agent at times. Children younger than 1 year of age are more likely to aspirate food; whereas older children tend to choke on non-food items.[1]

Death due to choking is among the top 5 causes of accidental death in United States which comprises of approximately 2500 deaths per year.[2] Choking is a form of asphyxia which is caused by impaction of a foreign body in the respiratory passage usually between pharynx and bifurcation of trachea.[3] More than 17000 infants and children are treated in the hospital emergency department for choking each year and more than 80% of these cases occur in children below 4 year age.[4] According to National Safety Council, choking occurs in people of all ages but children under 3 years are more vulnerable.[2]

Despite a strong gag reflex, a young child's airway is more vulnerable to obstruction than that of an adult in several ways. The smaller diameter is more likely to experience significant blockage by small foreign bodies. Resistance to air flow is inversely related to the radius of the airway to the fourth power, so even small changes in the cross-section of the airway of a young child can lead to dramatic changes in airway resistance and air flow. Mucus and secretions around a foreign body in the airway will reduce the radius of the airway even further and may also form a seal around the foreign body, making it more difficult to dislodge by forced air, such as with a cough or Heimlich maneuver. The force of air generated by a cough in an infant or young child is less than that in an adult; therefore, a cough may be less effective in dislodging a complete or partial airway obstruction during early childhood.[1]

Diagnosis is often delayed because the causative event is usually unobserved, the symptoms are nonspecific, and patients often are misdiagnosed initially. Most ear and nose foreign bodies can be removed by a skilled physician in the office with minimal risk of complications. Common removal methods include use of forceps, water irrigation, and suction catheter. Pharyngeal or tracheal foreign bodies are medical emergencies requiring surgical consultation. Radiography results are often normal. Flexible or rigid endoscopy usually is required to confirm the diagnosis and to remove the foreign body. Physicians need to have a high index of suspicion for foreign bodies in children with unexplained upper airway symptoms. It is important to understand the anatomy and the indications for subspecialist referral.[5] Complications of endoscopic removal include airway obstruction, laryngeal edema, and pushing the foreign body into the sub-glottis space, esophagus, or trachea.[6,7] When the foreign body is diagnosed and removed in the early period, no complications develop.[8]

CASE REPORT

A 7 year old boy from a village of southern part of Odisha while playing with his friends severely coughed as there was a foreign body sensation in throat. The child then visited the local doctor for treatment. There the doctor said it to be a foreign body in the throat and need removal and referred to the higher centre. Then he was shifted to S.C.B Medical College & Hospital, Cuttack where the casualty medical officer declared him brought dead.

By taking history from the parents of the dead child they told that the child was playing with a small whistle by blowing sound from it but after sometime he tried to suck the whistle air to sound and suddenly it got into his throat. There was whistling sound with each inspiration during his way to hospital and it was suddenly stopped near to hospital. The child survived for a period of about 48 hour after the incidence.

During post-mortem examination the deceased was of average built, dark complexion, the nail beds were bluish in color, conjunctiva congested, rigor mortis was present all over the body, postmortem lividity was in back and fixed and frothing from nostril. No injury was detected over the body. On internal examination, a black color whistle was found lodged in the larynx obstructing the lumen. Mucus plugs were present all over and within the whistle. Laryngeal mucosa was edematous and congested. The trachea and bronchi were frothy. Patechial hemorrhages were found on epiglottis and glottis. All other organs were intact and congested. Patechial hemorrhages were also found over the pleural surface. Stomach was intact and contains 100ml liquid food particles and the mucosa was healthy. Autopsy surgeon opined choking as the cause of death due to obstruction of respiratory passage by a foreign body (whistle).

DISCUSSION

Obstruction of the respiratory passage can be mechanical or anatomical origin. Mechanical obstruction occurs due to foreign body like food particles, small toys, coins or lemon.[9] Choking can also occur when vomited material is inhaled or when a large food bolus or a piece of meat is accidentally impacted in the glottis.[10] Anatomical obstruction occurs due to anatomical structures such as tongue, swollen tissues of mouth and throat like inflamed epiglottis or results from injury to neck .[9] Choking may occur following tonsillectomy or any operation on pharynx or larynx from a gauge pack left out inadvertently. Complete blockage of the respiratory passage is not required as sudden death due to laryngeal spasm can occur by small object blocking the lumen partially.[10] Incomplete obstruction eventually becomes complete when respiratory tract mucosal edema, inflammation, hemorrhage and broncho-spasm occurs [11], as in this case.

Choking deaths are commonly seen at the extremes of ages with young children and elderly having the greatest rate of fatality.[9] Choking is a common cause of accidental death in children less than 1 year age and 90% of choking deaths occur before the age of 5 years. Children aged 1 to 3 years are vulnerable to choking because of their increased mobility, inability to judge the appropriateness of placing small objects in their mouth and appreciate the size of a piece of food, small airways, inadequate dentition for chewing and weaker cough reflex.[11] Food is the most common cause of choking in all age groups.[9] Out of 17000 cases of pediatric choking in the year 2001, 60% cases were related to food and

31% were due to non-food substance.[4] As per the American Academy of Pediatrics, food particles most commonly responsible for choking are hard candy, chewing gum, nuts and seeds, chunks of meat, whole grapes and popcorn etc.[1] According to one author the most frequent aspirated objects are organic food items such as peanut, popcorn, hot dogs or vegetable matter and non-food objects include balloons, coins, pen tops and pins.[12] Home is the most common place for choking incidents involving children. Most adults choking deaths occur at home, in a nursing home or in a psychiatric institution and only a third of fatalities happen in a restaurant.[11] In adults, choking incidences mostly occur during eating .[1]

Choking incidences commonly occur in children, intoxicated adults, mentally challenged and in some manual professionals like electricians, fisherman and carpenters who held small items between their teeth while working.[13] In adults, the predisposing factors include a decreased protective airway reflex resulting from aging, poor dentition with a tendency to swallow whole food, alcohol consumption and ingestion of other CNS depressants impairing gag reflex.[11] Abnormal position while eating or an emotional outburst can trigger choking episodes.[11] Choking is almost always accidental in nature.[14] Choking can also occur at the time when the victim has been laughing or crying or someone out of fun had slapped him on his back, while the foreign body was in his mouth or during rape or violent sexual intercourse after a heavy meal.[10] Aspiration of regurgitated vomitus in to the lungs is commonly seen in acute alcoholics or during operations under ether anesthesia or in young infants.[15] Choking may occur due to inhalation of blood from facial injuries, such as a broken nose or dislodged teeth and laceration of the lips and gums inflicted during flight, if the victim becomes unconscious and lies on his back.[14]

A case of choking usually presents with vigorous coughing and respiratory distress, change in voice quality and swallowing problem, bluish discoloration of face, lips and nails and sudden loss of consciousness. Foreign body impaction in larynx mostly accidental in nature and requires urgent intervention to save the life of the patient.[13]

Mechanism of death due to foreign body in respiratory tract may be when a large FB impacted in pharynx and covers the opening of larynx then by completely obstructing the airway, such impacted FB may cause death from hypoxic hypoxia or anoxic anoxia. A small FB blocks the lumen of larynx & may cause death by laryngeal spasm. A FB at bifurcation of trachea may cause death by asphyxia but irritation may cause parasympathetic cardiac inhibition. A FB at bronchus may cause death by reflux cardiac inhibition.[14] In the present case the death may be due to blocking of lumen at glottis due to the FB and mucus plug.

CONCLUSION

Choking is an important public health problem for young children. Choking hazards are primarily associated with food, coins, and toys. A comprehensive choking-prevention effort will rely on education of parents, teachers, child care workers, and other child caregivers to supervise and create safer environments for children. Enactment and enforcement of safety legislation will monitor and reduce the availability of hazardous products on the market and the product-design changes will reduce the inherent choking risk of consumer products, especially food and toys. Choking incidences can be minimized by choosing safe age appropriate toys and learning CPR and Heimlich maneuver. Parents should be careful about deflated balloons, coins, batteries and parts of small toys.

Early consultation is advisable because pharyngeal foreign bodies are difficult to visualize without the use of flexible or rigid endoscopy. Furthermore, removal attempts are difficult and are complicated by the gag reflex. Because the airway must be protected, most foreign bodies in the throat require otolaryngology intervention with sedation and endoscopic removal.

Fig 1- A Whistle (foreign body) found lodged in Larynx during Autopsy.

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Postmortem Pink Teeth Phenomenon v/s Antemortem Staining of Tooth

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ABSTRACT

Oral Cavity within the humans is beginning of digestive system which plays a significant role in communication. Since, of many chromogenic microorganism teeth that are enclosed within the oral cavity is subjected to various means of exogenous and endogenous substances which can stain the teeth.

Appearance of pink teeth is commonly noted after death has occurred. This phenomenon is commonly noted by forensic dentists who usually visit for exhumation. Application of pink teeth in forensics as a possible means for evaluating the cause of death is limited. With the recent advancement in science and technique many research have been carried to know the etiology, biochemicals and also mechanism behind the appearance of pink color.

These paper review the literature regarding the postmortem "Pink Teeth Phenomenon" and provides an insight into ante mortem staining of teeth which enables the forensic dentists to differentiates between Pink teeth Phenomenon and Antemortem Teeth Staining.

Keywords: *Postmortem Pink Teeth, Chromgenic, Spectroscopical, Hemoglobin, Haemosiderin.*

INTRODUCTION

Oral cavity is the first portion in the digestive system, which encloses various structures. Oral mucosa is a moist lining which encloses the oral cavity. Oral cavity includes structures like teeth, periodontal ligament, oral mucosa, salivary glands, jaws etc. various microorganisms that are present in the oral flora incorporates stains either can stain the teeth. [1,2] Pink teeth phenomenon is a common postmortem finding. It can also occur during the life time. It is the pinkish discoloration of teeth especially along the cervical portion of the teeth and along the root portion. It is most commonly associated with decomposition in a moist environment.[3,4] Even though exact notification of the pink teeth phenomenon is not known within the literature first explanation regarding pink teeth in victims of hanging or drowning was made by Bell in 1829.[5] Later, in the field of forensics its purpose for establishing the cause of death was utilized in Christie murder case with a possible association with strangulation and carbon monoxide poisoning. Following these many pink teeth cases have been reported. It has been subjected to histochemical and spectroscopical analyses. Appearance of these pink teeth can be made out in people who has dead due to drowning, hanging, knifing, barbiturate poisoning, carbon monoxide and CO2 poisoning, also unknown cause.[5]

Knowledge about the tooth staining is very important for a forensic dentist in order to

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differentiate among the postmortem pink teeth and the antemortem staining of the teeth.

Fig I: Postmortem pink teeth

ANTEMORTEM STAINING OF TEETH

Basically teeth color and shade varies from the gingival margin to the incisal edge of the tooth from individual to individual. Physiologically tooth color varies, color at cervical region appears darker compared to other surfaces. Pigmented deposits of teeth are called as Dental stain. Stains that get incorporated into teeth structure can be classified as intrinsic stain and extrinsic stain.[6,7] these stains can be generalized or localized.

Usually common discoloration that can be noted in human teeth are yellow, brown, grey or black. A number of metabolic diseases and systemic factors are known to affect the developing dentition and cause discoloration. Various factors can cause tooth stains which includes, Chromogenic agents, Medicines, Fluorosis, Age-related staining, Genetic factors etc…

Fig A Non-Vital tooth

Fig B Flurosis stain

Fig : C Extrinsic stain

Teeth can get stains due to cumulative effect of years of exposure to chromogenic agents such as tea, coffee, colas, and tobacco products or due to ageing process. Pigmented compounds present within these consumables may get incorporated into teeth enamel. Individuals teeth consuming such agents can become dingy or have yellowed over time in severe cases it can even become orange or brown. Further staining of teeth can occur due to systemic exposure of medicines like tetracycline, fluoride etc. here systemic exposure of such compound results in incorporation of them into the tooth mineralized tissue that results in tooth discoloration. Teeth with tetracycline exposure can acquire yellow-brown or, more typically, a blue-grey staining. Though fluoride ions has been used as an caries preventive application excessive exposure of teeth to fluoride results in fluorosis which has the appearance of chalky-white patches or streaks running across the surface of a tooth. In more severe cases however, fluorosis can cause brown tooth staining or even cause the tooth's enamel to have a pitted surface. As age of an individual advances, because of various physiological process enamel becomes thin due to the thinning of enamel dentin exposure occurs which makes teeth to appear darker. [6,7]

Fig D Tobacco Stain

Pink discoloration of teeth can be noted in living individuals due to various causes. Few noted in the literature, includes people suffering with typhoid,[5] during dental treatment procedure which affects microcirculatory system of pulp,[8] during internal resorption as in case of pink tooth.[9] Stanley et al showed permanent pink to red discoloration of tooth due to ischemic infarction of the pulp.[10] Van der Burght and Byrne in their research showed tooth discoloration using endodontic sealers through pulp tissue.[11]

Fig E Antemortem pink tooth

POSTMORTEM STAINING OF TEETH

Postmortem pink teeth is commonly noted among the people who has dead due to drowning, hanging, knifing, barbiturate poisoning, carbon monoxide and CO2 poisoning, also unknown cause.[5] In the literature Pink teeth appearance was first noted by Thomas Bell in 1829. He reported that due to an increased intrapulpal pressure individuals who have expired due to drowning or strangulation pink teeth can be noted. Miles et al in 1953 examined two individuals one drowned and the other was buried alive. Similar to Thomas Bell, he noticed pink teeth. But in his examination he noted the patchy distribution along the root surface. Additionally he notices different in intensity of color among the adjacent teeth.[3,4,5,12] Camps in 1953 reported the root of teeth as pink and concluded that the victim died due to strangulation in Christie case.[13]

Beely and Harvey in 1973 noted pink teeth among individuals where the cause of death was drowining, barbiturate overdose and one was shot and buried. They noticed coronal portion was slightly pink when compared to root which was pinker. They conducted biochemical investigation into the nature of the post-mortem occurrence of pink teeth including iso-electric focusing after homogenisation, pH measurements and carbon monoxide detection. Following the investigation they concluded the presence of the pink pigment as haemoglobin and/ or its derivatives.[14] Kirkham et al in 1977 notes the suggestion by Miles and Fearnhead that the pinkness is a natural postmortem phenomenon, which occurs due to seepage of fluid containing hemoglobin or its degradation products derived from decomposition or liquefaction of the tooth pulp into the dentinal tubules. He also suggests that healthy teeth stain earlier than the decayed teeth. He also noted the intense stain among incisors, canine and premolars. With the experiment he postulated that pink teeth occurs due to breakdown of red blood cells in the pulp chamber of the tooth and diffusion of hemoglobin and other serum proteins into the dentin via the dentinal tubules.[4] Brondum and Simonsen in 1987 showed similar pink teeth appearance in individuals who was found dead in sea water, hanging and poisoning. They concludes that appearance of pink teeth is a common phenomenon.[15] Vanwyk during 1985- 1989 also noted pink teeth in his study among few forensic cases but here postmortem interval and examination was more than five days. Additionally he also concludes that phenomenon of pigmentation is due to heamoglobin and its derivatives. He suggests that due to suffocation and hanging there will be increase prevalence of pink teeth formation. Twenty four (24) hrs after death there will be increase in haemosiderin. Autolysis of the tissue begins and congestion in the head region can be noted. This would induce congestion within the pulp, followed by haemorrhage and diffusion of blood into the pulp chamber.[12] Whittaker et al. observed the onset of pink pigmentation after two to three months.[13] Fish conducted a study at Glasgow University Dental Hospital & School to know the role of blood and its products in pink teeth formation. He concludes that pinkness was developed within a period of 14days. [12] Ortmann C and DuChesne A in 1998 their case report noted a female corpse in a state of advanced decomposition and putrefaction with pink teeth. Discoloration was not generalized and it was immense along the neck of the teeth.[16] Carlo P. Campobasso et al in 2006 notes the frequency and distribution of postmortem pink coloration of the teeth among a representative sample of 52 cadavers who were victims of a single shipwreck. All the bodies were recovered from the sea approximately after seven months. Pink discoloration was noted

among only eighteen cases. He noted pronounced discoloration among younger individual. Based on previous reports he mentions the prominent discoloration among single rooted teeth that the multirooted teeth. He concludes that the Pink teeth are a common unspecific postmortem process reported in subjects who have died suddenly and unnaturally. Dead bodies specially in prone position are supposed to be exposed to wet or moist environment. Addition to congestion, humidity, cause of death, position of dead body he also mentions that ultrastructural changes of the root canal or of the pulpal blood capillaries associated with advancing age or sex may have role in pink discoloration of teeth. He suggests to the forensic pathologist that the firm conclusion regarding the cause of death and manner of death should not be drawn just by finding of pink teeth.[17] Evelyne-Pessoa Soriano et al in 2009 discuss that the haemoglobin in pink teeth can be originated from intravasal erythrocytes or from extravasated erythrocytes in congestion bleedings. He explains that the humid environment can contribute for development of pink teeth.[18] Stavrianos C et al 2011 concludes that pink teeth are not pathognomonic for a specific cause of death and it is an unspecific phenomenon.[19]

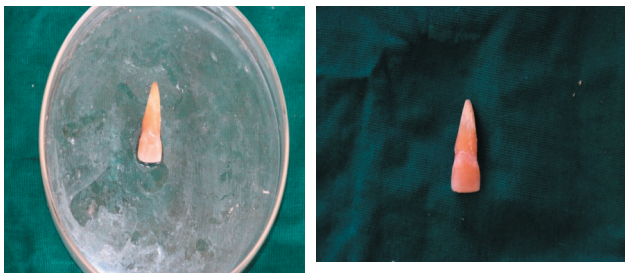

Fig II & IIa: Postmortem pink teeth appearence

CONCLUSION

With the various study it is noted that postmortem pink teeth appearance is common. It is necessary by any forensic odontologist to consider antemortem discoloration of the teeth before coming to a final conclusion of postmortem pink teeth. Though time since death, manner of death and presence of water plays major role for its appearance still research on a large scale is required for

1. Establishing exact time of appearance of the postmortem pink teeth.

2. To know the factors contributing for postmortem pink teeth appearance.

3. Why the intensity of color varies between different cases and also between different teeth in an individual.

4. Whether through postmortem pink teeth phenomenon cause of death can be noted.

5. Can postmortem pink teeth phenomenon be used as evidence in the field of forensics.

Source of Funding: Self

Conflict of Interest: Nil

Written consent was obtained from medical officer and also investigative officer for Postmortem Pink teeth. Consent was obtained from the concerned patient for antemortem stain photographs.

Ethical Certificate: Obtained

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Profile of Medico-legal Cases Reported to Casualty of Medical College Hospital, Ballari Hyderbad Karnataka Region

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ABSTRACT

Background: The most important duty of a doctor is to save the life of patient; however, after providing first aid & resuscitative measures, the Casualty Medical Officer has to carry out exhaustive documentation of medico legal cases especially while examining the victims of physical trauma, domestic violence, attempts of suicide, sexual assault, etc. The present study is carried out with a view to understand the pattern and magnitude of Medico legal cases (MLC's) in this region so as to identify methods to Prevent and reduce incidences, if any.

Materials & method: This was a retrospective study; all the records of MLC's which came to the casualty department of the hospital between Jan 2013 to December 2013 were studied.

Results: The males were maximally involved (66.3%). Among the age group 21-30 years (35%) were more. Among the MLC's cases, RTA constituted 31.77% followed by assault cases (26.71%).

Keywords: *Medico-legal cases, Casualty, Profile.*

INTRODUCTION

The Casualty Department is the backbone of every hospital because almost all emergency cases report initially to this department. Medico-Legal Case (MLC) is a medical case with legal implications for the attending doctor where the attending doctor, after eliciting history and examining the patient, thinks that some investigation by law enforcement agencies is essential to establish and fix responsibility for the case in accordance with the law of the land [1, 2] Such cases constitute substantial proportion of the workload in Casualty Department of the Hospitals. Profiling of Medico legal cases is an integral aspect for the prevention of preventable Casualties in future and to study the crime rate in that area[3]

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MATERIAL & METHOD

This was a retrospective study, conducted in medico legal section of MRD, MCH, Ballari, during 1st January 2013 to 1st December 2013. Total 8393 medico legal cases recorded/admitted in medico legal register of casualty department were included in the study which comprised of information regarding various parameters obtained from medico legal register and hospital record of individual patient. The data thus obtained was analyzed and presented.

RESULTS

Table 1; Total no of MLC's reported to casualty.

Particulars	Assault	Snake bite	RTA	O P Poisoning	Hanging	Fall from height	Burns	Electro cution	Bull Gore	Railway accident	Other	Total
January	159	33	228	132	0	57	24	7	7	2	10	659
February	174	32	197	87	2	76	41	13	4	6	12	644
March	198	56	226	126	3	76	47	20	4	3	19	778
April	197	29	225	114	2	60	31	4	3	2	7	674
May	196	28	248	115	2	67	45	5	1	2	10	719
June	175	47	236	68	2	72	44	3	2	4	16	669
July	135	50	175	105	2	45	40	3	2	1	10	608
August	280	6	227	123	2	50	39	6	0	1	11	699
September	159	60	245	149	0	52	50	1	9	0	9	734
October	174	75	209	245	3	53	33	2	4	1	7	787
November	188	57	190	180	1	71	39	3	2	1	5	737
December	162	33	261	131	0	30	29	1	4	5	4	662
Total	**2197**	**506**	**2667**	**1575**	**19**	**709**	**462**	**68**	**42**	**28**	**120**	**8393**

Maximum number of cases were of RTA (31.77%) followed by assault (26.17%) & OP poisoning (18.76%).

Table 2; Different modes of MLC's

	Total	%
Assault	2197	26.17
Snake bite	506	6.02
RTA	2667	31.77
O P Poisoning	1575	18.76
Hanging	19	0.26
Fall from height	709	8.44
Burns	462	5.5
Electrocution	68	0.81
Bull Gore	42	0.5
Railway accident	28	0.33
Other	120	1.42
Total	8393	100.00

Of the total 8393 MLC's, RTA's were 2667 (31.77%), assault were 2197 (26.17%) and OP poisoning were 1575 (18.76%).

Table 3; Sex wise distribution of MLC's.

	Male	**%**	**Female**	**%**	**Total**	**%**
RTA	1854	69.51	813	30.49	2667	31.77
Assault	1618	73.64	579	26.36	2197	26.17
O P Poisoning	925	58.73	650	41.27	1575	18.76
Fall from height	502	70.8	207	29.2	709	8.44
Snake bite	312	61.66	194	38.44	506	6.02
Burns	156	33.73	306	66.23	462	5.5
Electrocution	63	92.64	5	7.26	68	0.8
Bull Gore	35	83.33	7	16.67	42	0.5
Railway accident	24	85.71	4	14.29	28	0.33
Hanging	7	36.84	12	63.16	19	0.26
Other	70	58.33	50	41.66	120	1.42
Total	5565	66.30%	2828	33.70%	8393	100.00

Medico-legal cases were comparatively more among men (66.42%), than in the women (33.58) %), electrocution (92.64%) rail way accident (85.71%) bull gore (83.33%) assault (73.64%) fall from height (70.8%) RTA (69.1%) cases were more among the men, whereas Burns (66.23%) and hanging (63.16%) cases were more among the women.

Table 4; MLC's distribution among the age groups

	1-10	**%**	**11-20**	**%**	**21-30**	**%**	**31-40**	**%**	**41-50**	**%**	**> 50**	**%**	**Total**
RTA	55	2.06	401	15.03	1077	43.38	792	28.69	166	6.22	176	6.599	2667
Assault	20	0.91	265	12.06	694	31.58	843	38.37	279	12.69	96	4.36	2197
O P Poisoning	15	0.95	78	4.95	545	34.6	482	30.6	341	21.65	114	7.23	1575
Fall from height	89	12.55	284	40.05	168	23.69	72	10.15	23	3.24	73	10.29	709
Snake bite	1	0.19	37	7.31	151	29.84	169	33.39	79	15.61	68	13.43	506
Burns	81	17.53	55	11.9	223	48.26	38	8.22	26	5.62	39	8.44	462
Electrocution	6	8.82	14	20.58	23	33.82	11	16.77	5	7.35	9	13.23	68
Bull Gore	2	4.76	3	7.14	9	21.42	9	21.42	6	14.28	13	30.92	42
Railway accident	2	7.14	2	7.14	10	35.71	7	25	3	10.71	4	14.28	28
Hanging	0	0	3	15.78	6	31.57	6	31.57	2	10.52	2	10.52	19
Other	19	15.8	16	13.3	28	23.3	17	14.2	18	15	22	18.3	120
Total	**190**	**2.26**	**1158**	**13.79**	**2934**	**35**	**2446**	**29.1**	**948**	**11.3**	**616**	**7.3**	**8393**

RTA victims were more in the age group 21-30 years (43.38%). Assault cases were more in the age group 31-40 yrs (38.37%). poisoning cases were more in the age group 21-30 years (34.6%). Fall from height cases were more in the age group 11-20 yrs (40%). Snake bite cases were more in the age group 31-40yrs (33.39%) whereas burns cases were more in the age group 21-30 years (48.26%), electrocution cases were more in the age group of 21-30 yrs (33.82%). Bull gore victims found equal among the age groups 21-30 years and 31-40 yrs (21.42%). Railway accident cases were more in the age group 21-30 yrs (35.71%), hanging cases found more in the age group 21–30 Years & 31- 40 years (31.57%).

Table 5; Diurnal occurrence of MLC's.

	Day	**%**	**Night**	**%**	**Total**
RTA	1045	39.18	1620	60.82	2667
Assault	387	17.61	1810	82.39	2197
O P Poisoning	1108	70.34	467	29.66	1575
Fall from height	65	9.17	644	90.83	709
Snake bite	312	55.71	194	44.3	506
Burns	254	54.97	208	45	462
Electrocution	46	67.64	22	32.36	68
Bull Gore	36	85.71	8	14.29	42
Railway accident	20	71.42	8	28.6	28
Hanging	13	68.42	6	31.58	19
Other	64	52	56	48	120
Total	3350	39.91%	5099	60.75%	8393

Fall-from-height, RTA, assault, cases occurred more in numbers during the night hours, where as bull gore, railway accident, poisoning, electrocution, snake bite cases occurred more in numbers during the day hours.

Table 6; Area wise distribution of MLC's.

	Rural	**%**	**Urban**	**%**	**Total**
RTA	1864	69.89	803	30.1	2667
Assault	1320	60.08	877	30	2197
O P Poisoning	960	60.95	615	29	1575
Fall from height	560	78.98	149	21	709
Snake bite	476	94.07	30	6	506
Burns	154	33.33	308	76.66	462
Electrocution	26	38.24	42	61.76	68
Bull Gore	40	95.23	2	4.77	42
Railway accident	9	32.18	19	67.85	28
Hanging	10	52.63	9	47.37	19
Other	66	55	54	45	120
Total	5485	65.35%	2908	34.65%	8393
	Rural	%	Urban	%	Total

Among the medico legal cases reported large number were from rural area (65.5%), included bull gore (94.23%), snake bite (94%), Fall from height (79%), RTA (70%), assault (60%) were more in rural area. whereas burns, electrocution, railway accident, hanging were more in urban area (34.5%).

DISCUSSION

Present study revealed that maximum number of cases were of RTA's (31.77%) followed by assault (26.17%) and poisoning (18.76%) (Table. 2). Similar findings were reported in other studies [3, 4, 12, 13, 18]. reported that maximum numbers of cases were of poisoning. Hussaini S N [16] reported that maximum number of cases were of burns (21.87%). [17] . Reported highest numbers of cases was fall from height. This discrepancy may be due to fact that, [Malik y[4], Kar S M[13], Dhingra J[17]] conducted study in rural set up where people are more involved in agricultural activities, while Hussaini S N [16] conducted at Akola (Maharashtra), where all medico legal cases report first to casualty and also due to fact that there are very few private burn care unit in Akola and surrounding Districts; so that all such cases report to casualty of Government Medical College Akola. While Dhingra J[17] conducted study in ESI Hospital, New Delhi, where the concept of the hospital is to cater to the factory and industrial workers where the significant number of medico-legal cases being factory injuries, fall from height and crush injuries.

Present study showed great numbers (66.3%) of victims were of males as compared to females (33.7%) (Table. 3). Similar findings reported by[3-11], [14-17], This is because males are more involved in outdoor activities and usually the main bread winner for the family, so this makes them more vulnerable to accident, assault, or injury.

In present study more number of victims was in the age group between 21-30 years (35%) followed by 31-40 years (29.1%) (Table. 4). Similar finding were also reported by[3-5], [14-18] , and other workers. This may be due to the fact that individuals of these age groups lead more active life involve themselves in sports, adventurous & thrilling events and recreational activities and they take risk during this age.

Study reveals maximum number of MLC's occurred during the night hours (60%) when compared to day hours (40%) (Table. 5). This may be due to the fact that over time duties of employees in industries and vehicle drivers, bad lighting and deficiencies in safety standards in industries and roads.

Study revealed that maximum number of victims (65.50%) belongs to rural area as compared to urban

area (34.50%) (Table. 6). Hussaini S N [16] reported that maximum number of cases were in urban area, This discrepancy may be due to fact that this region is very rich in Iron and Steel ore, more numbers of large industries located in villages near by Ballari where incidence of fall from height, factory injuries is more common and OP poisoning incidences are more because of low socio-economic status of agriculturists, adapted rain dependent agriculture method are more in this area, assault, snake bite, bull gore, cases were more in rural area all these in total contribute to high number of MLC's in rural area than to urban area.

CONCLUSION

The casualty department of any hospital not only provides to the needs of patients who reports in emergencies but also carry out legal responsibilities to examine, document and certify medico legal cases, attending the courts, increase in accidents and violence, the need for round the clock availability of CMO's, all these puts a lot of burden on CMO's, in this situation, CMO's should be supervised by forensic experts & a mandate from MCI to take over casualty department by forensic medicine department is felt.

	Present study (%)	Malik Y (%)	Yadav A (%)	Dhingra J (%)	Hussaini S N (%)
Distribution of MLC's among the sex groups					
Male	66.30	73.26	67.61	71.75	74.05
Female	33.70	26.74	32.41	28.25	25.95
Distribution of MLC's among the age groups					
1-10	2.26	2.47	3.6	20.35	1.16
11- 20	13.79	14.35	24.3	5.06	13.78
21- 30	35	30.19	45.1	51.04	38.82
31- 40	29.1	15.34	18.9	22.64	19.43
41- 50	11.3	13.86	7.2		16.36
51-60	7.3	2.97	0,9		5.4
>60		1.98			4.9
Area wise distribution of MLC's					
Urban	67.85				55.91
Rural	32.12				45.08
Mode of MLC's					
RTA	31.77	36.63	27.02	22.5	16.99
Assault	26.71	9.9	29.72	8.43	19.72
Poison	18.76	41.58	36.93	8.43	18.70
Burns	5.5	6.93	2.70	4.34	21.87
Hanging	0.26	1.48	1		0.1
Fall from the height	8.44			34.01	
Bull gore	0.5				
Railway	0.33				
Snake bite	6.42	0.5			
Electrocution	0.81	0.5			0.73
Others	1.42			2.81	3.99

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Conflict of interest- None

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Miliary Tuberculosis of Liver in Alcoholics – An Autopsy Study

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ABSTRACT

Background and Objectives: Alcohol induced liver disease is a major cause of ill health and mortality. This autopsy study is conducted to know the morphological changes of liver disease in alcoholics and to study the incidental liver findings.

Materials and Method: Present study is a prospective descriptive study. Total of 50 autopsy liver specimens with history of habitual alcohol intake, laboratory findings and autopsy findings were collected from the department of Forensic medicine during the period 2011-13. Detailed gross and microscopic examination of liver specimens were done.

Results: Mean duration of alcohol consumption was 13years. Hepatomegaly was the common gross finding seen in 42%(n-21) of cases. Microscopic findings were steatosis in 28%(n-14) cases, steatohepatisis in 26%(n-13) cases, cirrhosis in 18%(n-9) cases, alcoholic hepatitis in 10%(n-5) cases. Miliary tuberculosis was the incidental finding seen in 8% (n-4) of cases.

Conclusion: Autopsy is an excellent learning tool. This study showed that apart from the usual spectrum of alcoholic liver disease, miliary tuberculosis is an unexpected common finding in chronic alcoholics.

Keywords: *Autopsy, Liver, Alcoholics, Tuberculosis.*

INTRODUCTION

Miliary tuberculosis is the wide spread dissemination of mycobacterium tuberculosis via hematogenous route. It may involve any organs including lung, liver, spleen and kidney. Miliary tuberculosis of liver though not rare is usually overlooked due to obscuring factors[1]. By definition an alcoholic is usually taken to be an individual who consumes an amount of alcohol capable of producing pathology (Criteria committee national council on alcoholism, 1972). For most individuals this is in excess of 80gm of ethanol per day[2]. The spectrum of alcohol induced liver lesions include fatty liver, alcoholic hepatitis, alcoholic cirrhosis and hepatocellular carcinoma[3]. Miliary tuberculosis is an incidental finding and alcoholism induced malnutrition is one of the risk factor for its development. The literature search on autopsies indicate progressive decline in autopsy rates. The recent autopsy workshops have emphasized the importance of medical autopsy which is an excellent learning tool. Many conditions would go unnoticed and undiagnosed unless the autopsy is performed. In 10-20% of autopsies the findings are either unexpected or accidental. Hence this autopsy study was conducted to know morphological changes in liver disease in alcoholics and to study the incidental liver findings.

MATERIAL & METHOD

Autopsy liver specimens were collected from the department of Forensic medicine during the period 2011-13.

Inclusion criteria: Postmortem cases aged above thirty years with history of habitual alcohol intake

Exclusion criteria: Liver specimens showing autolytic changes

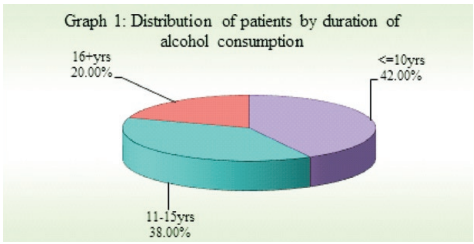
Clinical history, laboratory findings and autopsy findings were collected from autopsy records.

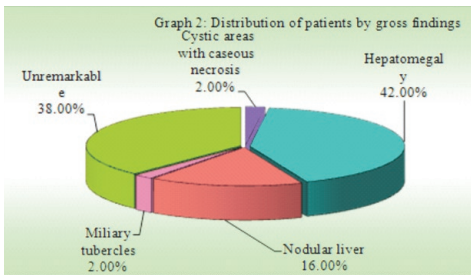
Minimum three representative sections from right lobe, left lobe, deeper areas and from any grossly visible lesions were taken. Following routine tissue processing and paraffin embedding, sections of five micron thickness were taken and stained by routine Haematoxylin and Eosin staining. Special stains like Van Gieson / Masson's trichrome/ Reticulin for connective tissue, Perl's Prussian blue for iron and Ziehl Neelsen for acid fast bacilli were done wherever necessary.

RESULTS

A total of 50 autopsy liver specimens with history of habitual alcohol intake were studied during the period 2011-2013. Majority of patients belonged to age group 40 to 49 years. Males accounted for 96% and females were 4% of cases. Mean duration of alcohol consumption was 13 years (Graph 1). Hepatomegaly was the common gross finding(Graph 2). Histopathological spectrum in the present study included steatosis in 28%(n-14) cases, steatohepatitis in 26%(n-13) cases, cirrhosis in 18%(n-9) cases, alcoholic hepatitis in 10%(n-5) cases, perivenular fibrosis in 10%(n-5) cases and miliary tuberculosis in 8%(n-4) cases (Graph 3).

In Miliary tuberculosis cases, grossly (Figure 1) liver specimens showed miliary tubercles and cystic areas with caseous necrosis in 50% of cases. Microscopically (Figure 2) all cases showed granulomas with casesous necrosis, fatty change in 50% of cases. Ziehl Neelsen stain for Acid fast bacilli was positive in 50% of cases.





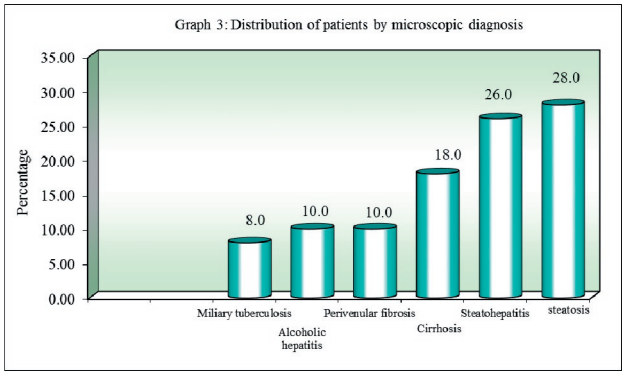


Figure 1: Gross photograph of liver specimen showing cystic area filled with caseous necrotic material

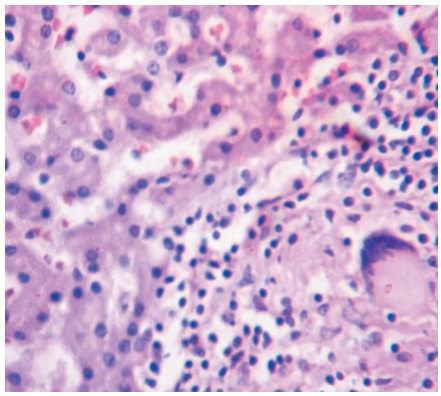


Figure 2: Microphotograph showing tubercular granuloma with Langhans' giant cell. (H&E, 400X)

DISCUSSION

Hepatic changes are common in alcoholics and their development is determined by dose and duration of alcohol intake. Mechanism of alcohol induced liver lesions are due to hepatotoxic affects of acetaldehyde, altered redox potential (NADH>NAD), immunological and cytokine mediated injury. This inturn leads to altered lipid metabolism, causing fat accumulation within the hepatocytes leading to fatty liver[4]. Also there is activation of stellate cells which further activates fibroblast leading to collagen synthesis and hence fibrosis. Histopathological spectrum of alcohol induced liver lesions are fatty

liver, alcoholic hepatitis, cirrhosis and hepatocellular carcinoma[5].

Miliary tuberculosis is an incidental finding in our autopsy study and accounted for 8% of cases. Chronic alcoholism and chronic liver disease are the predisposing factors. Associated microscopic findings were fatty liver and cirrhosis.

In Gonzailez VM et al[6] study, 29 cases of miliary tuberculosis were retrospectively studied from 2,800 autopsies, 58% were older than 50yrs. Predisposing factors were found in 80% of cases like diabetes, alcoholism, chronic liver disease, silicosis and malignancies. The more frequently involved organs were lungs(100%), liver(82%), spleen(75%). Early diagnosis and treatment of miliary tuberculosis is more difficult, so is necessary to maintain suspect of this disease always in mind.

Sanefugi H et al[7] concluded that miliary tuberculosis should never be forgotten in patients having fever of unknown origin. Though tuberculosis has markedly declined since the advent of antitubercular antibiotics, but autopsy cases with tuberculosis have not decreased in number. Clearly increased awareness of the continuing presence of tuberculosis is needed.

Arita K et al[8] studied 13 cases of active tuberculosis diagnosed at autopsy for the first time. They concluded that all 13 cases had risk factors like cirrhosis of liver, leukemia and other malignancies. Tuberculosis was not diagnosed until autopsy was done hence education about tuberculosis should be held repeatedly and one should think about tuberculosis with unexpected clinical features in patients suffering from liver cirrhosis, leukemia and any malignancies.

Hoshino H et al[9] concluded that in order to reduce undiagnosed miliary tuberculosis, one should always suspect miliary tuberculosis in patients suffering from chronic liver disease, renal diseases, malignancies and sepsis.

CONCLUSION

Autopsy is an excellent learning tool. It provides abundant material for better morphological asessment of the disease. This autopsy study on alcoholics showed the usual spectrum of alcoholic liver disease. Miliary tuberculosis was the common incidental finding in our autopsy study which gives an idea about burden of tuberculosis in the community. Miliary tuberculosis should always be suspected in critically ill alcoholic and chronic liver disease patients.

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Conflict of Interest: Nil

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Spot Death by Electrocution - A Case Report

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ABSTRACT

Electrical injuries are potentially devastating with high degree of morbidity and mortality. Deaths due to electrocution need to be thoroughly investigated and documented for reasons of compensation and for instituting future measures in relation to safety and prevention. In the present case, the deceased sustained electrocution while working at a function pandal and died on the spot. An attempt is made to discuss about electrocution and related injuries.

Keywords: *Electrocution, Electric marks, Skin resistance, Electric current.*

INTRODUCTION

The passage of substantial electric current through the tissues can cause skin lesions, organ damage and death. This injury is commonly called electrocution. Fatalities are usually accidental, both in a domestic and industrial environment.[1] Whether the injuries due to electrotrauma will occur and if it does, its extent and degree of severity depends upon the nature of current (alternate current, direct current, pulsating); voltage to which victim was exposed; frequency, if alternate current; amount of current (amperage); length of time the victim was in the circuit; condition of the earth (moisture), if the shock was from conductor to earth; presence of uninsulated points in the electrical system; direction of forces; resistance offered by the body and the route followed by the current within the body.[2] We report a case of fatal electrocution.

CASE REPORT

As per the information furnished by the police, an apparently healthy man sustained electrocution at a function pandal within the premises of a house while doing some decoration work, standing bare footed on a wet ground and died on the spot. On postmortem examination the following findings were observed. On external examination, dead body is of an adult man aged 23 years, measuring 165 cms in length, brownish complexion, averagely built and nourished. Rigor mortis present all over the body. Postmortem staining present over the back and fixed. Lips and nailbeds were bluish discoloured. Two circumscribed oval vesicles separated from one another by 0.2cm apart and each measuring 0.4 cm x 0.3 cm and 0.5 cm x 0.4 cm respectively present over the palmar aspect of base of the left thumb (Figure 1). The areas of vesicles were bordered by raised areola of blanched skin around its circumference. The skin with these vesicles was sent for histopathological examination. Internally, lungs were congested and oedematous. Multiple pericardial haemorrhages were present on the anterior and posterior surface of left ventricle of heart (Figure 2). There were no other significant findings in the internal organs.

DISCUSSION

Current flowing through the conductor is determined by the formula, I = V/R, where I is the current in amperes, V is the potential difference in volts and R is the resistance in ohms. The major barrier to the electric current is the skin which exercises far greater resistance than the internal body tissues. The better the contact between the person and the earth at the time of sustaining the electric shock, the more dangerous will be its effect. Therefore electric shock could prove fatal to someone standing barefooted on a wet surface.[3] In electrocution, the tissue resistance is important. Thick dry skin, such as the palm of the hand or sole of the foot, may have a resistance of one

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million ohm, but when wet, this may fall to a few hundred ohm, and the current , given a fixed supply voltage, will be markedly increased. This will be relevant in wet conditions.[4] When the skin has been in firm contact with an electrical conductor, the passage of the current through the high skin resistance heats up the tissue fluids and produces steam. This may split the layers of the epidermis or the epidermal - dermal junction and produce a raised blister. When the current ceases, the blister cools and collapses, producing a raised grey or white ring with and umbilicated centre and an areola of blanched skin at the periphery with a hyperaemic border outside the blanching. This electric mark is called as Joule burn.[1] If the current enters and leaves the body over a wide area of low resistance as provided by water (wet hands or wet body surface) and good grounding (wet soil), neither current marks nor burns may be found.[3]

These entry and exit marks of electrocution are produced when electric current encounters resistance from the skin, which is maximum with dry skin and reduces when the skin is wet. In the present case, the deceased was allegedly doing lighting work at a function pandal standing barefooted on a wet ground wherein he accidentally touched a source of current. As his bare feet was touching the wet ground, a circuit was completed with positive pole and negative pole and hence he suffered electric shock. His dry fingers provided maximum resistance to electric current developing two electric marks over the left thumb (entry wounds), but his bare feet on a wet ground provided an easy exit to the flow of electrons down to the earth without developing any injury (exit wound). The lesions on the base of left thumb were suggestive of entry wound and the histopathological report further confirmed that the lesions were due to electric burns with features such as streaming of the nuclei, dermo-epidermal separation with vacuolation and coagulative necrosis of cells in the epidermis and dermis.

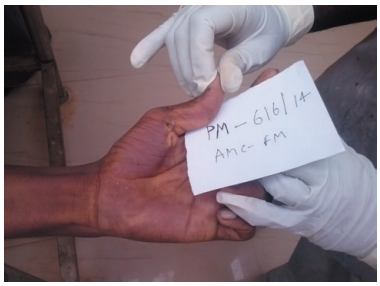

Figure - 1 : Entry wound over palmar aspect of base of left thumb.

Figure - 2 : Multiple pericardial haemorrhages over posterior surface of left ventricle of the heart.

CONCLUSION

After taking into consideration the circumstantial evidence, postmortem findings, histopathological report and absence of any other lesion at autopsy, the cause of death was attributed to electrocution. The present case emphasizes the need of bringing awareness among the people about the danger of electricity and the necessary preventive measures to be undertaken.

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Morphology and Morphometry of Foramen Ovale and Foramen Spinosum in Dry Adult Human Skulls and its Clinical Significance

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ABSTRACT

Background: Greater wing of sphenoid presents various foramina. Foramen ovale and foramen spinosum are amongst them transmitting important blood vessels and nerves.

Aim: To conduct morphological and morphometrical study of foramen ovale and foramen spinosum in dry adult human skulls in the Gujarat region.

Materials and Method: 150 dry adult human skulls were studied in the Gujarat region with regard to observe their size, shape, presence or absence and any duplication/multiplications of foramen ovale and foramen spinosum. Appropriate statistical analysis was performed. RESULTS: Out of 150 observed, foramen ovale and foramen spinosum were present in all skulls studied. Foramen ovale was not duplicated in any of skulls studied, while duplication of foramen spinosum was observed in six skulls. The mean maximum dimension of foramen ovale was 7.53±1.75 mm on right side and 7.41±1.53 mm on left side. The same measurement of foramen spinosum was 2.49±0.60 mm on right side and 2.55±0.70 mm on left side. Foramen ovale was oval in 229(76.5%), irregular in 40(13.5%), almond in 22(7.5%), round in 5(1.5%), and triangular in 4(1%) of total three hundred foramina ovale examined. Foramen spinosum was round in 252(84)%, oval in 13(4%) and irregular in 35(12%) of total foramina studied.

Conclusion: Foramen ovale and foramen spinosum in the Gujarat region showed variability in size and shape. As these foramina allow passage of important blood vessels and nerves, this study can be of great surgical importance to clinicians in invasive procedures such as percutaneous trigeminal rizotomy in trigeminal neuralgia.

Keywords: *Foramen ovale, foramen spinosum, morphology, morphometry, skull.*

INTRODUCTION

The study of skull and foramina provide valuable information regarding evolution of humankind. The foramen ovale is found consistently absent in class reptilia and this foramen was acquired at the beginning of class mammalia[1]. Greater wing of sphenoid presents several foramina which are pierced by important blood vessels and nerves. Foramen ovale is postero-lateral to foramen rotundum at posterior end of carotid groove in the floor of middle cranial fossa. It opens into infratemporal fossa and transmits mandibular nerve, accessory meningeal artery, lesser petrosal nerve and an emissary vein connecting cavernous sinus to pterygoid plexus of veins[2]. This is one of the important foramina which are situated at the transition zone between the extracranial and intracranial structures[3]. The earliest

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perfect ring-shaped formation of foramen ovale was observed in the 7th fetal month and the latest at 3 years after birth[4].

Foramen spinosum is situated postero-lateral to foramen ovale in floor of middle cranial fossa. It transmits middle meningeal artery with accompanying veins and meningeal branch of mandibular nerve[1]. The perfect ring-shaped formation of foramen spinosum was observed by 8th month after birth and the latest by 7 years after birth[4].

The present study is aimed to confer the knowledge of variability of the two important foramina of middle cranial fossa to anatomists and also to clinicians for various invasive procedures.

MATERIALS & METHOD

The study was done in the Department of Anatomy of Pramukhswami Medical College and other medical colleges of Gujarat region from May 2011 to June 2014 after obtaining permission from the institutional Human Research Ethics Committee.

The present study included 150 intact dry adult human skulls. The skulls having crack or fracture lines in the floor of middle cranial cavity were excluded from the study. The presence of foramen ovale and foramen spinosum was noted on the both sides of middle cranial fossa. Absence or presence of multiple foramina if any, were noted. The gauzed probe(steel wire) was used to confirm patency of foramina and rule out false passages. Measurements of foramina were taken along the maximum diameter. Shapes of the foramina (round, oval, irregular) were also observed bilaterally.

All the data was obtained. Analysis of data was done in SPSS software, version 14. Comparison of maximum dimensions of these foramina was done on the both right and left sides. The results were considered significant when p value was ≤0.05.

RESULTS

Table 1 shows comparison of mean maximum dimensions of right and left sided foramen ovale and foramen spinosum and the mean distance from foramen ovale to posterior clinoid process. Here, p value is ≥0.05. Hence, there is no statistically bilateral difference. In Table 2, distribution of shape of foramen ovale is shown.

Table 1- Mean Maximum Dimension of Foramen/Distance (mm)

Foramen/ distance	Right side n=150 Mean (SD)	Left side n=150 Mean (SD)	p value
Foramen ovale	7.53±1.75	7.41±1.53	0.556
Foramen spinosum	2.49±0.60	2.55±0.70	0.474
Distance between foramen ovale and posterior clinoid foramen	17.85±1.95	17.78±1.69	0.740

n= number of foramina

SD=standard deviation

Table 2- Distribution of Shapes of Foramen Ovale

Shape	Shapes of foramen ovale		
	Right side n= 150	Left side n= 150	Total n=300
Oval	105(70%)	124(83%)	229(76.5%)
Irregular	30(20%)	10(7%)	40(13.5%)
Almond	10(7%)	12(8%)	22(7.5%)
Round	3(2%)	2(1%)	5(1.5%)
Triangular	2(1%)	2(1%)	4(1%)

Variations in size and shapes of foramen ovale are shown in Figure 1 to Figure 4.

Figure 1 shows abnormally large foramen ovale separated from foramen spinosum by a thin plate of bone on left side of middle cranial fossa(Red arrow)

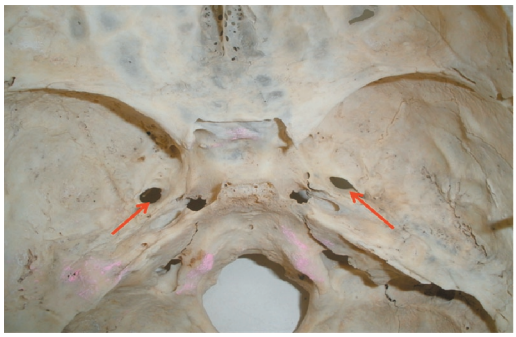

Figure 2 shows round foramen ovale on left side and almond shaped foramen ovale on right side of middle cranial fossa(Red arrows)

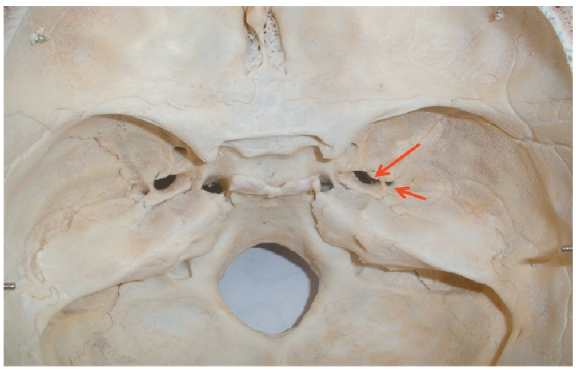

Figure 3 shows irregular foramen ovale and round foramen spinosum on right side of middle cranial fossa(Red arrows)

Figure 4 shows confluence of foramen ovale and foramen spinosum on right side of middle cranial fossa(Red arrow)

Table 3 shows distribution of shape of foramen spinosum. Variations in shapes of foramen spinosum are shown in Figure 3 and Figure 5. Duplication of this foramen was observed in six skulls, out of which bilateral duplication was present in one skull only. Unilateral duplication was found in five skulls. In three, duplication was seen on the right side and in another two it was on the left side. Figure 6 shows unilateral duplication of right sided foramen spinosum.

Table 3-Distribution of Shapes of Foramen Spinosum

Shape	Shapes of foramen spinosum		
	Right side n= 150	Left side n= 150	Total n=300
Round	131(87%)	121(81%)	252(84%)
Oval	5(3%)	8(5%)	13(4%)
Irregular	14(10%)	21(14%)	35(12%)

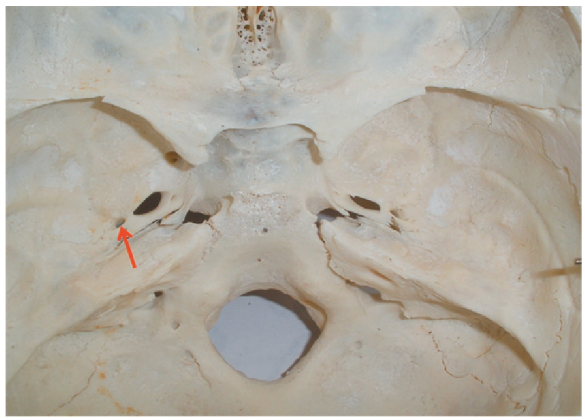

Figure 5 shows oval shaped foramen spinosum on left side of middle cranial fossa(Red arrow)

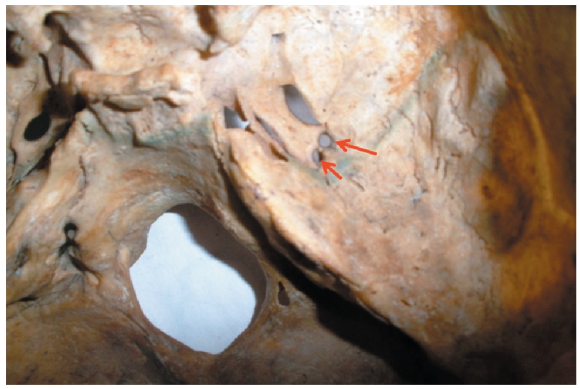

Figure 6 shows duplicated foramen spinosum on right side of middle cranial fossa(Red arrows)

DISCUSSION

Sphenoid bone develops from two ossification centers namely, intramembranous and endochondral ossification centers which consist of basisphenoids (body) and orbitospenoids (paired lesser wings) and alisphenoids (greater wings). The first ossification centers appear in the alisphenoid and by membranous ossification a large portion of greater wing is formed. Foramen ovale is then formed where mandibular nerve gets surrounded by cartilage. At the 7th month of intra uterine life, foramen ovale is seen as clear round opening in the area of unossified cartilage[5].

The comparison of maximum dimension of foramen ovale with other researchers is shown in table 4.

Table 4- Comparison of Mean Maximum Dimension of Foramen Ovale with Other Researchers

Name of researchers	Year	Mean maximum dimension(Right side)	Mean maximum dimension(Left side)
Lang et al.[6]	1984	7.2 mm	
Ray et al.[7]	2005	7.46±1.41 mm	7.01±1.41 mm
Osunwoke et al.[8]	2010	7.01±0.10 mm	6.89±0.09 mm
Somesh et al.[9]	2011	7.64±1.194 mm	7.561±1.123 mm
Daimi et al.[10]	2011	6.60 mm	6.26 mm
Agrawal et al.[11]	2012	7.11±0.09 mm	7.13±0.09 mm
Desai et al.[12]	2012	8.14±1.42 mm	7.98±1.89 mm
Wadhwa et al.[13]	2012	6.5 mm	6.8 mm
Gupta et al.[14]	2013	7.228±1.139 mm	6.485±1.31 mm
Philips et al.[5]	2013	7.27 mm	7.46 mm
Patil et al.[15]	2013	7.07±2.17 mm	6.8±1.40 mm
Present study	2014	7.53±1.75 mm	7.41±1.53 mm

The comparison of distribution of various shapes of foramen ovale with other researchers is shown in Table 5. Slit-like foramen was not found in the present study which was described by other researchers[3,7,13,14].

Table 5- Comparison of Distribution of Shape of Foramen Ovale with Other Researchers

Name of researchers	Shapes of foramen ovale				
	Oval	**Irregular**	**Almond shaped**	**Round**	**Triangular/slit like**
Khairnar et al.[3]	76.5%	-	10.5%	7%	Slit-like- 6%
Ray et al.[7]	61.4%	-	34.2%	2.8%	Slit like- 1.4%
Somesh et al.[9]	56.7%	3.65%	28.65%	10.97%	-
Agrawal et al.[11]	100%	-	-	-	-
Desai et al.[12]	62.8%	2.19%	23.2%	11.81%	-
Wadhwa et al.[13]	70%	-	15%	10%	Slit-like-5%
Gupta et al.[14]	54.29%		35.71%	8.57%	Slit like-1.43%
Present study	76.5%	13.5%	7.5%	1.5%	Triangular-1%

Khan et al.[16] showed abnormally large, irregular foramen ovale which was confluent with foramen spinosum in one out of twenty five skulls they examined. The same finding was observed in current study in one skull on the right side as shown in Figure 4. Some researchers[17,18] observed the presence of an accessory foramen ovale which was not observed in present study. Reymond et al.[19] found foramen ovale to be divided into two or three compartments in nine(4.5%) of total one hundred macerated skulls. Skrzat et al.[20] mentioned an absence of a typical foramen ovale on left side of cranial base. However, this foramen was present in all skulls observed in the current study.

The clinical significance of foramen ovale is noteworthy as described by various researchers. The most effective surgical treatment for trigeminal neuralgia is microvascular decompression[21]. According to Toda[22], Microvascular decompression is generally performed when the patient is healthy and relatively young. Meckel's Cave can be accessed percutaneously through foramen ovale[23]. Percutaneous biopsy of lesions of cavernous sinus can be approached through foramen ovale which is minimally invasive procedure as compared to open biopsy through craniotomy[24,25].

Foramen spinosum is an easily identifiable landmark in microsurgery of middle cranial fossa. The knowledge of this foramen and surrounding structures are useful for middle cranial fossa approaches and also in trauma surgery where the foramen has to be explored in order to get proper hemostasis[26]. Middle meningeal artery in most individuals, arises from the maxillary artery which is the branch of external carotid artery and enters the skull through foramen spinosum. Foramen spinosum is likely the most commonly affected arterial vascular foramen. Its appearance is influenced by variations in the course and origin of the middle meningeal artery. In anatomically modern humans, the absence of foramen spinosum includes abnormal development and course of middle meningeal arery, most often arising from ophthalmic artery system[27]. Middle meningeal artery represents the source of bleeding in 85% of epidural hematomas. The endocranial arterial blood accumulation dislocates the cerebral structures that herniates and cause fatal brain stem compression[28].

The comparison of maximum dimension of foramen spinosum with other researchers is shown in table 4.

Table 6- Comparison of Mean Maximum Dimension of Foramen Spinosum with Other Researchers

Name of researchers	Year	Mean maximum dimension(Right side)	Mean maximum dimension(Left side)
Lang et al.[6]	1984	2.56 mm	
Osunwoke et al.[8]	2010	2.34±0.05 mm	2.36±0.05 mm
Agrawal et al.[11]	2012	2.42±0.05 mm	2.37±0.05 mm
Kwathai et al.[29]	2012	2.67±0.65 mm	2.67±0.68 mm
Rai et al.[30]	2012	Male- 3.73±0.63 mm Female- 3.81±0.71 mm	Male- 3.31±0.84 mm Female- 3.20±0.83 mm
Present study	2014	2.49±0.60 mm	2.55±0.70 mm

The distribution of round foramen spinosum was lower than found by Kwathai et al.[29], while that of oval and irregular shaped foramen spinosum was higher as compared to the current study. Khairnar et al.[3] observed duplication of foramen spinosum in six out of 100 skulls studied which was nearer to finding of current study(six out of 150). Out of 25 skulls studied by Khan et al.[16], foramen spinosum was absent in one on left side and in another on the right, it was duplicated. Kulkarni et al.[31] found absence of this foramen in five skulls out of total 100 skulls studied. However, the foramen was present in all skulls observed in the current study.

CONCLUSION

The present study was done to confer the knowledge of variations of foramen ovale and spinosum to anatomists and also to clinicians

who perform various diagnostic and therapeutic procedures in the region of middla cranial fossa. The foramen ovale and foramen spinosum showed variations in shape and size which can be due to developmental reasons. From this study, it can be concluded that the skulls studied in the Gujarat region show variability in their morphology in form of size, shape and presence of accessory foramina.

Acknowledgement- Nill

Conflict of Interest- Nill

Source of Funding- Self

Ethical Clearance- Permission from institutional Human Research Ethical Committee has been obtained for present study.

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Pattern of Fatal Cases of Assault Autopsied at Victoria Hospital

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ABSTRACT

Assault is crime of attacking physically. Homicide by assault is killing of a human being by another human being using mechanical force. Assailants use various types of weapons depending upon their availability. A cross sectional study involving a total of 43 fatal cases of assault was conducted in the Department of Forensic Medicine, Victoria Hospital over a period of 1 year from Jan 2010 to Dec 2010. The most common age group of victims of fatal assault was 20-29 years (51.2%) followed by 30-39 years (23.3%). Grudge was the common motive for fatal assault in 51.2% cases. Male victims (83.7%) were commonly injured as compared to females (16.3%). Sharp weapons were commonly used by assailants in 74.4% cases.

Keywords: *Homicide, Assault, Assailant, Injury.*

INTRODUCTION

Homicide is killing of one human being by the act, procurement, or omission of another and the term applies to all such killings, whether criminal or not[1]. The various patterns of homicide include assault by sharp weapon, blunt weapon, firearm, strangulation, hanging, smothering, drowning, burns and poisoning[2]. The pattern of homicide may be useful indicator of the social stresses in a community and may also provide useful information for law enforcement strategies[1].

The pattern of homicides varies from country to country and is influenced by many factors which include method of killing depending on the availability of weapons as well as cultural influences which include family relationships, religious attitudes, criminal activity, drug culture, alcoholism and social, moral and political factors[3].

Homicide by assault is a cruel act of mankind. It reveals one of the darkest sides of the society. Homicidal crimes represent a reasonable proxy for all kinds of violent crimes in general and as all other violent crimes are not been recorded or notified by the system, homicide can be considered the tip of the iceberg. So homicidal crime rate data are considered among the most representative and comparable crime indicators[4].

Assault is crime of attacking physically. It is an act that threatens physical harm to a person, whether or not actual harm is done. Sec 351 Indian Penal Code defines assault as whoever makes any gesture or preparation intending or knowing it to be likely that such gesture or preparation will cause any person present to apprehend that he who makes that gesture or preparation is about to use criminal force to that person, is said to commit assault.

This study was conducted with the aim know the pattern of fatal cases of assault autopsied at Victoria hospital, Bangalore.

MATERIALS & METHOD

A cross sectional study involving a total of 43 fatal cases of assault was conducted in the Department of Forensic Medicine, Victoria Hospital over a period of 1 year from Jan 2010 to Dec 2010. All the cases coming to mortuary during the study period where the cause of death was due to assault were included in the study. The data was collected from the information furnished by deceased relatives

and police; post mortem examination. The data was analysed using Microsoft excel and presented as descriptive statistics.

RESULTS

Table 1. Age and sex wise distribution of cases.

Age(years)	Male	Female	Total
<10	0(0%)	1(2.3%)	1(2.3%)
10-19	0(0%)	0(0%)	0(0%)
20-29	21(48.9%)	1(2.3%)	22(51.2%)
30-39	8(18.6%)	2(4.7%)	10(23.3%)
40-49	5(11.6%)	2(4.7%)	7(16.3%)
50-59	2(4.7%)	0(0%)	2(4.7%)
≥60	0(0%)	1(2.3%)	1(2.3%)
Total	36(83.7%)	7(16.3%)	43(100%)

The most common age group of victims of fatal assault was 20-29 years (51.2%, n=22) followed by 30-39 years (23.3%, n=10). Male were common victims (83.7%, n=36) of fatal assault as compared to females (16.3%, n=7).

Table 2. Month wise distribution of cases

Month	Frequency (n=43)	Percentage
Jan	1	2.3
Feb	4	9.3
Mar	0	0.0
Apr	2	4.7
May	5	11.6
Jun	3	7.0
Jul	4	9.3
Aug	5	11.6
Sep	6	14.0
Oct	5	11.6
Nov	3	7.0
Dec	5	11.6

The month wise distribution of fatal assault cases showed that maximum number cases were occurred in month of September 14 % (n=6).

Table 3. Day wise distribution of cases

Day	Frequency	Percentage
Mon	4	9.3
Tue	7	16.3
Wed	2	4.7
Thu	9	20.9
Fri	6	14.0
Sat	8	18.6
Sun	7	16.3

Maximum number of fatal assaults occurred on Thursday 20.9% (n=9) followed by Saturday 18.6(n=8).

Table 4. Educational Status of victims of assault

Education	Frequency	Percentage
Illiterate	2	4.7
Secondary	2	4.7
SSLC	11	25.6
PUC	17	39.5
Graduation	11	25.6
Total	43	100.0

Maximum number of victims of fatal assault was educated till pre-university 39.5 % (17 cases) followed by SSLC and graduation 25.6% (11 cases).

Table 5. Socio-economic status of victims of assault

	Frequency	Percent
Lower	4	9.3
Middle	37	86.0
Upper	2	4.7
Total	43	100.0

Persons belonging to middle class were the victims in majority of cases i.e.86% (n=37) followed by lower class (9.3%).

Table 6. Motive for assault

Motive	Frequency	Percent
Grudge	22	51.2
Financial	2	4.7
Pickpocket	2	4.7
Extra marital affair	2	4.7
Family problem	1	2.3
Rape	1	2.3
Gambling	1	2.3
Elder alone	1	2.3
Love	1	2.3
Unknown	10	23.3
Total	**43**	**100.0**

Grudge was the common motive for fatal assault in 51.2% (n=22) cases. In 23.3% cases of fatal assault, motive was unknown.

Table 7. Body parts injured in fatal cases of assault

	Head	Face	Neck	Front of Chest	Back of Chest	Front of Abdomen	Back of Abdomen	Lower limb	Upper limb	External Genitalia	Axilla
Frequency	23	29	20	27	6	17	5	14	24	1	4
Percent	53.48	67.44	46.51	62.79	13.95	39.53	11.62	32.55	55.81	2.32	9.30

Face (67.44%, n=29) was most commonly injured followed by front of chest (62.79%,n=27).

Table 8. Number of injuries in fatal assault cases.

Number of injuries	Frequency	Percent
1-5	16	37.2
6-10	3	7.0
11-15	6	14.0
16-20	6	14.0
21-25	9	20.9
26-30	1	2.3
36-40	2	4.7
Total	**43**	**100.0**

1-5 injuries were commonly found on the victims of fatal assault in 37.2% (n=16) followed by 21-25 injuries in 20.9% (n=9) cases.

Table 9. Type of injuries

Type of injuries	Number of injuries	Percentage
Abrasions	111	19.37
Chop injuries	191	33.33
Stab injuries	112	19.54
Incised injuries	85	14.83
Laceration	50	8.72
Contusion	24	4.18
Total	**573**	

Chop injuries (33.33%, n=191) were the common injuries observed in cases of fatal assault followed by stab injuries (19.54%, n=112). Contusions (n=24) were least commonly found in assault cases.

Table 10. Defence injuries

Defence injuries	Frequency	Percent
Present	21	48.8
Absent	22	51.2
Total	43	100.0

Defence injuries were present in 48.8% (n=21) cases.

Table 11. Types of weapons used by assailant

Type of weapons	Frequency	Percent
Sharp	32	74.4
Blunt	9	20.9
Sharp + blunt	2	4.7
Total	43	100.0

Sharp weapons were commonly used by assailants in 74.4%(n=32) cases.

Table 12. Number of assailants

Number of assailants	Frequency	Percent
1	12	27.9
2	5	11.6
3	6	14.0
4	4	9.3
5	2	4.7
>5	6	14.0
unknown	8	18.6
Total	**43**	**100.0**

Single assailants was involved in 27.9% (n=12) cases followed by unknown assailants in 18.6% (n=8) cases.

DISCUSSION

The most common age group involved was 20-29 years 22(51.2%) followed by 30-39 years 10(23.3%) which is similar to Hugar et al[2], Zanzrukiya et al[4], Eze etal[5], Oberoi et al[6], Mohanty S et al[7], Aggarwal et al[8], Shivakumar et al[9], Jagannatha et al[10], Gupta et al[11]. Victims of assault in this age group are violent and more vulnerable to fast changing social trends that is resulting in great interpersonal interaction, which may end up in misunderstanding and frustration finally leading to homicide.

Male victims 36(83.7%) were commonly injured as compared to females 7(16.3%) which is similar to Hugar et al[2] (71.75%), Zanzrukiya et al[4] (72.27%), Eze etal[5] (90.8%), Oberoi et al[6] (75%), Mohanty S et al[7] (75%), Aggarwal et al[8] (78%). In our study male to female ratio was 5.14:1.Similar results were found in studies by Aggarwal et al[8] (3.54:1), Punia et al[12] (3.5:1). This can be explained that males are active members in Indian societies and aggressive in nature as compared to females.

The month wise distribution of fatal cases of assault showed that maximum number cases were occurred in month of September 14 % (n=6) which is similar to study by Garg et al[13] (September and August) whereas maximum cases were reported in the month of December by Zanzrukiya et al[4], May by Gupta et al[11] and July by Verma et al[14].We also observed that maximum number of cases occurred in monsoon season 41.86% (n=18) followed by winter (32.55%, n=14) which is similar to Verma et al[14]. But Mohanty MK et al[15] as well as Zanzrukiya et al[4] reported higher incidence of cases in winter and Rastogi et al[16] as well as Gupta et al[11] reported maximum cases in summer followed by winter. This seasonal variation of assault could be due to disparity in climatic, biological and cultural factors.

Maximum number of fatal assaults occurred on Thursday 20.9% (n=9) followed by Saturday 18.6(n=8) which is similar to study by Bhupinder et al[1] and Rastogi et al[16] whereas the pattern of homicides occurred over the weekends (Saturday and Sunday) in Manipal as reported by Mohanty MK et al[15] and in Auckland by Karlsson[17].

In our study, maximum number of victims of fatal assault was educated till pre-university 39.5 % (17 cases) followed by SSLC and graduation 25.6% (11 cases). In contrast to this, victims were from illiterate background followed by primary education as reported by Mohanty S et al[7] and secondary and illiterate as reported by Verma et al[14].This can be explained by the fact that overall literacy rate in Karnataka is more compared to the many northen states. Bangalore being a metro city overall literacy is still more better.

Commonly middle class victims 86% (n=37) were injured by assailants followed by lower class 9.3% (n=3) which is similar to the study conducted by Verma et al[14] (middle class 53.65% followed by lower class 36.58%). In contrast to this, the study by Mohanty S et al[7] reported lower socioeconomic group were major victims followed by middle class. This could be due to poverty, unemployment and family disharmony.

Grudge was the common motive for fatal assault in 51.2% (n=22) cases. In 23.3% cases of fatal assault, motive was unknown. In contrast to this, Verma et al[14] reported that maximum number of homicides occurred for land disputes (40%) followed by property and financial matters (16%), Hugar et al[2] (revenge 26.5%), Mohanty MK et al[15] (revenge 29.2%), Shivakumar et al[9] (enmity 32.5%), Karthik et al[18] (Vengence 36%), Mohanty S et al[7] (enmity 35.59%).

In the present study, face (67.44%) was commonly injured followed by front of chest (62.79%). Involvement of body region is dependent upon position of victim as well as assailant, target site on the body, number blows, defence by victim and type of weapon used. When blunt weapon was used; face (20.93%) was commonly targeted and when sharp weapon was used, front of chest was targeted. In contrast to this, head was commonly injured in studies conducted by Verma et al[14](54.8%), Vij et al[3](54.22%), Marri et al[19](30%), Eze et al[5](28.3%), Oberoi et al[6](30%) and neck in study by Zanzrukiya et al[4].

1-5 injuries were commonly found on the victims of fatal assault in 37.2% (n=16) followed by 21-25 injuries in 20.9% (n=9) cases. In contrast to this, there was a single offending injury present which resulted in death of the victim with no other associated injury in 27% cases and there was more than one injury in the victims of homicidal deaths in the rest of 73% cases in a study by Verma et al[14]. Different assailants may cause multiple injuries on different body parts of victim. In such cases it is prime responsibility of

forensic pathologist to determine the fatal and non fatal injury which will be useful in the court of law.

Chop injuries (33.33%, n=191) were the common injuries observed in cases of fatal assault followed by stab injuries (19.54%, n=112). Contusions (n=24) were least commonly found in assault cases. This observation is consistent with common use of choppers followed by knife by assailants to inflict injury. In contrast to this, lacerations (45%) were common injuries followed bruise (15.8%) on victims of fatal assault in a study by Verma et al[14] and abrasions followed by contusions were the most common mechanical injuries in victims of homicidal deaths in study by Buchade C et al[20].

Defence injuries were present in 48.8% (n=21) of cases, which is similar in studies by Punia et al[12] (47.22%), Metter et al[21] (48%), Karlson[22] (41%), Katkic et al[23] (38.5%), Schmidt et al[24](45%).

Sharp weapons (n=106, 84.5%) were commonly used in assault cases followed by blunt weapons (n=24, 18.5%). Our study findings are similar to observations by Jaganath et al[10] (53.12%, 23.12%), Shivakumar BC et al[8] (50%, 30%), Vij A et al[3] (49.4%, 34.8%), Mohanty S et al[7] (36.6%, 24.4%), Hugar BS et al[2] (33.25%, 28%), Zanzrukiya et al[4] (31.37%, 27.73%) that sharp weapons were commonly used followed by blunt weapons in fatal assault injuries. In contrast to this, blunts weapons were commonly used than sharp weapons in studies conducted by Punia et al[12] (66.67%, 19.45%), Verma et al[14](58.55%, 12.19%), Oberoi SS et al[6] (52.5%, 25.%), Gupta S et al[11] (42.49%, 33.68%), Buchade D et al[20] (37.2%, 32.8%), and Rastogi AK et al[16] (31.75%, 21.96%). This can be explained that type of weapons used in fatal assault cases depends upon availability of weapon, mind set of assailant, criminal activity drug culture, alcoholism and social, moral and political factors.

Single assailant was commonly involved in 27.9% (n=12) cases of fatal assault followed by unknown assailants in 18.6% (n=8) cases. Number of assailants involved in homicide depends upon motive and circumstances of assault.

CONCLUSION

Present study has highlighted young adult males of age group of 20-29 years belonging to middle class are common victims of assault where grudge was the common motive. Face was commonly injured followed by front of chest. Chop injuries were the common injuries observed in cases of fatal assault followed by stab injuries. Sharp weapons were commonly used in assault cases followed by blunt weapons. Single assailant was commonly involved in cases of fatal assault.

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Study on Nursing Records in Hospital Case Sheets

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ABSTRACT

Documentation in the case sheet is the prime duty of a nurse, documentation should be timely, accurate and complete. Whenever a case of medical negligence is filed against a hospital the only defence is medical record, good records always provide a good defence. A cross sectional study was done on nursing documentation in hospital case sheets at rural medical college hospital with an attached school of nursing. The objective was to appraise the importance of nursing record in case sheet with regard to various medico legal aspects. 100 case sheets were collected from the medical record department of the hospital and only the nursing information from the case sheet was collected in to a data sheet and analysed for errors. None of the case sheet was free from errors. We observed too many lacunae in the case sheets and explained how it leads to medico legal issues,

Keywords: *Nursing documentation, Hospital case sheet, Medico legal problems.*

INTRODUCTION

Nursing records are the data recorded by the nurses concerning the nursing care given to their patients. Nursing documentation is an important medico legal record in hospital. Improper documentation may lead to various medico legal issues. Nurses are supposed to document timely and accurate data of relevant observations in hospital case sheets while rendering services to their patients. It represents the amount of care and services provided to their patients and communication with health care providers.

Documentation is any written or electronically generated information about the care and services provided to their patients. Documentation of good nursing care helps to maintain professional and legal standards. Whenever patient files a case against hospital, the only evidence is hospital records. Good records always provide good defense; poor records mean poor defense and no record mean no defense. Qualified and experienced nurses are always responsible for their actions. Vicarious liability also applies in case of training nurse working under the direct supervision of a senior qualified nurse. Writing something which was not given to the patient is fraud, unprofessional and unethical.

AIM & OBJECTIVE

The main aim of this study is to create awareness in nursing community about the importance of the medical records, Case sheet documentation is an integral part of their duty and it is the only tool to evaluate the good nursing care provided to their patients. Many of the nurses are not aware of the importance of clinical documentation. Most of the nurses they learn documentation from their seniors, some time they commit mistakes while recording and some information is not recorded out of ignorance. This study highlights the mistakes they commonly do in the hospital case sheets and explain how it leads to medico legal issues.

MATERIALS & METHOD

A retrospective record based study conducted at Tertiary care rural medical college hospital with an attached school of nursing. 100 case sheets were collected from the Medical record department of the hospital. Case sheets were collected randomly from 1st January 2013 to 31 December 2013, from major departments of the hospital (Medicine, surgery and OBG). All the case sheets were thoroughly examined and only nursing details were collected into a data sheet for evaluation. A written permission was taken

from the hospital authority before commencement of the study.

The following important data are taken from the case sheet for a systematic analysis.

1. Name, Address, Age, Sex and IP number of the patient.
2. Height and weight record.
3. Vital parameters like Pulse rate, Temperature, blood pressure and Respiratory rate.
4. Urine and bowel chart.
5. Fluid input and output chart.
6. Medicine chart- Drug name, dose, schedule, route of administration and drug reactions.
7. Diet chart (Quantity, calories and any specific diet)
8. Consent and other hospital forms recording.
9. Lab investigations reports.
10. Incident report.
11. Legibility of the record.
12. Any abbreviations are used while recording.
13. Complaints of patient and any other observations record.
14. Name and signature of the nurse in the case sheet.

All the above data were collected into a data sheet and examined for any errors.

Review of Literature: Nursing documentation is one of the important medical records in hospital for a patient well being. Some time we may think that spending on record work may hamper the patient care but it is not true. It is nearly impossible to remember each and every incident that happened on duty and difficulty to handover the duty to the next coming team of nurses without proper documentations.

Whenever a case of medical negligence is filed against a doctor the medical records are the only proof regarding the standard of care provided to the patient. A timely accurate and relevant document is most useful in the court as evidence. Too many erasures and corrections may discredit the value of evidence in the court. Whenever a correction is made, it should be signed on the top of the corrected sentence; wrongly written sentence should be struck off by putting a horizontal line over it and put the signature over the struck off portion.[7,8] Do not use sticky labels or correction fluid.[1]

A qualified nurse who rendered services to the patient on duty is responsible for recording the case sheet. In case of a junior nurse on duty, a senior qualified nurse has to supervise and assist on documentation.[1] Always use dark ink pen while recording the data, never use pencil which can be easily erased. The record should be timely and accurate, never record without examination.

What should be recorded in a case sheet : The records must be relevant accurate and comprehensive, can be written by hand, electronic record keeping is not compulsory. Always use standard prescribed forms which are prepared by the institution.

Patient details and Assessment : Nursing records always begin with patient identification this includes Name, Sex, age, address[2,7,8], IP No and details of attendants and their contact phone number. Phone number is very important to contact them during emergency. Identifications details like Name, age, sex, IP Number must be written in all pages of the case sheet. Must record Date and time of examination. A brief history of the case, why the patient was admitted, what are the complaints, any drug allergies and food allergies and diagnosis of the case must be recorded in the nursing notes of the case sheet.[7,8]

Height and weight of the patient: Nurse must record the height and weight of the patient.[1,7,8] it is useful to know the Body mass index (BMI) of the patient. Weight is very essential in prescribing the drugs, many drugs dosages are adjusted as per the weight of the patient, and this is most significant in children and old age patients. A normal dose may cause drug toxicity in a low weight patient.

Vital signs: It is the fundamental duty of the nurse to record the patient general conditions like pulse rate, Blood pressure, respiratory rate and temperature[1,7,8]. Temperature is to be preferably documented as a chart. Never rely on some others examination findings. Vital records are essential to know the day to day progress of the illness; incorrect data will cause misinterpretation of the clinical condition resulting damage to the health of the patient.

Drug chart: Nurse must maintain a drug chart; record all the medications given to the patient as per

the prescription written by the doctor.[1,2,3] Must record the drug name in generic formulae, dose, schedule (number of times in a day) and route of administration should be specified for each drug. Nurse must sign immediately after giving medications to the patient. Drug name should be written in capital letters only.[4] Nurse should also record drug allergies if any. If the drug cannot be given for some reason, like patient is in another department or the physical condition of the patient is a contraindication for giving the drug, make sure that this fact is recorded in the drug chart and the doctor is informed if necessary. Never use abbreviations in case sheet, abbreviations are notorious and mislead. Not writing the drug name in capital letters comes under infamous conduct as per the latest guidelines issued by Medical council of India[4,5,6], always write the generic name of the drug. Brand name should not be written in the case sheet.

Fluid input and output chart : This is often called a ''fluid chart'. It is used to record all fluid intake and fluid output over a period of 24-hours.[1,2,3] Fluid intake includes oral, nasogastric and infusions given intravenously, subcutaneously and rectally. Fluid output which includes urine, vomit, and aspirate from a nasogastric tube; diarrhea and fluid from a stoma or wound drain are all recorded. Input output chart can evaluate the renal function of the patient. Never use abbreviation like pinta in the case sheet; it can be misread as zero resulting in danger to the patient.

Urine and Bowel chart: Nurse must record the bowel movements,[1,7,8,] whether the patient developed any constipation or diarrhea and similarly urine abnormalities like urinary obstructions, frequency, urgency or any pain during micturition and any abnormal urine. Nurse should record the complaints made by the patient and any specific observations made by her should be recorded in the case sheet and informed to the physician immediately. Sometime minor complaints may become more serious if not addressed in time.

Consent forms and other check list: Consent forms and other check list[1,7,8] entries before surgery must be prepared by the nurse, care should be taken while recording the consent, rules of the consent to be followed, and any deviation may lead to a medico legal problem. Use simple language while recording; do not use too many medical terminologies. Write legible, clear and short sentences. Consent must always be recorded before a witness, and it is preferable to write the language known to the patient.

Diet Chart : Nurse must maintain the diet chart of every patient[1,7], depending on the advice of dietician or physician. Nurse should order the diet and record the same in the case sheet. Diet should be in terms of calories and always preferable to give a balanced diet,

Nursing care: Nursing care is very much important to the bed ridden patient; different types of services are offered to a patient depending on the patient condition. Nurse must record in the case sheet the type of service given to the patient[1,7,8]. Sometimes a special care given to a comatose patient like care of skin, care of respiration and bedside physiotherapy. All these services must be recorded in the case sheet. Services which are provided but not recorded in a case sheet will be treated as no service given to the patient and court considers this as deficiency of service and considers the case as negligence.

In intensive care ward the duty of nurse is more important, she should serve the patient and observe the life saving monitors and record the events time to time. Similarly, in the operation theatre nurse should write the operative notes and any other specific observation must be recorded in the nursing notes of the case sheet.

Incident report: Nurse must record any untoward incident report[1,7,8]. Whenever any untoward incident happens at bed side, like accidental fall from bed, wrong medication or over dosage given to the patient or patient overexcitement, violent attitude and aggressive behavior with other patients or with patient attendants, any such incident must be reported and brought to the notice of the physician immediately.

LEGIBILITY OF THE RECORD

Illegible handwriting[1,2,7,8] is the handwriting that cannot be read or understood by others. This includes sloppy writing, misspelled words and poor grammar. Illegible or poorly written documentation gives an impression of carelessness. The nursing documents must be legible, clear and accurate. Electronic records are useful to avoid illegibility.[2,3,7]

OBSERVATIONS & DISCUSSION

A retrospective cross sectional study was conducted at teaching hospital wherein 100 case sheets were collected randomly from the medical record department of the hospital and only the nursing documentation of the case sheets were analysed and found the following observations:

- Patient general details like name, IP number were not recorded in continuous pages of the case sheet in 5% of the case sheets. Age and sex were also not recorded in continuous pages in 3% of the cases, Nurse must write general information on every page of the case sheet, so that, whenever a loose paper is detached from the main case sheet this information will help to identify the complete case sheet.

- Patient case details like complaints, Diagnosis, Progress and follow up must be written in the nursing notes; in none of the case sheets this information was correctly written.

- Patient height and weight must be recorded at the time of admission in to the hospital. Not even a single case sheet contained this information. Most of the drugs doses are prescribed on the basis of body weight. There is an every possibility that the patient may get adverse reactions to the drugs due to over dosage as the dose is not calculated.

- Vital sign's recording is the prime duty of the nurse; in my study 20% of the cases it was incomplete. It should be checked at frequent intervals as per the instructions by the treating physician and recorded in the case sheet,

- Input and output chart (I/O) must be recorded by the duty nurse, I/O chart is essential in all acute dehydration cases in the ward and it is mandatory in intensive care units, in 40% of the case sheets it was incomplete.

- Nurse should record the bowel regularity; any abnormal bowel movements must be recorded and reported to the physician immediately. In my study 75% of the case sheets this information was not mentioned.

- Nurse must record the drug chart. In our study none of the case sheets contained drug names written in capital letters. Nurse should write generic name of the drug but in our study it was observed that in all the 100 case sheets brand names of the drugs were written. Nurse should record the dose schedule and route of administration clearly. In 95% of cases this was incomplete. Nurse must write name and sign after dispensing the drugs to the patient. But nurse neither signed nor wrote the name in any of the case sheets.

- Consent and other check list must be prepared by the nurse and the treating doctor. In all surgical cases informed consent is must. In this study 95% of cases it was incomplete.

- Nurse must write the investigation reports in the investigation chart, none of the case sheets contained investigation chart.

- Diet chart should be written for every patient depending on the disease condition as advised by the physician and dietician, in none of the case sheets diet related information was mentioned.

- Incident report must be written by the nurse. None of the case sheets contained incident report.

- In majority of the case sheets hand writing was illegible, which is an unethical and wrong practice

- Abbreviations are used in all the 100 case sheets. Abbreviations which have more than one meaning can cause misinterpretation and risk to the patients.

CONCLUSION AND RECOMMENDATIONS

Documentation is the fundamental duty of every nurse. Neat, accurate and timely record in the case sheet is mandatory. In spite of providing excellent nursing services but not recording in the case sheet will be treated as no service given to the patient. Every hospital must employ qualified nurses in adequate number depending on the bed strength of the hospital. Appointing an unqualified nurse resulting in damage to the patient will be treated as corporate negligence and the hospital has to pay the penalty for it.

Documentation is an art, it can be learned by means of practice only, and every nurse must cultivate the habit of neat and accurate documentation. Regular workshops on documentation should be conducted in every hospital and awareness on medico legal issues should reach to every nurse.

The following are Recommendations for better documentations:

- Write Legible and use a permanent black ink pen.
- Mention the time of each entry and write as early as possible after providing care.
- Don't erase or alter the record which is a criminal offense. Do not use abbreviations that are not standard. Do not write vague descriptions and always record your own examination findings.
- Don't write your personal opinions and unnecessary things, which will discredit your documentation.
- Hospital records are confidential-must keep in safe place. Never reveal the patient details without consent. Professional secrecy should be maintained by the nurse.

Conflict of Interest: Nil

Source of Funding: Self

Acknowledgement: We thank our professor & HOD, Principal and Medical superintendent of the Hospital who constantly supported and encouraged us to conduct this study.

Ethical Clearance: No ethical issues in this study.

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Evaluation of Third Molar as an Indicator of Age Estimation in Chennai Population

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ABSTRACT

Aim: To assess the chronologic age based on the mineralized stages of mandibular third molar development following the stages of eruption using modified demirjian's method.

Objective: To evaluate the stages of eruption and to derive a formula for age estimation.

Material and Method: Panoramic radiographs from 200 Chennai populations with unknown age and gender were selected for the study. The investigated radiographs were collected from the records of SRM dental college. Radiographs with any pathology, facial deformities, congenital deformities, trauma, magnification and distortion were excluded.

Results: There was no statically difference between interobserver and intraobserver reliability. Stastical difference exists between genders, in which male showed earlier eruption than females.

Conclusion: Radiographic is cheaper and routinely used method of age identification. hence sound knowledge is necessary to choose the appropriate methods and to identify the stages of mineralization so that its application is extended in medico legal cases.

***Keywords**: Third molar, age estimation, Demerjians method, Chennai population.*

INTRODUCTION

Dental findings are important sources of information to estimate age of pediatric patients, orthodontic treatment and in forensic science[1]. Dental development is the most accurate for age estimation from birth until early teens. Age estimation becomes difficult by 14 years of age since all the permanent teeth erupts except the third molar which develops in the late adults and give clue to age estimation[2]. There are various non destructive patterns to estimate age such as clinical, histological, radiographic biochemical analysis, among all these methods radiography, is a simple routinely used technique in dental practice. Obtained images are considered to be an essential tool in forensic science[3]. The problem of determining age to ascertain whether one can be criminally charged brings to all the methods of investigation which can be used to define a person's biological age[4]. Radiological assessment of mineralized third molars is the main criteria for dental age estimation in criminal cases[5, 6]. Several methods are used for age estimation; Demirjian-1973 was first to estimate chronological age based on tooth formation[7]. The purpose of this study was to evaluate the chronology of third molar development in Chennai population following the stages described by Demirjian et al.

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MATERIALS & METHOD

The study was done in the department of Oral medicine and radiology (SRM dental college, Chennai).Study subjects consist of 200 (males 97 females 103) who were residents of Chennai between the ages 8 to 30 yrs .The OPG of optimal density, contrast and resolution were selected.

The study subjects with pathological deformities,

congenital deformities, traumas, magnification and distortion were excluded. Before the patient was exposed to OPG, thorough history was taken; those who were residents of Chennai were selected and exposed. Demirjian et al method was used to determine mineralized stages of mandibular third molars to evaluate the dentition development. The method was classified in eight stages A to H. The observer was blind to both age & sex. Panoramic films of 200 individuals were examined by two investigators. The third molar scoring was given respectively (A to H) [5,7] based on the stage of mineralization. The deformed images of third molar were marked unclear. Repeated examination was done at an interval of 10 days. Kappa statistics was used to check the interobserver and intraobserver reliability. Linear co-efficient regression was used to compare between sides (right and left) and between the genders.

DEMIRJIAN'S CLASSIFICATION SYSTEM (A TOH) (FIG 1 TO 8)

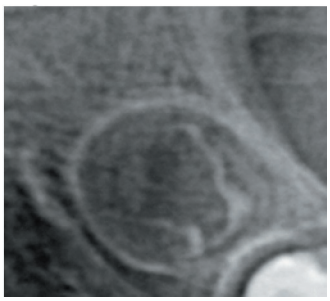

FIG 1: A: Cusp tips are mineralized but have not coalesced.

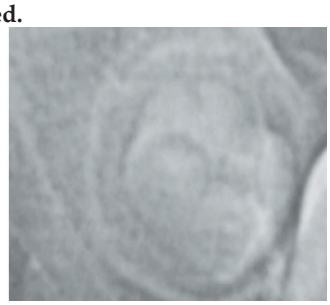

FIG 2: B. Mineralized cusps are united so the matured coronal morphology is well defined

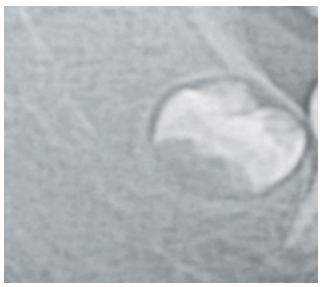

FIG 3: C. The crown is about half formed and the pulp chamber is evident and dentinal deposition is occurring.

FIG 4: D. Crown formation is complete to the dentino-enamel junction. The crown is about half formed and the pulp chamber is trapezoidal form.

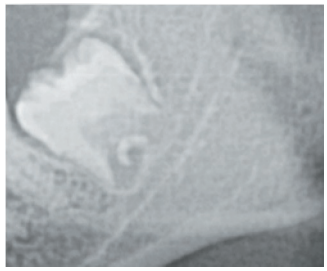

FIG 5: E. Formation of the inter- radicular bifurcation has begun. Root length is less than the crown length.

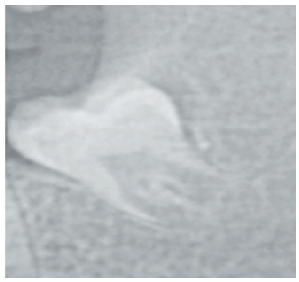

FIG 6: F. Root length is at least as great as crown length. Roots have funnel-shaped endings.

FIG 7: G. Root walls are parallel, but apices remain open.

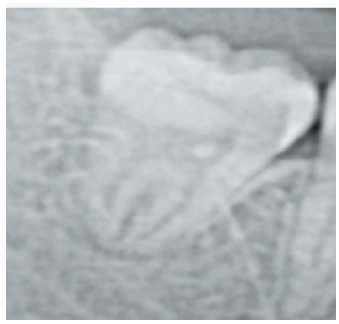

FIG 8 : H. Apical ends of the roots are completely closed, and the periodontal membrane has a uniform width around the root.

RESULTS

Interobserver and intraobserver reliability between right and left showed no significant differences (Table 1). Third molar formation using demerjians method was observed in both the sex and between the sides. A linear regression analysis was used to compare the eruption on right and left side. There was no statically difference observed between both the sides as observed in (Table 2). There was statically difference observed in the eruption of the third molar on both the sides between the gender .Males showed earlier eruption than females on both sides. (Table 3).

The regression equation for sides and gender in (Table 4).

Table- 1: Interobserver and intraobserver reliability:

Symmetric measures	Kappa value	P value
First observation of first Observer with second observation on the right side	0.910	<0.001
First observation of first observer with second observation on the left side	0.948	<0.001
First observation of first observer on right side with second observer on the right side	0.884	<0.001
First observation of first observer on left side with second observer on the left side	0.895	<0.001
Second observation of first observer on the right side with the second observer on right	0.949	<0.001
Second observation of first observer on the left side with the second observer on the left side	0.921	<0.001

Table-2: Linear regression co-efficient analysis on right side& left side

		Unstandardized Coefficients		95% CI for Beta		P-Value
	Constant	Beta	Standard. Error	Lower	Upper	
OBS-2 R	4.846	2.262	0.144	1.977	2.547	<0.001
OBS-2L	5.420	2.189	0.143	1.908	2.471	<0.001

Table 3: Linear co efficent regresion for gender

			Unstandardized Coefficients		95% CI for Beta		P-Value
		Constant	Beta	Std. Error	Lower	Upper	
MALE	OBS-2 R	4.881	2.268	0.237	1.977	1.798	<0.001
	OBS-2 L	5.522	2.195	0.224	1.750	2.640	<0.001
FEMALE	OBS-2 R	4.909	2.241	0.190	1.863	2.619	<0.001
	OBS-2 L	5.500	2.157	0.193	1.773	2.540	<0.001

Table 4: Regression equation for sides and gender

	RIGHT SIDE	LEFT SIDE
OVER ALL	Age = 4.846 + 2.262 × (OBS-2 R)	Age = 5.420 + 2.189 × (OBS-2 L)
MALE	Age = 4.881 + 2.268 × (OBS-2 R)	Age = 5.522 + 2.195 × (OBS-2 L)
FEMALE	Age = 4.909 + 2.241 × (OBS-2 R)	Age = 5.500 + 2.157 × (OBS-2 L)

DISCUSSION

The development stages of the teeth in radiographs play very important role in age estimation, orthodontic treatment and in forensic science. Estimating chronological age from third molar formation stages is suggested because of the absence of other reliable biological markers during late adolescence[8,9]. There are several methods adopted to estimate the age based on the calcification stages of the teeth such as like Kraus and Jordan et al, Schour and Masseler method[10,4]. Goldstein et al, Tanner et al., Moore's, Fanning , Hunt etal[11,7]. In our study we have chosen Demirjian's method as it is highly reproducible and reliable because the inter and intra observer errors are like to occur and the stages of tooth development are restricted to eight stages which makes minimal error in scoring and also assess the relative length of crown and root instead of their length[3] .

The development of tooth varies among population with the difference exists between cities of the same country. The reports given by Olze et al Arany et al showed less inter and intraobserver errors which are in agreement with the present study[12,4] Males showed significant earlier eruption than females which was in contrast with Solari and Abramovitch[13] and there was insignificant difference between the sides. (Mincer et al) (JoséL. Prieto et al 2005) [14,9]. This variation in the individuals could be affected by genetic, racial, nutritional, climate, hormonal and environmental factors (kulluman et al 1992) [15].Hence the regional difference in south Indian cities like Chennai show significant difference between genders.

Our study yielded regression equation formulae between right and left side and gender based on the mineralization of third molar using modified demerjian's method obtained from panoramic radiographs.

RIGHT SIDE Y=A+BX1 LEFTSIDE: Y=a+bX2

Y=age, Aa, Bb, Cc= constant, X1= Right side, X2=Left side

This is a first study to estimate age in Chennai population using modified demerjian's method that showed acceptable results using a formulae derived from stastical analysis to estimate age. Thus the regression formulae helps in age estimation in foresenic odontology criminal cases, orthodontic purposes, massive disasters,labour laws, archaeology in Chennai population

CONCLUSION

Teeth play important role in age estimation. Third molar are the only teeth which erupt in the late adololesence and one of the essential diagnostic tool to estimate age in later stages of life but however the accuracy decreases with age. Teeth mineralization is less affected by external sources compared to that of bone mineralization. Hence, mineralized stages of third molar serves as an important marker of age estimation in forensic science and various purposes.

Acknowledgement – Nil

Conflict of Interest - Nil

Source of Support- Nil

Ethical Clearance – As our study is a retrospective study based on the previous radiographic records. Radiographs were taken for patients own diagnostic purpose and those data's were collected and utilized for our study for which ethical clearance was not required but the institution is aware of our study.

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A Study of Non-Accidental Cases of Poisoning Deaths

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ABSTRACT

Males were involved in 342 cases. The male: female ratio being 1.6: 1. It is found that the common predisposing factors for committing suicide in males were stress and financial crisis. In females, most common predisposing factor to commit suicide was social harassment by in laws. In cases of unmarried females, most common cause for suicide was love failure. Higher incidences were found in the 3rd decade of life.

Keyword : *Poisoning, Suicide, Homicide, Accidental.*

INTRODUCTION

Definitions: The word "**toxicology**" is derived from the Greek word "**toxicon**" which was used as a poisonous substance in arrowheads. Traditionally**, toxicology** is defined as the science embodying the knowledge, source, character, fatal effect, lethal dose, analysis of poisons and the remedial measures.

A poison is defined as the substance, which is capable of producing injury or death when absorbed. It may also be defined as a substance capable of producing detrimental effects on a living organism as a result of which there may be a change in the structure of the substance or functional process, which may produce injury or even death.

Classification of poisoning as per mode of administration: Accidental poisoning

- Coal is allowed to burn in a room leading to carbon monoxide poisoning.
- Allergic conditions.
- Bites by poisonous insects and animals.
- Accidental cattle poisoning.
- Overdoses of certain medicines.
- Industrial leakage.
- Careless spraying of insecticides and pesticides.

Homicidal poisoning

- Arsenic salts, mercury salts, cyanides, methyl alcohol, dhatura seeds etc are used for homicidal purposes owing to their properties like small fatal doses, tastelessness, odourlessness, miscibility with drink and common availability.
- Opium is used as infanticide poison. Suicidal poisoning
- Some poisons are mainly popular for suicidal purposes because of their domestic availability and in work places like cyanide in electroplating units, insecticides in farms, sodium nitrite in dyeing industries.
- Barbiturates are used by educated people.

AIMS & OBJECTIVES

The present study involves continuation of the retrospective study done at the department of Forensic Medicine, Sheth V.S. General hospital, Ahmedabad involving poisoning cases. Out of the total 4392 cases spread over a period of 5 years (1995 to 1999), 556 were of poisoning (i.e. 13%). These 556 cases were further studied in detail for the utility of chemical analysis report in detecting the nature of the poison. This was compared with cases with sure positive clinical signs and positive suggestive post mortem findings. It was revealed that despite of positivity in clinical and PM signs, about 20% cases showed negative report in CA.

The objectives of this study are:

- **To study the rate of incidence of poisoning cases.**

- **To study distribution of poisoning cases based on various parameters.**

- **To postulate relationships between various factors and incidence or intensity of poisoning by statistical analysis.**

- **To enlist all possible reasons that lead to contradictory analytical findings in chemical analysis.**

- **To provide the statistical analysis and typical illustration cases for the above.**

- **To make recommendations so as to minimize errors at every step and hence improve and enhance the chances of a positive chemical analysis report.**

- **This will, in turn prove to cause a direct impact on the valuability and utility of the forensic analysis and subsequently the CA report in the courtroom in all poisoning cases.**

MATERIALS & METHOD

- The study includes cases of poisoning brought for PM examination at the **department of Forensic Medicine, Sheth V.S. General Hospital, Ahmedabad.**

- The department of Forensic Medicine, Sheth V.S. General Hospital, Ahmedabad receives cases from Ahmedabad city as well as surrounding areas for PM examination. This also includes cases brought for treatment in V.S. Hospital from all over Gujarat.

- All the cases for PM examination brought to the department of Forensic Medicine, Sheth V.S. General Hospital Ahmedabad were studied and cases with a history of poisoning were identified and segregated. This includes all the cases from the year **1995 to 1999.**

- A database of this study was availed by the department of Forensic Medicine, Sheth V.S. General Hospital, Ahmedabad wherein the study was undertaken for a different pattern.

- The entire database was analyzed for different parameters like gender, geography, time elapsed, positivity in clinical signs, positivity in PM findings Vis a Vis the CA report.

- The positivity of the CA report was taken as a standard finding.

- The negativity of the CA report was further analyzed in light of positive clinical signs and positive PM signs.

- The results were analyzed and tabulated.

- All the tabulated results for different parameters were statistically evaluated by using the **EPI 6 medical software.**

- **Chi square tests and t tests** were performed for authenticity of the results that evolved during the study.

OBSERVATIONS AND DISCUSSION

Table 1: Year wise distribution of poisoning deaths in relation to total post mortem examinations of deaths due to various reasons.

Year	Poisoning	Total	Percent
95	93	759	12.25
96	109	900	12.11
97	121	904	13.38
98	112	894	12.52
99	121	935	12.94
Total	**556**	**4392**	**12.65**

It was found that there was no apparent increase in the proportion of poisoning cases during the years 95 to 99.

Table 2: Distribution of poisoning cases in relation between age group and sex during 95 to 99

Age group	Sex		Total
	F	M	
0 to 4	4 44.4%	5 55.6%	9 1.6%
5 to 9	3 60%	2 40%	5 0.9%
10 to 14	11 55%	9 45%	20 3.6%
15 to 19	54 58.1%	39 41.9%	93 16.7%
20 to 24	44 34.4%	84 65.6%	128 23%
25 to 29	35 36.5%	61 63.5%	96 17.3%
30 to 34	19 32.8%	39 67.2%	58 10.4%
35 to 39	17 44.7%	21 55.3%	38 6.8%

(Table 2: Cont...) Distribution of poisoning cases in relation between age group and sex during 95 to 99

40 to 44	9 20.9%	34 79.1%	43 7.7%
45 to 49	10 33.3%	20 66.7%	30 5.4%
50 to 54	1 8.3%	11 91.7%	12 2.2%
55 to 59	3 25%	9 75%	12 2.2%
60 to 64	2 40%	3 60%	5 0.9%
65 to 69	1 33.3%	2 66.7%	3 0.5%
70 to 74	1 100%	0 0%	1 0.2%
75 to 79	0 0%	1 100%	1 0.2%
80 to 84	0 0%	2 100%	2 0.4%
Total	**214** **38.4%**	342 61.5%	556 100%
T TEST VALUE There is significant difference Between the two variables.			0.008

Higher incidences were found in the 3rd decade of life. Incidence of poisoning was the highest in the age group of 20 to 24 years i.e. 128 cases (23%) with more males than females.

Table 3: Year-wise distribution of cases in relation to mode of poisoning

Year	Accidental	Homicidal	Suicidal	Total
95	17 18.3%	1 1.1%	75 80.6%	93 16.7%
96	12 11.0%	3 2.8%	94 86.2%	109 19.6%
97	11 9.1%	0 0.0%	110 90.9%	121 21.8%
98	9 8.0%	3 2.7%	100 89.3%	112 20.1%
99	19 15.7%	0 0.0%	102 84.3%	121 21.8%
Total	**68** **12.2%**	**7** **1.3%**	**481** **86.5%**	**556** **100.0%**

It was found that homicidal poisoning is rare in Ahmedabad and its surrounding rural areas.

Table 4: Yearwise distribution of poisoning cases Based on their CA report

Poison	Year	Total				
	95	96	97	98	99	
Ca report pending	13 19.7%	11 16.7%	10 15.2%	14 21.2%	18 27.3%	66 11.9%
Acid corrosive	8 23.5%	10 29.4%	9 26.5%	3 8.8%	4 11.8%	34 6.1%
Aluminium phosphide	8 8.0%	23 23.0%	25 25.0%	21 21.0%	23 23.0%	100 18.0%
Carbamate propoxure	18 16.2%	20 18.0%	28 25.2%	27 24.3%	18 16.2%	111 20%
CO	0 0.0%	0 0.0%	0 0.0%	0 0.0%	2 100.0%	2 0.4%
Chloroquin	1 14.3%	0 0.0%	1 14.3%	4 57.1%	1 14.3%	7 1.3%
CuSo4	3 100.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	3 0.5%
Drug overdose	0 0.0%	0 0.0%	0 0.0%	1 100.0%	0 0.0%	1 0.2%
Drug reaction	0 0.0%	1 100.0%	0 0.0%	0 0.0%	0 0.0%	1 0.2%

(Table 4 Cont...) Yearwise distribution of poisoning cases Based on their CA report

Ethyl alcohol	0 0.0%	0 0.0%	0 0.0%	1 33.3%	2 66.7%	3 0.5%
Insect bite	7 29.2%	3 12.5%	4 16.7%	4 16.7%	6 25.0%	24 4.3%
Kerosene	0 0.0%	0 0.0%	0 0.0%	1 100.0%	0 0.0%	1 0.2%
OP	6 9.2%	16 24.6%	15 23.1%	15 23.1%	13 20.0%	65 11.5%
OC	5 22.7%	5 22.7%	1 4.5%	4 18.2%	7 31.8%	22 4.0%
Reducing agent sulf	0 0.0%	0 0.0%	0 0.0%	0 0.0%	1 100.0%	1 0.2%
Rodenticide	0 0.0%	0 0.0%	0 0.0%	0 0.0%	1 100.0%	1 0.2%
Scorpion bite	0 0.0%	0 0.0%	0 0.0%	1 50.0%	1 50.0%	2 0.4%
Sedative	0 0.0%	0 0.0%	1 50.0%	1 50.0%	0 0.0%	2 0.4%
Snake bite	1 33.3%	0 0.0%	0 0.0%	0 0.0%	2 66.7%	3 0.5%
Undetected	23 21.5%	20 18.7%	27 25.2%	15 14.0%	22 20.6%	107 19.2%
Total	**93** **16.7%**	**109** **19.6%**	**121** **21.8%**	**112** **20.1%**	**121** **21.8%**	**556** **100.0%**

Carbamate propoxure was the most commonly ingested poison (111 cases) followed by aluminium phosphide (100 cases), op compounds (65 cases) and OC compounds (22 cases)

INFERENCES

Listed below are the various inferences that were drawn from the case studies. These inferences highlight the reasons which are collectively or individually responsible for contradictory chemical analytical findings and in some cases, despite of positive clinical and postmortem findings.

1. The poison is naturally metabolized, detoxified or eliminated by the victim's body. In such cases the poison will not be detected by the chemical analysis of the viscera.

2. The poison is in such small quantities that it cannot be detected by the available methods of chemical analysis or the quantity present or extracted is below detection limits.

3. The absorbed poison, might not have evenly distributed in various organs which varies with different poisons and also with its mode of administration. E.g.: blood levels are higher than liver levels when the poison is administered by IV route and reverse generally applies when poison is administered orally.

4. The sample sent for analysis is insufficient in quantity and the analyst has to look for all types of poisons.

5. The detection of highly potent toxic, i.e. low LD substances is quite difficult.

6. The interference of proteins, fats and decomposition products sometimes makes the detection difficult or rather impossible.

7. Treatment given to the victim may alter the poisonous substance and make its detection difficult or even impossible. An excellent illustration of this point is the cases numbers 19, 44 and 87 of the present study. In all of these the patients remained under treatment in the hospital for more than 15 days and during this period the poison was eliminated from the body in such quantities that the remaining poison quantity would fall much below plausible detection limits. The deaths occurred due to secondary complications due to delayed systemic effects of the toxic substance.

8. The poison is also not detected if irrelevant tissues are taken. An excellent illustration of this point is the cases with inhalation and skin contamination history in the present study. In most of these cases it was found that in spite of inhalation history, lung tissues were not sent for CA and in the latter, skin piece was not sent for the CA. the quantity of poison found in other routine tissues would either be nil or as less as would escape detection.

9. Faulty packing, sealing and preservation of tissues to be analyzed leads to negative analysis. It was found from the present study that due to the prevailing unsuitable conditions and delay due to lengthy legal procedures and also due to prevalent bureaucratic practices the packing and sealing activities of the viscera were greatly hampered.

10. If tissues are sent unpreserved and analysis is taken up after a long time, the poison present in the tissues might have decomposed and remains undetected. It was found that often due to highly increased work load in the highly populated country as ours timely analysis of the viscera is not done. A lot of time elapses between the preservation and sealing and the actual taking up of the tissues for analysis during which, at any step if the sealing and/or preservation is inappropriate the analysis will yield negative results.

11. For reasons not yet known, in deaths due to intravenous narcotism and anesthetics sometimes even when the victim is found with the needle, with syringe attached still in vein or material is taken and sent with all precautions, no narcotic substance or anesthetic substance is detected.

12. Normal values are averages of many observations. Therefore when a substance that is normally not present in the body is isolated, it becomes necessary to consider a range of values before interpreting the result as exposure to the toxic levels of this substance.

13. There are many poisons like proteinaceous poisons, once absorbed are rather impossible to extract and detect from tissues by chemical methods of analysis. Similarly, the extraction of water soluble compounds is very difficult. An excellent illustration of this point is the cases number 96 and 100 of the present study which have a positive history of snake bite as well as corroborative evidence for the same. Snake venom being proteinaceous remains undetected in the CA. same can also be said for scorpion venom and other insect venoms which are known to cause instantaneous deaths in very small quantities. Vegetable poisons are usually not detected.

14. Time lag between time of consumption and time of hospitalization is very high. An excellent illustration of this point is the large number of cases enlisted in the table 14 of the present study which fall in the category of a time lag higher than 12 hours between consumption and hospitalization. In this time period, numerous factors come into play which prevents the detection of the poison in the later performed CA.

15. Time lag due to delay by police causes delayed chemical analysis and may lead to negative results. An excellent illustration of this point is those cases in the present study in which the viscera was not timely collected and dispatched by the police mainly due to lengthy legal procedures.

16. Acid corrosive poisons are undetected due to total corrosion and perforation of GI tract. An excellent illustration of this point is the cases number 15 and 98 of the present study which have a positive history as well as clinical symptomatology which confirms the acid corrosive nature of the poison taken and a negative CA report in both cases which show that necessary steps were not taken to prevent the negativity in the report.

17. Use of wrong analytical technique may lead to negative results. It was found in the present study that often due to total lack of history of poisoning and corroborative evidences unknowingly this reason may have come into play.

18. Tampering of preserved viscera, intentionally or non intentionally may lead to negative results.

19. Certain poisons disintegrate very fast. E.g.: Barbiturates.

SUMMARY AND CONCLUSIONS

- The present study includes 556 cases of poisoning in Smt. NHL Municipal Medical College and Sheth V.S. General Hospital, Forensic Medicine Department, Ahmedabad from 1995 to 1999 retrospectively.

- The incidences of poisoning were 12.65% of the total PMs in the hospital. It is found that there was

no apparent increase in the proportion of poisoning cases during the years in question.

- Males were involved in 342 cases. The male: female ratio being 1.6: 1. It is found that the common predisposing factors for committing suicide in males were stress and financial crisis. In females, most common predisposing factor to commit suicide was social harassment by in laws. In cases of unmarried females, most common cause for suicide was love failure.

- Higher incidences were found in the 3rd decade of life. Incidence of poisoning was observed highest in the age group of 20-24 years i.e. 128 (23%) cases with more males followed by age group of 25-29 years i.e. 96(17.3%) cases with more males.

- Percentage of population in Ahmedabad and its outskirts is comprised of Hindu community and Muslims consider suicide as sinful, so more numbers of poisoning cases were found in Hindu community.

- It is found that in rural areas, number of poisoning cases was higher. Accidental insecticide poisoning cases were found increased in numbers in rural areas. This is due to increase in agricultural use of insecticides and the same leads to increased numbers of suicidal cases because of their easy availability and low costs.

- Suicidal and accidental poisoning deaths were more in married persons while homicidal poisoning deaths were more in unmarried persons. This is due to increasing stress and strain in life and diminished mental strength to cope with them, free and easy availability of poisons, social problems like marital disharmony, economic hardships, disagreement, dowry, scolding, love failure, unemployment, adjustment problem and quarrel with other members. The more number of married persons committing suicide may reflect the early age of marriage in India compared to western countries.

- Incidences of poisoning cases were more during the night i.e. 169 (30.4%) cases at the victim's own residence.

- Majority of poisoning cases were suicidal. Most victims were laymen so easiest administration of poison was oral.

- Majority of poisoning cases i.e. 380 cases were hospitalized within 1 to 4 hours of intake of the poison. In 71.9% of the victims in history taking (as per inquest) exact compound consumed could not be detected because majority of them were found unconscious. There was no corroborative evidence like empty container etc. while in remaining conscious victims the exact details of the poison could not be elicited due to lack of knowledge. Due to these reasons, proper antidote could not be given during treatment. Delayed treatment was the most common cause of deaths in poisoning cases.

- Aluminium phosphide, carbamate propoxure, organo phosphorus, organo chloro compounds and chloroquin anti malarial drugs have effect on respiratory system causing pulmonary edema with resultant froth at mouth and nostrils and cyanosis. Cyanosis and froth at nostrils are suggestive of pulmonary edema so conclusion regarding nature of poison is easier as poison acting on respiratory system causes pulmonary edema and treatment can be given accordingly.

- In cases of poisoning due to insecticides, typical peculiar smell like that of kerosene was observed at the time of autopsy i.e. 268 (48.2%) cases in either oral cavity or stomach cavity. So diagnosis is easier in such cases and treatment can be started.

- Carbamate propoxure and aluminium phosphide compounds were most commonly used for suicidal and homicidal poisoning. Baygon and aluminium phosphide are easily available and relatively cheap and fatal dose required is too small. Both compounds are available in urban and rural areas at chemist's shops as well as number of provision stores.

- Insect bite and snake bite was found to be the most common cause of accidental poisoning in rural areas. It seems that delayed specific treatment or non availability of treatment are the common causes of deaths in accidental insect and snake bite poisons in rural areas.

- In overall observations it was felt that the role of chemical analysis was in fact restricted. Although the viscera were preserved and sent for analysis, the results did not show detection of poisons. This was more particularly observed in cases where, although strong and suggestive clinical and PM findings were present, because of delay, incorrect methods, improper preservation and poor logistics in the system the CA result was negative.

• FSL Gujarat is one of the best in the country. Despite this, the negativity was observed as above. Various reasons have already been discussed in the previous chapter and the recommendations coming out from my study are enlisted in the next chapter.

RECOMMENDATIONS

• The patient of poisoning must be shifted immediately to a hospital because in such case even though the consumed poison is less in quantity, the chances of detection by CA are more.

• Sufficient quantity of samples should be taken.

• The logistics in carrying the viscera samples from hospital to forensic toxicology lab should be upgraded in such a way that minimum delay is there.

• A great care should be taken during the collection of samples at various levels and it should be ensured that the sealing and packing is accomplished with utmost care.

• The medical team involved in preservation of viscera should use the right preservative in cases where nature of poisoning is known. Care must be taken to avoid contradictory preservatives.

• For quantitative analysis of the poison present, when the analysis is based on quantifying a metabolite that is normally present in the body, a range of values must be considered before interpreting the result as exposure to the toxic level of that substance.

• Depending on the history of poisoning, relevant tissues should be collected and suitably forwarded for chemical analysis.

• Since the forwarding of viscera involves police agency there is a significant time delay in following legal procedures. Hence it is recommended that in all major hospitals the facility for chemical analysis and detection of poison should be made and there should be such **regional Poison Detection Centres** at all major hospitals.

• Although the hospitals are equipped to cater to the critical needs of poisoning patients it should be remembered that treating a poison patient is a speciality in itself. All hospitals should have an **Emergency Poisoning Management Unit**. This unit can take care of any poisoning case, render the best treatment and has a facility for bedside analysis for early detection of poison.

• There should be good correlation between the medical team, investigating team and analytical team. For this there should be an **orientation programme** for the medical team for analytical aspects, analytical team for the medical aspects and investigating team for both.

Toxicological analysis of decomposed materials:

• Decomposed viscera lead to many problems in toxicological analysis and difficulties in the interpretation of results.

• In decomposed bodies, the tissues are softened and liquefied by autolysis and bacterial actions release carbohydrates, fats and proteins which are extracted with the extracted materials in abundant amounts and complicate the process of analysis leading to serious difficulties in the interpretation of results. Hence, suitable cleanup procedures should always be applied to remove these materials from the extracts. An analyst should always keep the following points in mind at the time of interpretation of results of analysis of tissues taken from decomposed bodies.

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Source of Funding- Self

Conflict of Interest – Nil

Ethical Clearance – The study is based on dissertation done during residency programmed. Also no patients were interviewed and nor were any interventions done. Hence it was a retrospective study and data was collected from already reported documents. So ethical clearance is not required.

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Drowning Case Turned to be Homicide with Sexual Assault by Meticulous Post Mortem Examination – A Case Report

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ABSTRACT

Dead body recovered from water stained with mud is commonly thought to be a drowning case. One such case was brought to Kolkata Police morgue for medicolegal autopsy. Apparently it was a simple case of drowning but when autopsy was started, the actual fact was revealed something else. Injuries over the face, asphyxia signs and findings of external genitalia were sufficient to draw the opinion and the case turned to be a homicide with sexual assault. Such crimes are increasing day by day in every part of our country. All such victims, irrespective of their socioeconomic status deserve the justice. Here we are going to discuss the case to highlight how a meticulous post mortem examination can be a first ray of light in a dark field of justice.

Keywords: *Drowning, Asphyxia, Sexual assault, Autopsy, Injury, homicide.*

INTRODUCTION

Every case of medicolegal autopsy is a challenge to all autopsy surgeon. It is not as simple as it looks. Our eyes can see any fact only when our mind sees that. Mind of an autopsy surgeon should always be alert even if the case looks very simple. Often we see a case reported to be suicide or accident in inquest report converts into homicide after post mortem examination and here lies the success of a medicolegal autopsy. In this case report we are going to discuss such a case where initially it was a simple accidental or suicidal drowning to the police but finally a deadly crime was revealed and solved only due to one meticulous autopsy.

History: History regarding the case was very limited. The only source of information was the inquest report. Identity of the deceased was not known before post mortem examination. The victim was a young aged woman and the age was reported around 25 years in the inquest report. Dead body was recovered incidentally from the river by police. The victim was brought to emergency department of Medical College, Kolkata and was declared as brought dead by emergency medical officer. Finally the dead body was brought to Kolkata Police Morgue for medicolegal autopsy with all relevant documents.

Post mortem findings: The wearing apparel of the deceased made the mind of the autopsy surgeon suspicious. It was only the upper portion of the body which was covered whereas the lower portion was completely naked. A careful post mortem examination revealed following injuries and findings which were sufficient to draw an opinion.

One small lacerated wound was found near root of the nose. Deep bruise was detected over right side of chin on dissection. Bruise was detected over inner aspect of lower lip. Along with this, all the organs were congested with petechial haemorrhagic spots over lung surface and subepicardial region of heart. There was no ligature mark over neck. Neck was dissected last applying V shaped incision with care. No extravasations of blood could be visualised over soft tissue of neck. Hyoid bone and thyroid cartilage were absolutely intact. There was no evidence of any foreign substance including mud, sand weeds within the entire respiratory tract. Stomach was empty except little amount of yellowish fluid with no peculiar smell

or submucosal haemorrhage. Excluding poisoning and any other form of asphyxial death, cause of death was opined as smothering considering the above mentioned positive findings.

Fig 1. Deep bruise over chin

Fig 2. Lacerated injury near root of nose

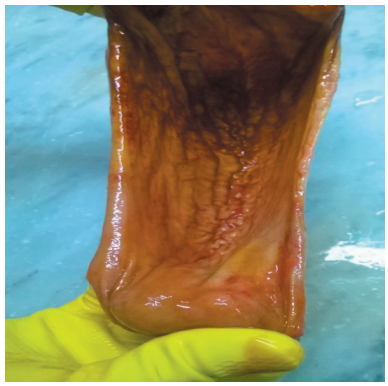

Fig 3. Stomach of deceased

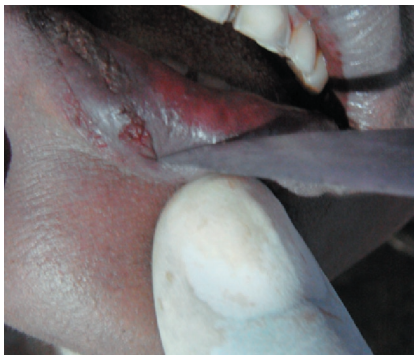

Fig 4. Bruise over inner aspect of lip

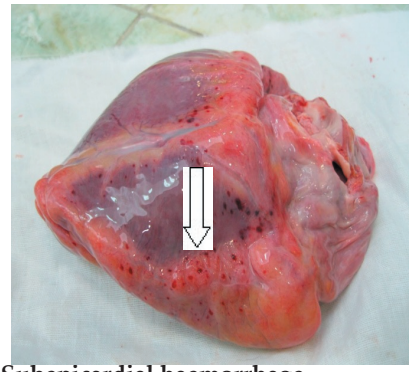

Fig 5. Subepicardial haemorrhage

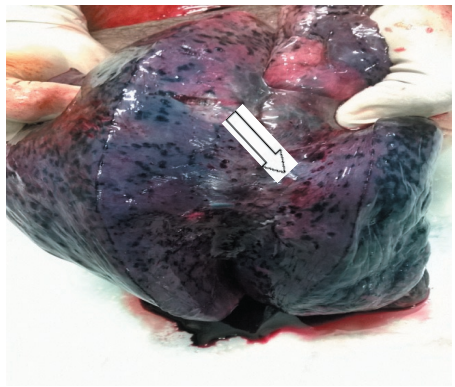

Fig 6. Congested lung with petechial haemorrhage

During autopsy, hymen could not be distinguished separately because of multiple recent tears and there was evidence of blood stain around vagina. Two small linear abrasions of approximately 0.1'' length were detected over anterior aspect of right thigh. Finally one stained area was detected over right sided inguinal region from where swab was collected and sent to Forensic Science Laboratory for chemical examination and the stain was proved to be seminal stain.

Fig 7. External genitalia

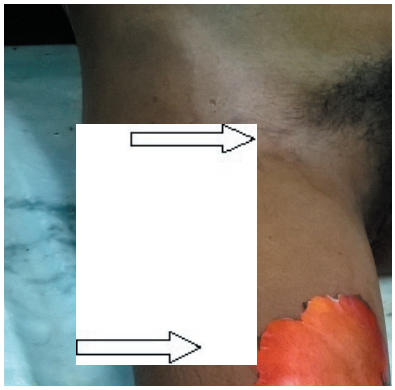

Fig 8. Two small linear abrasions and seminal stain

DISCUSSION

Violent asphyxial death is of various types. Suffocation is one of those types. Smothering is a variety of suffocation where external air passage is obstructed by any mean other than water at the level of mouth and nostril [1]. Other forms of violent asphyxia death like hanging, strangulation, choking, traumatic asphyxia- all present with some specific finding none of which was present in this case. Moreover the case was reported as drowning which was excluded by absence of any feature of antemortem drowning including the surest sign i.e. presence of mud, sand beyond bifurcation of trachea[2]. Chemical examination report of viscera revealed no poison. Asphyxial signs like petechial haemorrhagic spots, subepicardial haemorrhage, and congestion of all organs along with the external injuries as mentioned above were very much suggestive of smothering which was homicidal in nature in all probabilities [3]. Post mortem findings and FSL report also excluded other possible causes of death. There was only a tag of hymenal tissue at the margin of vaginal wall which was almost similar to Caranculae hymenalis [4]. No evidence of healing, blood stain over and around the vagina, abrasion over anterior thigh and evidence of seminal stain were consistent with recent sexual intercourse. In this way one simple case of drowning took new twist and forced police to start investigation into the fact. Within few days, identity of the girl was revealed. Three suspected accused persons were arrested and they were charged under sec 376 D for gang rape [5] and sec 302 for committing murder[6]. On trial they were convicted for killing the girl after assaulting her sexually.

CONCLUSION

There must be a story behind any unnatural death and there must be a clue behind every crime. This is duty of a medicolegal expert to find out the clue from the dead body. This job is very difficult as we often don't get opportunity to visit the undisturbed place of occurrence and often history, inquest report misguide us. Possibility of a crime should always be in the mind of every autopsy surgeon. Crime on woman is increasing everyday in our society. The National Crime Records Bureau (NCRB) said there were 309,546 crimes against women reported to the police last year against 244,270 in 2012[7]. A deceased can't get his or her life back but definitely deserves justice and we may be an important part of that justice procedure by our careful and meticulous post mortem examination.

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Conflict of Interest: This article was not sponsored by anyone and was done exclusively by the authors with their own resource and interest.

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Ethical Clearance: Not applicable

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Socio-demographic Pattern of Poisoning Cases Reported at Aarupadai Veedu Medical College & Hospital, Puducherry: A Five Years Retrospective Study

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ABSTRACT

Background: Poisoning ranks as the 13th leading cause of death worldwide & it is the fourth most common cause of accidents in children. The World Health Organization(WHO) reports an uptrend in suicidal poisoning worldwide and consumption of pesticides is the most common method of suicide. Thorough knowledge about the nature and magnitude of the problem is hence essential for developing strategies to tackle such casualties.

Objective: To study the socio-demographic pattern of poisoning cases admitted in Aarupadai Veedu Medical College & Hospital, Puducherry.

Methodology: Retrospective analysis of all 548 poisoning cases reported to the casualty of Aarupadai Veedu Medical College & Hospital over a period of 5 yrs i.e. from 1st July 2009 to 30th June 2014 was done. Data regarding age, sex, educational status, marital status, socioeconomic class, place of residence, type of poison, time of exposure and intention of poisoning was entered into excel & analysed in SPSS for calculating percentages and Chi square test.

Results: Peak incidence was observed in the age group of 21-30 yrs (31.57%) & majority (58.03%) were female victims, 75.36% were from rural area & in 52.92% of cases poisoning happened during the day time. In 75.90% cases, intention of poisoning was suicidal while 23.70% cases were accidental. The most common class of poison involved was pesticides (38.87%) with Organophosphorus compound in majority patients (25.73%).

Conclusion: There is an urgent need to reinforce the regulations regarding sales of drugs & agrochemicals which will definitely reduce the misuse of these substances by the general public. Equally important is to focus on vulnerable, ignored groups and pool together researchers, clinicians, politicians, policy makers to develop a national plan for providing sustainable mental health support for our community for suicide prevention.

Keywords: *Poisoning, pesticides, rural, suicide, demography.*

INTRODUCTION

Poison is any substance, which produces toxicity and in fact, every substance is capable of producing toxicity if it is not used judiciously. Poison can be defined as any solid, liquid or gas which if introduced in a living body or brought in contact with any part thereof will produce ill health or death by its constitutional or local effects or both.[1,2,3] As per the Indian law statutes, any substance, irrespective of its quality or quantity, when given with intention to endanger, injure or kill a person is called poison.[4] Poisoning occurs when people drink, eat, breathe, inject, or touch enough of a hazardous substance

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(poison) to cause illness or death.

According to World Health Organization (WHO), globally more than three million of acute poisoning cases are reported of which 2, 20,000 die annually.[5] In developed countries, the rate of mortality from poisoning is as low as 1% to 2% but in India it varies between 15 to 30%.[6,7] Poisoning ranks as the 13th leading cause of death worldwide and it is the fourth most common cause of accidents in children.[8,9] In India, five to six persons per lakh of population die annually because of acute poisoning.[1] Accidental poisoning is most common among victims under the age of 15 years but fortunately with low mortality while most suicidal poisonings are observed in individuals over 15 years of age and are associated with high mortality.[6]

Overwhelming industrialization, invention of new drugs for the treatment of ailments and massive use of agrochemical substances and pesticides in agriculture has lead to increased incidence of poisoning. In developed countries, poisoning deaths are mainly due to cleansing agents, detergents, analgesic drugs and other cosmetic products.[10] In developing countries like India, insecticides and pesticides are used to a greater extent and the poisoning with such products is more common.[11] As per many studies organophosphorous compounds are the most common poisoning agents.[12-16] There is considerable difference between North India and South India with regards to poisoning statistics and since 1995, it has been found that the incidence of aluminium phosphide poisoning is increasing in North India.[17-19] A thorough knowledge about the nature and magnitude of this problem in a particular area is essential for the doctors in day to day practice. Present study was taken up to identify the commonest causative agents and to analyze the epidemiological and social factors, which can provide a practical guide for the general practitioners and hospital staffs towards the management of acute poisoning.

MATERIAL & METHOD

A retrospective analysis of all the poisoning cases reported to the casualty of Aarupadai Veedu Medical College & Hospitals, Puducherry over a period from 1st July 2009 to 30th June 2014 was done. A total of 548 cases were admitted due to acute poisoning during the study period. Data regarding age, sex, educational status, marital status, socioeconomic class, place of residence, type of poison, time of exposure and intention of poisoning were collected from the hospital records and documented in the pre-structured proforma. Poisonous substances were categorized based on purpose for which it is used or chemical classification. The data was analysed applying proportions & Chi square tests.

RESULTS

A total of 548 cases of acute poisoning were reported during the study period at casualty. The incidence of poisoning was observed to be increasing from 75 cases in 2009-2010 to 162 cases reported in 2013-2014. There were 230(41.09%) male patients and 318(58.03%) female patients. (Table 1)

Table: 1 Year and sex wise incidence of Poisoning cases

Year	No. of cases		
	Male	Female	Total
July 2009 -June 2010	29	46	75
July 2010 -June 2011	46	36	82
July 2011 -June 2012	43	63	106
July 2012 -June 2013	48	75	123
July 2013 -June 2014	64	98	162
Total	230	318	548

As shown in the Figure 1, the peak incidence was observed in the age group of 21-30 years (173 cases i.e. 31.57%) followed by the age group of 31-40 years (91 cases i.e. 16.61%) and least in the age group of 41-50 years (32 cases i.e. 5.84%).

The distribution of poisoning cases as per marital status and sex (Table no. 2) showed that, the incidence of poisoning was more among males who were married compared to their female counterparts and it was statistically highly significant. ($\chi^2 = 52.55$, $p < 0.001$)

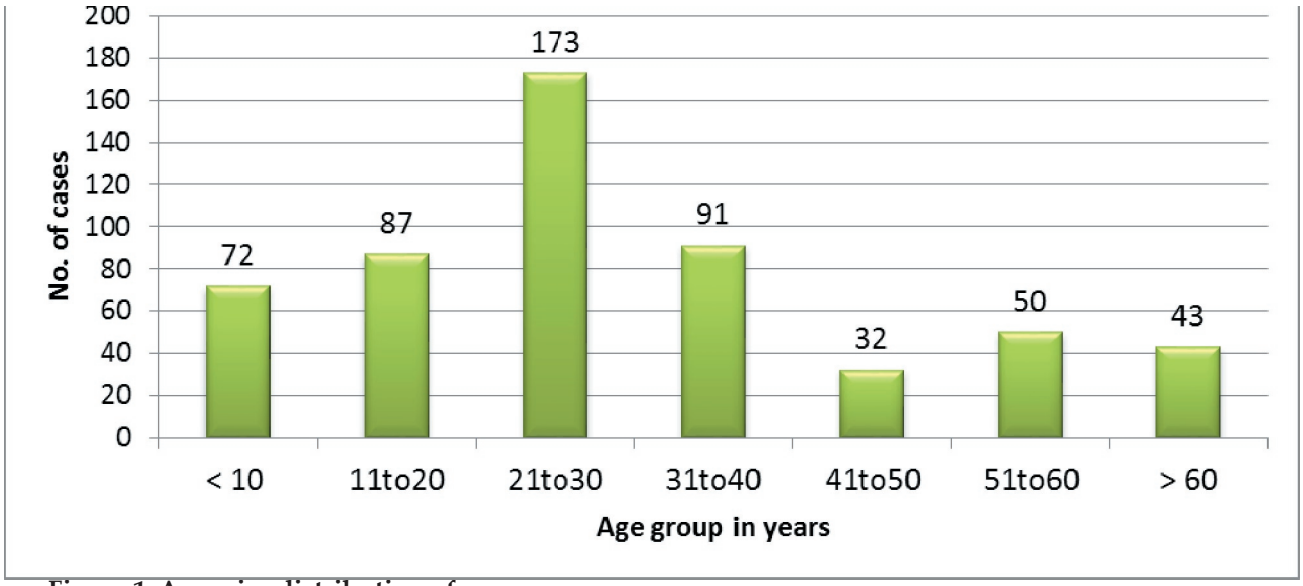

Figure 1: Age wise distribution of cases

Table 2: Distribution of poisoning cases as per Marital Status and Sex

Marital status	No. of cases		
	Male	Female	Total
Single	41	152	193
Married	189	166	355
Total	230	318	548
Chi square test: $\chi^2 = 52.55$, $p < 0.001$			

Among the study population, majority of patients i.e. 413 cases (75.36%) were residents of rural area surrounding Puducherry City, while rest 135 cases (24.64%) were from urban population. It was observed that 261 patients (47.63%) were from low socioeconomic class followed by 175 patients (31.93%) from middle socioeconomic class. Literacy status of the victims reveals that 465 victims (84.85%) were literate. (Table 3)

Table 3: Distribution of Poisoning cases as per place of residence, socioeconomic status and literacy

	No. of cases (n)	Percentage (%)
Place of residence		
Rural	413	75.36
Urban	135	24.64
Total	548	100
Socio-economic Class		
Lower	261	47.63
Middle	175	31.93
Upper	112	20.44
Total	548	100
Literacy status		
Illiterate	83	15.15
Literate	465	84.85
Total	548	100

Considering the time of poisoning it was noted that in majority of cases (52.92%) poisoning happened during the day time, between 6 AM to 6 PM. (Table 4)

Table 4: Incidence as per time of the day

Time	No. of cases (n)	Percentage (%)
Day (6 AM to 6 PM)	290	52.92
Night(6 PM to 6 AM)	252	45.99
Not known	6	1.09
Total	548	100.00

In 416 cases (75.90%) the intention of poisoning was observed to be suicidal while in 130 cases (23.70%) it was accidental and 2 cases (0.4%) were due to homicidal poisoning. (Figure 2)

Pesticides was the most commonly involved class of poison (Table no. 5) causing casualty among 213 patients (38.87%) and 141 cases (25.73%) were victims of Organophosphorus compounds poisoning alone. Second most common cause of casualty was

animal envenomation with 112 patients (20.44%) and among those the highest were due to snakebite (8.21%). Drug overdose or over consumption was observed in 87 cases (15.88%) with sedatives being most commonly misused by 25 patients (4.56%).

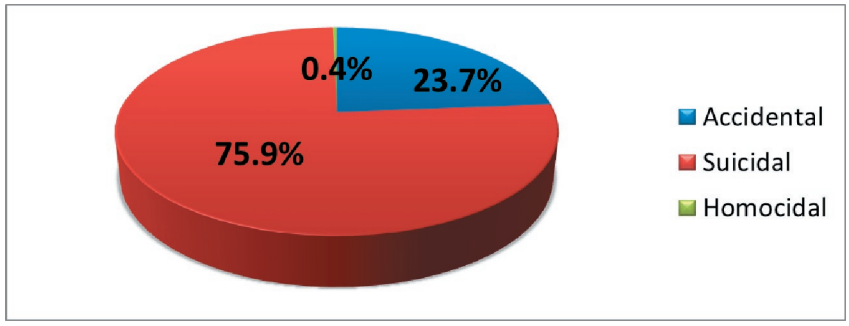

Figure 2: Intention of poisoning

Table 5: Type of poisonous substances

Class of poisonous substance	No. of cases (n)	Percentage (%)	Poisonous substance	No. of cases (n)	Percentage (%)
Pesticides / Rodenticides	**213**	**38.87**	Organophosphorus compound	141	25.73
			Organochlorine	22	4.01
			Carbamate	8	1.46
			Mosquito repellant (pyrethroids)	7	1.28
			Rodenticides (Zinc phosphide)	35	6.39
Animal/Insect bites	**112**	**20.44**	Snake bite	45	8.21
			Scorpion sting	32	5.84
			Wasp sting	26	4.74
			Unknown bite	9	1.64
Plant poisons	12	2.19	Abrus	3	0.55
			Oleander	9	1.64
Hydrocarbons	47	8.58	Kerosene	39	7.12
			Petrol	6	1.09
			Engine oil	2	0.36
Corrosive substances	14	2.55	Corrosive substances	14	2.55
Cleansing agents	44	8.03	Phenol	26	4.74
			Detergent liquid	15	2.74
			Dettol	3	0.55
Drugs	**87**	**15.88**	Antibiotic	3	0.55
			Analgesics	20	3.65
			Anti-histaminic	10	1.82
			Anti-anxiety	21	3.83
			Sedatives	25	4.56
			Multi vitamin & iron	4	0.73
			Others	4	0.73
Glass pieces	7	1.28	Glass pieces	7	1.28
Unknown	12	2.19	Unknown compound	12	2.19
Total	548	100.00	Total	548	100.00

DISCUSSION

The age group of 21-30 years is considered to be the most active and efficient period of life and unfortunately the peak incidence of poisoning was in the same age group of 21-30 yrs with 31.57% cases similar to the findings of other authors like Maharani et al[20] in Salem, Tamil Nadu (30%), Karki[21] in Nepal (32.1%) and Chan[22] in Hongkong (32%). While relatively more number of cases were reported in the same age group as observed by Dash et al[23] in Orrisa (40.5%), P Prajapati et al[24] in Gujarat (45.68%), Guntheti et al[7] in Andhra Pradesh (50.5%) and Maskey et al[25] in Nepal (43%).

Male to female ratio in the present study was observed to be 1:1.38 with female victims outnumbering the males. Among the referred literature, only one study reported similar findings in Hongkong by Chan[22] where Male:Female ratio was 1:1.5. Many other authors observed contradictory findings with more number of male victims[23-31]. Married males were commonest victims of poisonings in our study as it was observed similarly by Patil A et al[26] in Maharashtra & Guntheti et al[7] in Andhra Pradesh.

The incidence of poisoning was more among literates (84.85%) compared to illiterates which is consistent with study by Dash et al[23] (83.9%) and Guntheti et al[7](79.28%).

More cases were noted falling under Lower (47.63%) and Middle (31.93%) socioeconomic class, which could be related to the constant financial and social constraints among these people. Similar findings were presented by Karki[21] in Nepal and Howldar[27] in Bangladesh.

The generous availability of agricultural poisons like OP compounds in rural areas explains the marked preponderance of poisoning in rural population compared to urban counterpart as observed in present study (75.36%) as well as in studies by K Prajapati[28] in Ahmedabad, Jailkhani[29] in Maharashtra and Sukbir singh[30] in Rohtak. The commonest consumed poisonous substances were pesticides or insectides (38.87%) in the present study and this is consistent with observations made by Maskey[25](41.9%) and Karki[21](40.9%) in Nepal, P Prajapati[24] in Ahmedabad. Contrary to this, drugs were commonest encountered poisons in Hongkong (Chan-24%)[22] and Shillong (Ropmay-32.9%)[31]. Organophosphorus compound was the most common among the group of pesticides in the present study (25.73%), similar to the findings by Dash et al[23] in Orrisa (22.9%), Jailkhani et al[29] in Maharashtra (27%) while it was comparatively higher in Salem, Tamil Nadu (58.6% - Maharani et al[20]) and Andhra Pradesh (74.1% - Guntheti et al[7])

Suicide was the most common intention of poisoning (75.9%) in our study and it was observed to be same in Maharashtra (69%-Jailkhani et al[29]) and Andhra Pradesh (93%-Guntheti et al[7]).

CONCLUSION

The younger generation happens to be more victimized by poisoning, especially women from lower socio-economic class with increasing incidence every year. In spite of restrictions for sales of drugs and agrochemicals, the high vulnerability to these poisonous substances should not be overlooked. There is an urgent need to strengthen the legislature regarding sales of drugs & agrochemicals, which will definitely reduce the misuse of these substances by the general public. Equally important is to focus on vulnerable, ignored groups and draw together researchers, clinicians, politicians, policy makers to develop a national plan for providing sustainable mental health support for our community for suicide prevention in India.

Conflict of Interest :- None

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Sex Determination from Clavicular Length and Mid-Shaft Diameter Using Digital X-ray in Indian Bengali Population: A Preliminary Study

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ABSTRACT

The present research was designed to derive a model to determine sex from digital measurement of adult clavicle. The following discriminant function was obtained:

DF = 0.61 (Right Clavicle Length) + 5.40 (Right Mid Shaft Diameter) – 14.05

Overall 90.0 % of the cases could be correctly classified in to the two sexes from the two predictors [in the model]. Cross-validated results showed correct classification in 88.3% cases. At the individual group level, 86.2% of males and 93.5 % of female were correctly classified. Sexing of the adult human clavicle is thus possible with reasonably acceptable accuracy using the age specific discriminant function on a sample obtained from the Indian Bengali population. This investigation help postulate that the clavicle undergoes morphometric and morphological remodeling with aging even after completion of ossification .

Keywords: *forensic anthropology, human identification, sex determination, digital X ray measurement, clavicle discriminant function analysis, Indian Bengali.*

INTRODUCTION

Human clavicle, like many other postcranial skeletal elements, is sexually dimorphic. Sex determination from the clavicle has been well studied and reported in medical literature. Determination of sex is the primary step in the process of establishing the biological profile of human remains.. Several methods have been successfully applied to determine the sex of human skeletal remains[1]. Of these, digital osteometry with discriminant function analysis has been effective, reproducible and precise. Sexing of bones has been attempted using almost all the elements of the human skeleton. Several earlier investigations have shown that metric differences of almost all bones exist between different population groups[2, 3]. Discriminant function equations derived for the determination of sex from bones are population specific as well. Even within- population variations have been studied and reported in medical literature[4]. Researchers have studied the clavicle to examine the sexual dimorphism and derive mathematical models to determine sex in population specific samples [5-14].

Several studies[6,7,8,9,10] on the morphometry and sexual dimorphism of clavicle from the Indian subcontinent have been published. Earlier researchers have reported age estimation [15, 16, 17] from morphology and morphometry of clavicle. Previous works on sexing of hyoid and hipbone have been reported in Indian Bengali population[18, 19].

The present investigation was designed to derive a model for determination of sex from digital measurements of adult clavicle in an Indian Bengali

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sample using Discriminant Function Analysis. The present study was carried out by applying two variables of adult clavicle namely length of clavicle (RCL) and mid shaft diameter (RMSD). We also examined the age -specific Discriminanat Functions in the same population (Indian Bengali).

MATERIALS & METHOD

Sixty healthy subjects above the age of twenty-two years were included in the present investigation. Digital X-ray measurement of sixty consecutive adult subjects in the age group of twenty two years and above who attended the depart of Radiology of IPGMER, Kolkata, WB, India, for chest X- ray were included in the study. Only those without any obvious deformity /injury of clavicle or shoulder girdle were included in the study sample.

Informed consent was obtained to use their data (demographic information and digital measurement) for the research. The study was approved by the Institutional Ethics Committee.

The age of the subjects were recorded and digital measurements of clavicle were taken from chest Postero-anterior view using Digital x-ray (AGFA Computerized Radiography machine) and related software.

The following measurements (in centimeters) were taken from the digital x ray of the subjects (figure 1).

Length of clavicle: maximum distance between the most extreme ends of the clavicle that is the distance between the lateral-most point of the clavicle in the acromioclavicular joint and the medial most point of the clavicle in the sternoclavicular joint.(AB in Figure 1)

Mid shaft diameter of clavicle: Distance from the superior to the inferior surface at midshaft of clavicle. (CD in figure 1)

Data was analyzed using SPSS 17.0 for windows. Metric data was summarized as mean and standard deviations. One-Sample Kolmogorov-Smirnov Test was used to examine the normality of the distribution. Discriminant function analysis was performed to examine how the two variables could correctly assign the clavicle to the proper sex. All the variables were entered together. A two-tailed P value of less than 0.05 was considered significant. The clavicles of both the sides were measured. A paired t- test was conducted to test the sidewise difference in length of clavicle. The measurements of the right side were taken in the analysis of linear discriminate function.

RESULTS

In the present study sample of sixty subjects, 29 were male and 31 female. The mean age of the pooled sample was 43.02 and the standard deviation was 13.7. The summary of univariate and multivariate analysis is shown in Tables 1. It was observed that the clavicles were larger in males regarding both the variables (length and midshaft diameter) used in the study. The left clavicular length (LCL) was more than that of the right side (RCL). This difference was statistically significant (paired t -test with t= -4.56 df= 59 p=0.00).

A direct discriminant function analysis was performed using both the variables as predictors of sex .All the variables were entered together. The Predictors were length of clavicle (RCL) and midshaft diameter (RMSD).The classification groups were male and female. One discriminant function was calculated with Wilks' Lambda equal to 0.44 ,chi square ($\chi 2$) equal to 4.56 , degree of freedom 2 and P value of.000 Because P value was less than .05, we could say that the model was a good fit for the data (Table 2). The following Discriminant Function (DF) was obtained:

DF = 0.61 x Right Clavicle Length + 5.40 x Right Mid Shaft Diameter – 14.05

The standardized canonical coefficients and the structure weights (Table 2) reveal that both the variables contributed to the multivariate effect. The length of clavicle was the better predictor for distinguishing between male and female clavicle. The Cut Score was [Calculated from group centroid (Table 3) by obtaining the arithmetic mean of the values] 0.04. Those cases where the D F score was less than 0.04 the bone was female. For values of discriminant score above 0.04, were male. Overall 90.00% of the sample was correctly classified into their group by this model. At the individual group level, 86.2% of males and 93.5 % of females were correctly classified. (Table 4).

In cross validation each case is classified by the functions derived from all cases other than that case. Cross-validated results showed this bi-variable model

could correctly classify 88.3 % of the cases.

To examine the age- specific discriminant functions, the sample was divided into two groups. One group comprising those up to forty years of age and the other above forty years. The discriminant function analysis was carried out using the same method and variables for both the samples.

The following Discriminant Functions (DF) were obtained:

DF [1a] for ages up to forty = 0.45xRCL+ 7.92 xRMSD-14.87 [CUT SCORE -.031]

DF [1b] for age group above forty = 0.69 xRCL+3.9xRMSD – 13.40 [CUT SCORE 0.18]

The discriminating power of the two variables was more in the twenty -two to forty years age group showing 96.0% correct classification (Table 5).

DISCUSSION

Osteometry is a helpful technique in the determining sex from human skeletal remains[1, 2, 11-14]. Discriminant function analysis is used to determine which continuous variables discriminate between two or more naturally occurring groups.

Earlier works on the sexual dimorphism of clavicle have been reported from a diverse population and osteological collection[4-10]. Prediction of sex from clavicluar dimensions have been successfully conducted on contemporary European, Asian and Latin American sample[11-14].

Previously researchers have concluded that there are intra and inter population differences in the accuracy of sex differentiating models[4].

The present analysis showed that this model could correctly classify overall 90.0% of original grouped cases. This result in the population specific sample (Indian Bengali) is comparable with those of other earlier Indian studies where correct classification was possible using the demarking point[5, 7, 8, 9] of different predictors. The present investigation used Discriminant function analysis to improve the precision and population specificity. The 90.0% accuracy of the present series is concordant with the results of other recent works[8-14, 20] on different populations (Table 5). Our contention is that morphometry and sexual dimorphism in human clavicle is population and race specific. This has been substantiated by earlier researchers [9-14].

Age dependent disciminant functions produce different percentage of accuracy of sex assessment using the length and mid shaft diameter as predictors in the present series. The results help postulate that the clavicle undergoes morphometric and morphological remodeling with aging even after completion of ossification. We hypothesize that the handedness and use pattern are the primary contributors to this phenomena. We propose that age related changes in the morphology and morphometry make the clavicle less dimorphic in the higher age group. This aspect needs further exploration in future studies using a larger and diverse sample.

This preliminary study was on a sample of only sixty adult subjects. Linear measurements were taken for only two variables in this pilot study. These shortcomings need to be overcome in future study designs wherein more number of linear measurements including the curves of the clavicle can be used. In addition, the handedness of the subjects and their occupational pattern can be included in future broad based investigations. There is also extensive scope for working with other newer modalities of osteometry like CT with 3D imaging on clavicles of subjects belonging to Indian Bengali population.

Sexing of the adult clavicle is possible with reasonably acceptable accuracy using the linear discriminant function on skeletal remains obtained from Indian Bengali population. This approach can be applied to supplement other methods [21, 22,] of sex determination in Indian Bengali skeletal remains. Often only, the clavicles or fragmentary remains are available for identification as in cases of terrorist explosion, railway mishaps and air crash incidents. This method will be useful in such cases where a limited number of skeletal elements are available. The results can easily be extrapolated and applied in skeletal remains both dry and autopsy specimens. This method will be of practical importance when fragmentary human remains are examined for identification provided the population origin of the victim in known.

Table 1 showing the descriptive statistics		Mean Std. Deviation	
Male	Right Clacivular Length	14.342	1.09762
	Right Midshaft Diameter	1.1986	.17862
Female	Right Clacivular Length	12.8303	1.02014
	Right Midshaft Diameter	.9587	.09514

Table 2: Showing the structure matrix, standardized canonical function and summary Structure matrix		Standardized Canonical Discriminant Function Coefficients		Summary of Canonical Discriminant Functions			
Right Midshaft Diameter	.765	Right Clacivular Length	.644	Wilks' Lambda	Chi-square	Df	Sig.
Right Clacivular Length	.643	Right Midshaft Diameter	.766	.442	46.567	2	.000

Table 3 : Showing function at group centriods and the cut score

Functions at Group Centroids		
sex	Function	
	1	
male	1.143	
female	-1.069	
Cut score	Above 0.04	Below 0 .04
Sex	Male	Female

Table 4: Classification table		Sex	Predicted Group Membership		
			Male	Female	Total
Original	Count	male	25	4	29
		female	2	29	31
	%	male	86.2	13.8	100.0
		female	6.5	93.5	100.0
Cross-validated	Count	male	24	5	29
		female	2	29	31
	%	male	82.8	17.2	100.0
		female	6.5	93.5	100.0

Table 5: Comparision with other works onmorphometry of clavicle and its accuracy in sex determination

	POPULATION	RIGHT CLAVICLE LENGTH (IN CENTIMETER)				RIGHT MID SHAFT DIAMETER				PERCENT OF CORRECT PREDICTION	SOURCE OF DATA AND SAMPLE SIZE
		MEAN		STANDARD DEVIATION		MEAN		STANDARD DEVIATION			
PRESENT STUDY 2014	INDIAN BENGALI	M	F	M	F	M	F	M	F	90	DIGITAL X RAY MEASUREMENTS RIGHT SIDE FROM LIVING SUBJECTS (60)
		14.34	12.83	1.09	1.02	1.19	0.96	.17	.09		
Akhlagi et al 2012	IRANIAN[13]	14.72	13.03	1.03	0.86	**	**	**	**	73.3-88.3	AUTOPSY SAMPLE OF CLAVICLE (120)
Papaioannou et al 2012	Greek[12]	15.39	13.70	0.80	0.77	**	**	**	**	91	Skeletal material of cemeteries (147)
Kaur et al 2002	North West Indian[10]	14.94	13.45	.89	0.96	**	**	**			Cadaver from post mortem (1000)
Haque et al 2011	Nepalese[6]	14.32	_	1.1	_	_	_				Skeletal collection (257)
Bachoura et al 2013	American[20]	13.67		1.04		**	**	**			3 D morphometry ()
Frutos 2002	Guatemala1[11]	14.67	12.74	.09	.08	**	**	**		85.6-94.8	Forensic sample of bones (97)

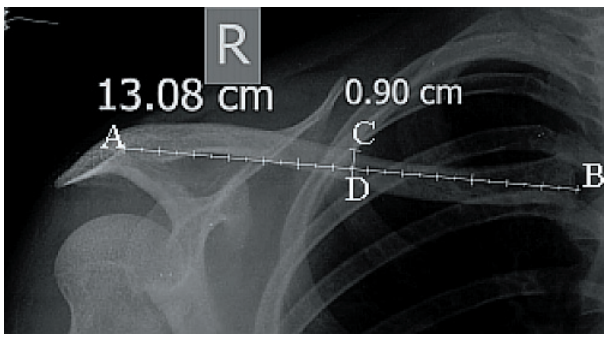

Figure 1: Showing the measurements used in the study

CONCLUSION

1 The present research was conducted to derive a model to determine sex from digital measurement of adult clavicle in Indian Bengali population .

2 The following discriminant function was obtained:

DF = 0.61 (Right Clavicle Length) + 5.40 (Right Mid Shaft Diameter) – 14.05

Those cases where the D F score was less than 0.04 the bone was female. For values of discriminant function score above 0.04, were male.

3 Sexing of the adult human clavicle is thus possible with reasonably acceptable accuracy using the age specific discriminant function on a sample obtained from the Indian Bengali population.

4 This investigation also help postulate that the clavicle undergoes morphometric and morphological remodeling with aging even after completion of ossification. This metric analysis can be used to determine sex from skeletal remains of Indian Bengali origin.

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Profile of Organophosphorus Poisoning at Tertiary Care Hospital, Bellary (Hyderabad-Karnataka Region)

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ABSRACT

Poisoning is a major public health problem worldwide, with thousands of deaths occurring every year, mainly in the developing countries. Organo-phosphorus (OP) compounds occupy the greatest burden of poisoning related morbidity and mortality. India, holding 70% of agricultural - land, accounts for one third of pesticide poisoning cases in the third world, the farm workers being the worst affected. Most of the poisonings occur due to deliberate self ingestion of the poison. The present study was aimed to know the profile of OP poisoning.

Methodology: A record based retrospective study from January 2013-December 2013 was Conducted in a tertiary care hospital and data regarding age, gender, domicile, type of poison, manner of poisoning, seasonal trends, marital status, motive behind poisoning, socio-economic status and outcome was collected in a pre-structured Performa. All data were documented, analyzed and interpreted as per the laid down protocol.

Results; out of total 1575 cases of Organo-phosphorus compound poisoning. 1130 (71.73%) were male, 34.6% were in the age group 21-30 years, (70.95%) were of lower socio-economic, Occupation wise agricultural workers were on top of the list (70.07%), The commonest motive of poisoning was suicidal in both males and females (93.78%), Financial problem was one of the commonest reasons of poisoning (51.22%). (The mortality rate in our study was 13.47%.

Conclusion Poisoning is more common in young and adult males, suicide being the most common motive. Low socio-economic class, rural, both literate and illiterate agriculturists commonly choose this method to commit suicide.

Keywords: *Organo-phosphorus compound, Suicide, profile.*

INTRODUCTION

WHO estimated that approximately 3 million pesticide poisoning occurs worldwide and cause more than 2,20,0000 deaths per year. Developing countries like India and Sri Lanka report alarming rates of toxicity and death [1]. Because the OP compounds are readily available and relatively cheap and having rapidly lethal action even in smaller doses, they are widely used as suicidal poisons [2] Suicidal poisoning with OP compound is seen with increasing frequency and carries 4-30% mortality in Indian studies [3]. Most of the fatality rate is of intentional poisoning by OP compounds, which has been reported in southern and central India [4]. It is important to know the nature and severity of poisoning in order to take appropriate preventive measures. The present study was conducted with the objective of determining the socio-demographic profile and assessing the pattern and outcome of poisoning cases admitted at a tertiary care hospital, over a period of one year.

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MATERIALS & METHOD

This Retrospective hospital record based study was conducted in a tertiary care hospital of Hyderabad Karnataka region. Permission was obtained from the RMO of the hospital to allow us to access the information from the patient's case sheet in the record section; strictly for the purpose of this research. The study included 1575 cases of OP poisoning reported to hospital during Jan13 - Dec13.

RESULTS

Table 1: Socio-demographic profile of OP poisoning (n=1575)

Age (years)	**Number**	**%**
01-10	15	0.95
11- 20	78	4.95
21- 30	545	34.6
31- 40	482	30.6
41- 50	194	12.31
51 -60	114	7.23
>60	155	9.84
Total	1575	100
Sex	**Number**	**%**
Male	1130	71.73
Female	445	28.27
Total	1575	100
Male to female ratio	1: 2.5	
Socio-economic Status	**Number**	**%**
Low	1118	70.95
Middle	409	25.98
Upper	48	3.05
Total	1575	100
Educational Status	**Number**	**%**
Illiterate	819	52
Literate	756	48
Total	1575	100
Domicile	**Number**	**%**
Rural	960	60.95
Urban	615	39.15
Total	1575	100

Table 2: Occupation of the victim (n= 1575)

S. No.	**Occupation**	**Cases (%)**
1	Agricultural workers	**1104 (70.07)**
2.	Home maker	**121 (7.68%)**
3.	Labourers	**172 (10.90%)**
4.	Students	**40 (2.56%)**
5.	Drivers	**10 (0.61%)**
6.	Clerical	**24 (1.53%)**
7.	Businessmen	**24 (1.53%)**
8.	Others	**80 (5.12%)**
Total		**1575 (100%)**

Table 3: Types of Poison Consumed (n= 1575)

S. No.	**Type of Poison**	**%**
1	Dichlorvos	598 (38%)
2	Methyl Parathion	316 (20.08%)
3	Malathion	259 (16.44%)
4	Fenitrothin (Tic-20)	165 (10.46%)
5	Diazinon	139 (8.8%)
6	Unknown	98 (6.22%)
		1575 (100%)

Table 4: Motive of Poisoning (n = 1575)

S. No.	**Manner**	**No**	**%**
1	Suicidal	1477	93.78
2	Accidental	76	4.82
3	Homicidal	22	1.40
Total	**1575**		**100**

Table 5: Reason behind Poisoning (n=1575)

S. No.	**Reasons**	**Cases (%)**
1	Financial Problem	807(51.22%)
2	Domestic Problem	554(35.17%)
3	social	69 (4.41%)
4	Unspecified	145 (9.2%)
Total		**1575(100%)**

Table 6: Association of Poisoning with Marital status (n= 1575)

status	**Male (%)**	**Female (%)**	**Total**
Married	1071 (68%)	141 (9%)	1212 (77%)
Unmarried	331 (21%)	32 (2%)	363 (23%)
Total	1402 (89%)	173 (11%)	1575 (100%)

Table 7: OP poisoning in relation to season (n=1575)

Season	Cases (%)
Winter	530 (33.65 %)
Summer	423 (26.85 %)
Rainy	622 (39.50%)
Total	1575 (100%)

Table 8: Outcome of Poisoning Cases (n=1575)

Outcome	Patients (%)
Survived	1374(87.53%)
Expired	211(12.47%)
Total	1575(100%)

A total 1575 cases of OP compound poisoning were registered during the study period, January 2013 to December 2013. The majority of patients were male 1130 (71.73%) and 445 (28.27%) were female; Male to Female ratio was 1:2.5. The age of Patients varied from 1- 80 years. OP poisoning was maximum (34.65%) in 21- 30 year group followed by 31-40 years group (30.6%), Persons of low socio-economic status were involved maximum (70.95%), both literates and illiterates chose this method for causing self harm 52% and 50% respectively (Table 1), Occupation wise agricultural workers were on top of the list (70.07%) followed by labourers (10.90%) and home makers (7.68%) (Table 2), The commonest motive of poisoning was suicidal (93.78%), followed by accidental 76 (4.82%)(Table 4), Financial problem was the commonest reason behind poisoning (51.22%) (Table 5), married males 1071(68%) involved more followed by unmarried males (table 6), Incidence was more 622 (39.50%) during rainy season followed by winter 33.65% (table.7), It was observed in our study that highest number of patients consumed Dichlorvos (38%), followed by Methyl parathion (20.08%), the least consumed compound was Diazinon (8.8%). (Table 3), the mortality rate in our study was 12.47% (Table 8), Respiratory failure was the leading cause of death.

DISCUSSION

OP compound poisoning is one of the commonest cause of acute poisoning in India particularly among the rural, agricultural workers, evaluation of data obtained revealed that 1575 patients admitted with OP poisoning consisted of 1130 (71.73%) males and 445 (28.27%) females findings are similar with[5], [6], [8],[9]. This could be due to male indulge with economic activities and responsibilities of running families. A majority of the victims were in the age group of 21-30 years which is similar to that in other studies [5], [6], [7], [8], [10], [11], [12], [14], [15] This age group was the most active one, physically, mentally and socially and so, it was more prone to stress during life. The 6 cases which were seen under the age of 10 in this study were accidental, and 11-20 years group is comparatively less; this could be due to availability even to school children not associated with agricultural activities and having no economic burden.

The present study had an equal number of literate and illiterate cases and this could be explained on the basis that the unemployment problem, among both the groups, town population are also indulge in forming in this area; similar finding were found in[5], [6], [7]. Incidence was more among rural population (60.95%) than to urban population (39.05%), this is in concurrence with report depicting higher incidence even up to 82% in patients of poisoning from rural area [5]. This is because use of the OP compound as an insecticides, pesticides and fungicides was more in rural areas than urban. Maximum no victims (77%) were married; similar findings observed by [6], [7] this may be due to early marriage culture cultivated in this area; this in turn lead to stress and social mal-adaptation. In present study maximum culprits (70.95%) were in low socio economic status; this findings correlate with other workers [5], [6], this can be explained on the basis that Bellary belong to backward area- Hyderabad Karnataka region (The provisions of Article 371(J) of the Constitution)

Agricultural workers are maximum (70.07%) this observation is similar with other study [5], this can be explained on the basis of this area comes under low rainfall zone and spars ground water and rain dependent forming. In our study among the OP compounds, Dichlorvos was the most commonly consumed Poison (40.86%), although Diazinon was the most commonly used compound in another study as reported by Singh et al [24]. In present study the commonest motive of poisoning was with a Suicidal intention and the maximum number of victims were agricultural workers (51.07%), residing specifically in rural areas. as it is highly toxic compound effective in smaller doses most common motive is suicidal findings correlate with other workers[5],[6],[8] Most of the studies from India [15], [16],[17],[18], [23], and from other countries [10],[11],[19],[20],[21],[22] showed that suicide (in the

present study, it was 93.78%) was the commonest reason for the non-accidental poisoning.

Financial problem secured top in reason behind poisoning (51.22%) similar findings with [5], [6], more no of cases recorded during rainy season(39.50%) this finding is similar with[7], [8] in present study survival rate was 87.53% findings correlate with other workers[5], [8], [9]

Comparison with other studies

		Present study	Joshi S C et al	Kora S A et al	Sheetu M K et al	Patel D J, Tekade P R	Shah et al
Sex	**Male**	71.73	55.01 %	43.92 %	52	56.94	52.5
	Female	28.27	44.89 %	56.08 %	46	43.05	47.5
Age (years)	11- 20	4.95	25 %	20.94 %	21.4	29.86	
	21- 30	34.6	43.8 %	46.62 %	38.8	44.44	
Domicile	Rural	60.95	75.80 %	43.24 %	67.35	82.29	52
	Urban	39.15	24.19 %	56.75 %	32.65	17.71	48
Literacy	literate	52	39.79	50			
	illiterate	48	60.21	50			
Marital status	married	77		67		74.65	54.2
	unmarried	23		33		25.35	45.8
Socio-economic state	Low SE	70.95	65.05			48.95	
	Middle SE	25.98	31.98			28.81	
Occupation	Agriculture workers	70.07	51.07	18.24			
	Home maker	7.68	27.68	37.76			
	Labourers	10.9	12..09				
Type of OP compound	Dichlorovos	38	40.86			7.29	9.3
	Malathion	16.44	14.78			19.09	8.5
	Tic-20	10.46	13.44			26.38	
	diazinon	8.8	9.67			11.45	
Motive of poisoning	suicidal	93.78	93.81		69.9	86.86	
	accidental	4.82	4.83		28.6	12.50	
Reason behind poisoning	Financial problem	51.22	53.22			45.48	
	Domestic problem	35.17	38.17			34.41	
Relation to season	Winter	33.65		27.70	31.1		
	Summer	26.85		19.67	33.7		
	Rainy	39.50		52	35.2		
Out come	survived	87.53	86.56		89.29		87.3
	died	12.47	13.44		10.71		12.7

CONCLUSION

The results of current study revealed Acute OP poisoning is commonest among the agricultural workers. The causes of high rate of occurrence are depending on the variety of factors such as large group of agricultural population, economic loss, creditor forever, low socioeconomic status and stressful life. There is an urgent need to save formers by making 'former protection act' by the Government including 1) Crop insurance schemes, 2) fixing value added price for agricultural products, 3) dearness allowance to farmers. 4) Combo pack of antidote and pesticide made available with subsidy to antidote. Train the medical officers of primary health centres in initial treatment of OP poisoning. Providing ventilators at community health centres and ventilator fitted ambulances made available even at remote area is felt.

Ethical Clearance- Nil

Financial Assistance- None

Conflict of Interest- None

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A Retrospective Study of Pattern of Neck Injuries in the Cases of Hanging

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ABSTRACT

In case of asphyxial deaths either due to hanging or strangulation, a ligature mark may be the only external evidence available. Therefore a through examination of ligature mark is needed to ascertain hanging as a probable cause of death. A retrospective study was conducted at the Department of Forensic Medicine and Toxicology, North Delhi Municipal Corporation Medical College, Hindu Rao Hospital, New Delhi from January 2014 to December 2014. During that period we found, death due to hanging constituted 26 (12.09%) of total deaths (215),which were subjected to medicolegal autopsy. Young adults of age group 21 to 30 years accounted for maximum cases, 57.69% while male to female ratio was 1:1.16. Ligature mark was obliquely placed in 88.46% cases and was found to be running above thyroid cartilage in 69.23% cases. On dissection of neck, soft tissue injuries were found in 19.23% cases while fracture of hyoid bone was present in 7.69% cases.

Keywords: *Hanging, Ligature mark, Autopsy.*

INTRODUCTION

For centuries, hanging has been preferred mode of suicidal death. Hanging is a form of asphyxial death due to constriction of neck produced by suspension of the victim's body or a part of body weight by the ligature round the neck[1]. When the body completely suspends from above is called complete hanging. When some part of body touches the ground is called partial or incomplete hanging[2]. In hanging, ligature mark is produced by local damage to the skin of the neck due to pressure,this may be associated with an additional rubbing action resulting into abrasion[4]. Many times this ligature mark on the neck has diagnostic importance, that's why it requires detailed inspection with regard to its pattern, position, course, depth and width[3].

Sometimes, the characteristic pattern of the ligature material is impressed on the skin, mainly when the rope is used[5]. The ligature mark is usually situated above the thyroid cartilage between larynx and the chin. The course of it is directed obliquely upwards and backwards following the line of mandible and interrupted at back, sometimes shows an irregular impression of the knot. The mark is a groove, base is pale, hard leathery and parchment like and margins are red and congested[6]. The width of ligature mark is uniform when rope or wire is used as a ligature material and non-uniform when cloths are used.

Hanging is a painless death for the victims and there is no cost involvement, so in many country people prefer it as a common method of suicide.

MATERIAL & METHOD

This retrospective study of asphyxial death due to hanging was conducted among the victims who brought to the Department of Forensic Medicine and Toxicology, North Delhi Municipal Corporation Medical College, Hindu Rao Hospital, New Delhi for medicolegal autopsy during the period from January 2014 to December 2014. Various history regarding

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the age, sex, marital status, external and internal postmortem findings of neck were obtained from autopsy report.

OBSERVATIONS

A total of 215 medico-legal autopsies were conducted by the department during the period of one year, of which 26 (12.09%) cases were deaths due to hanging. Among these hanging victims 12 (46.15%) were males and 14 (53.85%) were females. Most of victims 15 (57.69 %) were from the age group 21-30 years followed by 10 (38.46 %) from age group 11-20 years (Table 1). Regarding the marital status, male victims were found to be married in 25 % cases while female victims of hanging were married in 50% of cases. Rest of the victims were unmarried (Table 2).

The ligature mark was incompletely encircling around the neck in 84.61% of cases (Chart 1) where as 15.39 % of cases were showing complete encircling. Direction of ligature mark was oblique in 88.46% of cases (Chart 2) whereas in 11.54% of cases, the ligature mark was running in a transverse manner. In this study, it was seen that the position of ligature mark was above thyroid cartilage in 69.23% cases, over thyroid cartilage was in 19.23% cases & below thyroid cartilage was in 11.54% cases (Chart 3).

Fracture of hyoid bone was present in 7.69% cases (Chart 4) and injuries to the soft tissue under the ligature mark were present in 19.23% cases (Chart 5).

Table 1- Age & Sex distribution:

Age	Male	Female	Total	Percentage
0-10	0	0	0	0
11-20	4	6	10	38.46 %
21-30	7	8	15	57.69 %
31-40	1	0	1	03.84 %
Total	12	14	26	100 %

Table 2- Marital Status distribution:

Age	Male		Female		Total
	Unmarried	Married	Unmarried	Married	
0-10	0	0	0	0	0
11-20	4	0	4	2	10
21-30	5	2	3	5	15
31-40	0	1	0	0	1
Total	9	3	7	7	26

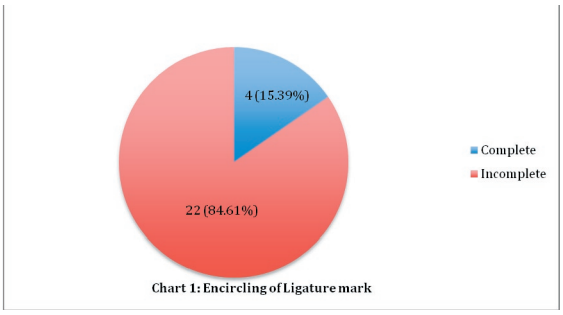

Chart 1: Encircling of Ligature mark

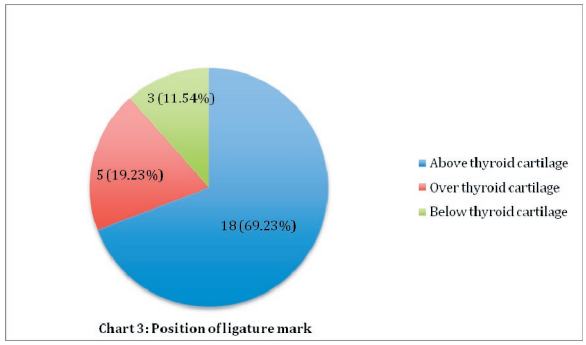

Chart 3: Position of ligature mark

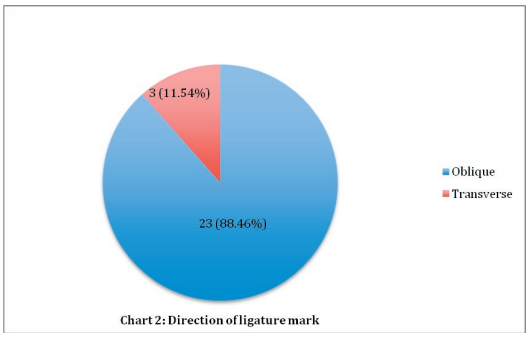

Chart 2: Direction of ligature mark

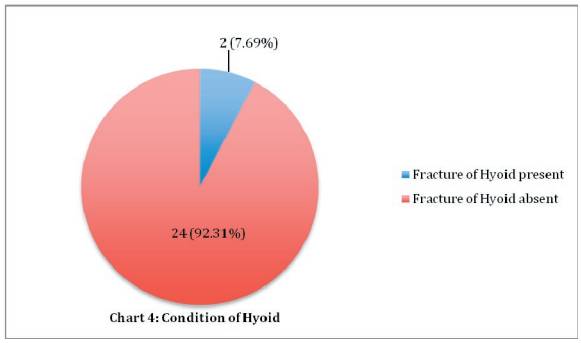

Chart 4: Condition of Hyoid

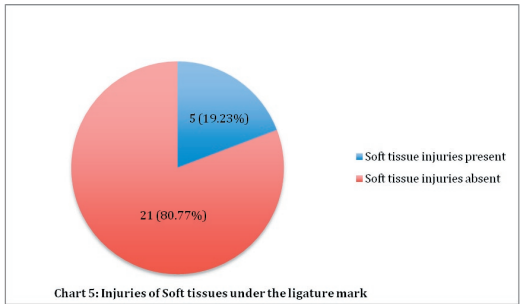

Chart 5: Injuries of Soft tissues under the ligature mark

DISCUSSION

Hanging as a method of suicide adopted by humans is known for centuries. In this study we took the retrospective analysis of the observations made available after examining the postmortem reports and medical records of the cases that were autopsied in one year. In the present study, outof 215 medico-legal autopsies that were conducted in the department,death due to hanging accounts for 12.09% cases. Among these hanging victims, male count was observed to be 46.15%, while 53.85% were females. Most of victims, about 57.69 % were from the age group 21-30 years followed by 38.46 % from age group 11-20 years, which shows similar pattern with the study by Ahmad M et al[7]. It was observed in my study that male victims were found to be married in 25% cases while female victims were married in 50% of cases of hanging. The equal incidences of hanging in females irrespective of the marital status, are perhaps a pointer towards the influence of stress being crept into the adolescent age group in females and thus increasing their vulnerability.

In this study, the ligature mark showed incompletely encircling around the neck in 84.61% of cases where as 15.39% of cases were showing complete encircling, similar to the study conducted by T. Saisudheer et al[8]. Direction of ligature mark was oblique in 88.46% of cases, whereas in 11.54% of cases, the ligature mark was running in a transverse manner. The similar patterns were observed in the studies conducted by both T.Saisudheer et al and J Sharijaet al[9]. In the study, it was seen that the position of ligature mark was above thyroid cartilage in 69.23% cases, over thyroid cartilage was in 19.23% cases & below thyroid cartilage was in 11.54% cases, a pattern consistent with the pattern observed by T.Saisudheer et al[7].

Fracture of hyoid bone was present in 7.69% cases, similar to findings by T Saisudheer et al, and J Sharija et al[9], and injuries to the soft tissue under the ligature mark were present in 19.23% cases, similar observations were reported by J sharija et al and T Saisudheer et al.

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

CONCLUSION

The number of suicide by hanging is increasing, as it is considered as a painless death and ligature material is easily available. Ligation deaths from hanging are commonly seen in young and middle age group, indicating towards challenging stressful situations of life, people are not able to cope up. Therefore, a well designed, comprehensive and targeted program to identify the major causative factors behind suicidal hanging and their appropriate preventive modalities, is profoundly required. Further, to meet the above, it requires the collective efforts from the government, media, society to work in tandem with each other to curb the menace of suicidal hanging.

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Estimation of Age by Morphological Changes in Symphyseal Surface of Pubis in Males

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ABSTRACT

Age determination at death by skeletal remains is a difficult problem. Determination of age by morphological changes in pubic symphysis is the best indicator for age beyond 25 years. The present study used three morphological indicators of McKern and Stewart's method, viz: dorsal plateau, ventral rampart and symphyseal rim. Samples were draw from 32 male individuals. The results were compared with the McKern and Stewart's study. The similariets and differences among the study were discussed.

Keywords: *Age determination, Skeletal remains, Pubic Symphysis.*

INTRODUCTION

Establishment of identity of an individual is of paramount medico-legal significance and age is one of the primary characteristics used to establish identity.[1, 2] The establishment of age of the individual is very essential both in living and dead, especially in cases of impersonation, murder or mass disasters, where the body is grossly mutilated or in the advanced stage of decomposition.[3] The determination of the age of a skeleton is thought to be one of the most difficult problems. There has been general impression that little or no information is obtained from the examination of skeletal remains but it is unjustified, as even though the body is completely destroyed the bones may prove to be a rich source of medico legal evidence.

In skeletonised bodies it is possible to attain accuracy up to +/- one year in the first two decades. But after 25 years, age determination cannot be done with same reliability. However closure of cranial sutures, changes in teeth and changes in pubic symphysis help in the age estimation beyond 25 years.

Symphyseal surface of pubic bone being a concealed structure is less prone to environmental influences like teeth. So the age related metamorphic changes at pubic symphysis are a reliable criterion of age estimation especially from second to fifth decade. Child bearing may cause certain symphyseal changes, so assessment of age in females by pubic symphysis cannot be as accurate as in males.

The present study is designed to judge the reliability of age estimation in males by pubic symphysis using McKern and Stewart's method as an indicator of chronological age.

MATERIAL & METHOD

32 pubic bones were collected from the male dead bodies brought to JSS Medical college mortuary, aged between 15-60 years. Consent of the lineal relatives was obtained before removal of bone. Dead bodies with history of disease of bone and unknown age were excluded from the study. After obtaining a pair of pubic symphyses from each body by cutting the inferior and superior ramus, they were kept in a plastic container containing water. After an average of 30 to 40 days, when maceration was complete, soft tissues attached to the bone were removed, and then washed with water and air dried. Later

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McKern and Stewart's method was applied for age estimation which considers developmental stages (0-5) of 3 components namely dorsal plateau, ventral rampart and symphyseal rim.[4] Particular stage of the component was called score. The scores of each component were then added to obtain total score which could range from 0-15. The age range, mean age, standard deviation for the total score was then calculated and compared with the McKern and Stewart's method.

RESULT

Table 1: Calculated mean age, standard deviation and age ranges for the total scores of symphyseal formulae in the present study

Total Score	No of Cases	Age range for scores in present study	Mean	S.D
0	0	-	-	-
1-2	3	16-20	18.0	2.00
3	2	19-20	19.5	0.71
4-5	2	22	22.0	0.00
6-7	2	24-25	24.5	0.71
8-9	0	-	-	-
10	2	23-26	24.5	2.12
11-13	12	25-40	32.0	5.33
14	5	30-48	42.4	8.68
15	4	45-60	53.8	6.29

Table 2: Comparison of age range for different scores in the present study with the McKern and Stewart's study

Total Score	Age range for scores in present study	Age Range for the Scores in Mckern and Stewart's study
0	-	17
1-2	16-20	17-20
3	19-20	18-21
4-5	22	18-23
6-7	24-25	20-24
8-9	-	22-28
10	23-26	23-28
11-13	25-40	23-39
14	30-48	29+
15	45-60	36+

Table 3: Determination of 'P' Value

Total score	Present study			McKern and Stewart's study			't' value	'P'value
	No. of cases	Mean	Standard deviation	No. of cases	Mean	Standard deviation		
0	0	-	-	7	17.3	0.49	-	-
1-2	3	18.0	2.00	76	19.0	0.79	0.23	0.82
3	2	19.5	0.71	43	19.8	0.85	0.07	0.94
4-5	2	22.0	0.00	51	20.8	1.13	0.21	0.84
6-7	2	24.5	0.71	26	22.4	0.99	0.57	0.57
8-9	0	-	-	36	24.1	1.93	-	-
10	2	24.5	2.12	19	26.1	1.87	0.26	0.80
11-13	12	32.0	5.33	56	29.2	3.33	0.29	0.77
14	5	42.4	8.68	31	35.8	3.89	0.50	0.62
15	4	53.8	6.29	4	41.0	6.22	1.18	0.28

Table 4: Comparison of age range for different stages of each component of the present study with the McKern and Stewart's study

	IN THE PRESENT STUDY			MCKERN AND STEWART'S METHOD '57'
Stage	**No. of cases**	**Age range (in years)**	**Mean**	**Age range (in years)**
	COMPONENT I			**COMPONENT I**
0	0	0		17 – 18
I	1	16	16.0	18 – 21
II	4	18-22	20.0	18 – 21
III	2	19-24	21.5	18 – 24
IV	4	23-40	30.5	19 – 29
V	21	22-60	37.5	23+
	COMPONENT II			**COMPONENT II**
0	4	16-20	18.3	17 – 22
I	4	22-25	22.3	19 – 23
II	1	24	24.0	19 – 24
III	2	23-26	24.5	21 – 28
IV	8	25-40	31.5	22 – 33
V	13	30-60	43.2	24 +
	COMPONENT III			**COMPONENT III**
0	5	16-20	18.6	17 – 24
I	4	22-25	23.3	21 – 28
II	3	26-37	31.0	24 – 32
III	10	25-40	30.3	24 – 39
IV	6	30-50	42.0	29 +
V	4	45-60	53.8	38 +

DISCUSSION

When age range for the total score from the present study was compared with the age range of McKern and Stewart's study (Table 2), it revealed that the age ranges in the present study were within the age ranges of McKern Stewart's study except in scores 6-7 and 11-13 where a variation of 1 year was seen. It was also found that the standard deviation has increased in the later age group (Table 1). this indicates that the accuracy of estimation of age from McKern and Stewart's method decreases as the age increases. By comparing the present study with the Mckern and Stewart's study statistically (Table 3), no significant difference was found. Therefore the Mckern-Stewart criteria could be equally useful in estimation of age for Indian population. The same was also observed in a study done in East Delhi.[5] On comparing the age range of each component of present study with the McKern and Stewart's study (Table 4), it could be seen that as the age advances, changes in the symphyseal surface appeared earlier (1to2years) in case of McKern and Stewart's study where the study samples were from American population. It was in accordance with the study done on Punjabi & Guajarati population.[6, 7]

The present study revealed that the lacunae of McKern and Stewart's method lies within the age range given for scores 14 and 15, i.e. 29+ and 36+ years respectively, and does not account for variability of age after 40 years. So age assessment from pubic bones in the fourth decade and beyond would be unreliable. Same findings were observed in a study done on Guajarati population.

CONCLUSION

The appearances of changes in the symphyseal surface are premature in case of American population than Indian population. Age assessment in the fourth decade and beyond from symphyseal surface of pubic bones using Mckern and Stewart's method is unreliable.

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