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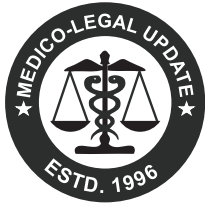
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Patient-Physician Communication Gap: A Study Exploring Role of Informed Consent Process in Shared Decision Making in a Tertiary Care Hospital

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ABSTRACT

Aim: To assess the differences in the knowledge and attitudes of doctors and patients regarding the informed consent process in shared decision making.

Methods: A cross sectional survey was carried out among physicians performing invasive procedures at a tertiary care hospital between March to June 2011. After institutional approval was obtained cohorts of 125 doctors and 250 patients completed a structured questionnaire on the informed consent process.

Results: Out of total doctors, 81 (64.8%) were men and 44 (35.2%) were women; 98 (78.4%) were specialists/super specialists and 27 (21.6%) were residents. Almost all patients (94.8%) reported that they had chosen the treatment method suggested by doctor. Less than half of physicians 52 (41.6%) reported being fully acquainted with the informed consent process, Significant discrepancy was registered between the answers from patients and physicians to all the questions comparing their experiences regarding the procedure of obtaining informed consent to treatment ($p < 0.001$).

Conclusion: There exists a vast disagreement between physicians and patients concerning both understanding and knowledge of the informed consent process. The results of this study conform existence of patient-physician communication gap, hence need for physician and patient education programs on the process of informed consent for better communication between doctors and patients.

Key words: Patient Rights, Informed Consent, Patients.

INTRODUCTION

Informed consent is the process of agreeing to take part in a study based on access to all relevant and easily digestible information about what participation means in particular, in terms of harms and benefits.¹ Adequate information before any procedure is fundamental to give informed consent. Information should include a description of the benefits, risks, and complications of the intended procedure as well as alternative treatment options.^{2,3} It should not be an inert and one-sided process in which a medical or surgical decision is left up to the physician only, but an interactive process whereby patients preferences regarding medical or surgical decisions are considered.⁴⁻⁶

It is a known fact that several patients tend to view written consent as a ritualistic and bureaucratic obstacle, may unnecessary feel undue anxious and

pressured by having to give written consent, and report that they do not read or understand the consent form.⁷ Although there has been some research on patient's understanding to what has been explained to them and their retention of information after the consultation when consent is obtained.^{8,9} Till date we are not crystal clear about patients' knowledge and understanding of the consent process and the role of the consent form.

It is essential for health care and medico legal system to know about reasons of existing patient-physician communication gap so that patient and physician can make a shared decision about their clients. The present study was therefore conducted to assess the differences in knowledge between physicians and patients regarding the informed consent process for various procedures in shared decision making. An additional

objective was to compare their personal perception on the range of information exchange during the informed consent process.

MATERIAL AND METHODS

The present observational cross sectional survey was carried out among physicians performing invasive procedures at Maharishi Markandeshwar Institute of Medical Sciences and Research (MMIMSR), Mullana between March to June 2011. Prior to study inclusion, all participants were informed about the purpose of the study and that participation was voluntary and anonymous. Patients who were scheduled for invasive procedures in general anaesthesia were interviewed at the same time.

A self-administered questionnaire was handed out to 175 doctors including residents performing invasive procedures under general anaesthesia in the departments of anaesthesiology, general surgery, orthopaedics, ophthalmology, otorhinolaryngology and gynaecology. The physicians were requested to return the filled up questionnaires within two months to the anaesthesiologist in charge of the hospital.

The patients undergoing invasive procedures during the study period were also requested to participate in the study during preanesthetic visit before invasive procedures. Of the 300 eligible patients, 250 agreed to a structured interview with an anaesthesiologist who read the questions and recorded their answers. There were 159 patients interviewed at the Department of general Surgery, 11 at the Department of Orthopaedics, 34 at the Department of Ophthalmology, 19 at the Department of Otorhinolaryngology and remaining 27 patients at the Department of Gynaecology.

Information was collected using a detailed structured physician and patient questionnaires. The questions were related to the informed consent process,

i.e. provision of information to patients, respecting patient autonomy, knowledge of regulations & understanding towards the process of informed consent. The questionnaires were previously pilot-tested among 25 subjects and modified accordingly. Most of the questions on the physician and patient questionnaires were similar; however, the questions were rephrased to ask about experiences specific to either physicians or patients. Patients were given instructions to refer to the informed consent for procedure they are currently prepared for, whereas physicians were requested to refer to their last obtained informed consent process.

The collected data was entered in Microsoft Excel. Coding of the variables was done. SPSS version 11.5 was used for analysis. Interpretation of the collected data was done by using appropriate statistical methods like percentage and proportions. Chi-square test was applied to test for proportions wherever applicable and considered significant at $P < 0.05$.

RESULTS

Out of total, 137 doctors returned questionnaires giving a response rate of 78.3%. 125 questionnaires (71.4%) were fully completed and included in the analysis. Among the doctors who returned the fully completed questionnaire, 81 (64.8%) were men and 44 (35.2%) were women; 98 (78.4%) were specialists/ super specialists and 27 (21.6%) were residents. The median age of doctors was 45 years (range 28-65 years).

A significant disparity was observed in the answers to the questions on the amount of information that was given or obtained about patient’s medical condition, forthcoming clinical procedures and on the possible complications of forthcoming medical procedures ($p < 0.001$). Almost all patients (94.8%) reported that they had chosen the treatment method suggested by doctor. (Table 1)

Table 1. Distribution of subjects according to their awareness and understanding towards informed consent in decision making

Statement	No. of respondents (%)		P value
	Doctors (n=125)	Patients (n= 250)	
I inform patients about their condition and treatment modalities / I was informed about my condition			
in detail	39 (31.2)	25 (10.0)	<0.001
as much as necessary	68 (54.4)	174 (69.6)	
only as much as needed (for a patient) to make a decision	18 (14.4)	51 (20.4)	
I answered whatever patients want to know / Doctor answered my questions			
in detail	32 (25.6)	46 (18.4)	<0.001
clearly and briefly	87 (69.6)	145 (58.0)	
by providing only the most necessary information	6 (4.80)	59 (47.2)	

Statement	No. of respondents (%)		P value
	Doctors (n=125)	Patients (n= 250)	
I provide/received information on risks and possible complications of treatment			
in detail	34 (27.2)	21 (8.4)	<0.001
as much as necessary	61 (48.8)	108 (43.2)	
only on most common risks and complications	29 (23.2)	80 (32)	
no (to avoid upsetting the patient)	01 (0.8)	41 (16.4)	
Patients / I usually make decision about the treatment method			
suggested by a clinician	100 (80.0)	237 (94.8)	<0.001
suggested by friends	04 (3.20)	02 (0.80)	
I don't know	21 (16.8)	11 (4.4)	
I provide/received information on possible alternative methods of treatment			
on more than one method (if existing).	96 (76.8)	134 (53.6)	<0.001
I do not talk about other methods in order not to confuse the patient. / No, clinician did not mention other methods.	14 (11.2)	87 (34.8)	
Patients themselves can find information /I myself found information.	15 (12.0)	29 (11.6)	
How long does/did the conversation with the patient/clinician last?			
<5 minutes	39 (31.2)	59 (23.6)	<0.001
10 -15 minutes	82 (65.6)	181 (72.4)	
>15 minutes	04 (3.2)	10 (4.0)	
Do you inform patients about their length of hospital stay? /Were you informed about the length of your hospital stay?			
Yes	99 (79.2)	197 (78.8)	<0.001
No	24 (19.2)	53 (21.2)	

Significant discrepancy was registered between the answers from patients and physicians to all the questions comparing their experiences regarding the procedure of obtaining informed consent to treatment (p< 0.001). Disagreement was the most prominent in the question on the amount of the information

presented to the patients before they had to make their decision on the forthcoming procedures. In the instance that patients were not able to make their own decision regarding treatment, most of them would leave the decision to physicians. (Table 2)

Table 2. Comparison between responses of physicians and patients to questions about the procedure of obtaining informed consent to treatment

Statement	No. of respondents (%)		P value
	Doctors (n=125)	Patients (n= 250)	
In your opinion, do your patients receive sufficient information so that they are able to decide their treatment? / Did you receive sufficient information so that you are able to decide your treatment?			
yes, complete information	67 (53.6)	30 (12.0)	<0.001
only the most necessary information	55 (44.0)	189 (75.6)	
not complete information	03 (2.4)	31 (12.4)	
Your patients/you provided consent to treatment independently, without			
anyone's help	105 (84.0)	223 (89.3)	<0.001
after consulting with the family	14 (11.2)	20 (8.0)	
after special persuasion by a clinician	06 (4.8)	07 (2.8)	
If patients/you are not able to choose the treatment method, who would you ask for consent?			
(patient's) family	121 (96.8)	98 (39.2)	<0.001
(patient's) friends	01 (0.8)	00 (00)	
colleagues /physician	03 (2.4)	152 (60.8)	

Less than half of physicians 52 (41.6%) reported being fully acquainted with the informed consent process, whereas 73 (58.4%) reported having partial

or no knowledge. Most patients (174; 69.6%) reported having partial knowledge of the informed consent process. A total of 112 (89.4%) physicians reported that

they completely or partially informed their patients about their rights although only 37 (14.8%) patients

reported that they felt that they were fully informed about their rights ($p < 0.001$). (Table 3)

Table 3. Comparison between the responses of physicians and patients to questions about knowledge and practice of obtaining patient informed consent to clinical procedures.

Statement	No. of respondents (%)		P value
	Physicians (n=125)	Patients (n= 250)	
Are you familiar with the informed consent process?			
Completely	52 (41.6)	65 (26.0)	<0.001
Partly	59 (47.2)	174 (69.6)	
No	14 (11.2)	11 (4.4)	
Do you inform patients about their rights? / Are you informed about your patient rights?			
In detail	48 (38.2)	37 (14.8)	<0.001
Partly	64 (51.2)	150 (60.0)	
No	13 (10.4)	63 (25.2)	
Do patients receive a copy of signed consent form?			
Yes	17 (13.6)	06 (2.4)	<0.001
No	82 (65.6)	169 (67.6)	
I don't know	26 (20.8)	75 (30.0)	
Is the informed consent process legally regulated?			
Yes	50 (40.0)	94 (37.6)	0.584
No	12 (9.60)	21 (8.4)	
I don't know	63 (50.4)	135 (54.0)	

DISCUSSION

The most important goal of informed consent is that the patient should have an opportunity to be an informed participant in his or her health care decisions so it acts as a safeguard to ensure the preservation of individual rights and to attain this goal there must be robust physician-patient interaction.¹⁰ Recently a study has identified a number of issues such as law, ethics, knowledge, information, structural health care problems and funding issues as major areas of importance within a particular physician-patient interaction.¹¹

The findings of present study have shown significant differences in the knowledge and perception of these points of interests defining patient-doctor interaction between two study groups. Physicians lacked awareness about their professional, legal and ethical obligations to provide patients with information concerning their medical condition and forthcoming diagnostic and therapeutic procedures. On the other hand, a good number of patients reported receiving only limited or incomplete information, or in some cases no information obtained at all. Similar observations were also made by another study from Israel.¹²

We observed in present study that the extent of information exchange was a limited during the physician-patient consultation. This may happen because physicians often feel pressed for time. It can be a possible explanation for the same. This comes in contrast with the findings of another study which observed that the patients often do not wish to be fully informed of the risks and possible complications of the forthcoming surgery.¹³

In our study it was found that most patients reported providing their consent independently and agreeing on the treatment method suggested by their doctors. Another population-based survey has reported similar results to those observed in present study.¹⁴ In the current era of information and technology, a significant amount of health information is now accessible to the general public including patients. Recently a study from Bethesda confirmed that patients performing their own internet research are more interactive with their doctors about the treatment methods and that the internet does not replace the role of doctors in such scenario.¹⁵

One evident limitation of this study is that the education level of the patient was not included in the analysis so we were unable to assess how the educational level of the patient influenced their ability

to understand the provided medical information during the consent process. And those patients who did not completely understand the information provided that was needed to decide on treatment their signature on the informed consent form is legally and ethically questionable and consent should be obtained from family members. Secondly, we interviewed only surgical patients, whereas not all of the physicians who completed the questionnaire work in surgical specialties.

CONCLUSION

The study concludes that there exists a vast disagreement between the informed consent explained by doctors and perceived by patients, confirming existence of patient-physician communication gap, which create hurdle in shared decision making. Hence current consent procedures seem inadequate in current scenario. We need better communication between doctors and patients as well as physician and patient education programs on the process of informed consent. The difference in perception and partial knowledge of the legal implication of informed consent indicates that consenting in its current form is not informed and should be reassessed in order to achieve patient autonomy, which is the ultimate goal of informed consent and nutshell in making the shared decision.

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Determination of Sex From Femur in the Population of Vidarbha Region of Maharashtra

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ABSTRACT

Background: Determination of sex from single formula is difficult for different zone. For this reason we planned the study on the population of Vidarbha using femur to know the status.

Material and Methods: 140 femurs, (96 male, 44 females) were included in the study. Parameters used were diameters of head, weight and bicondylar angle. In head, recorded diameters were vertical, anteroposterior and mediolateral. By Demarking Points (DP), percentage of bones in males and females were calculated.

Results: Using DP, with vertical diameter 41.66% right male and 68% of female and 66.66% male and 68% left female bones could be assigned sex. With anteroposterior diameter 73% male and 73% of female right and 75% of males and 54.54% female left could be identified. By mediolateral diameter 21% right males and 73% females and 6.25% of left male and 64% of left female bones could be sexed. With weight, 16.66% of right and 42.66% male and none of the female could be sexed. There was statistically significant difference in bicondylar angles of femur in males and females.

Conclusion: We conclude that anteroposterior diameter of the head of femur is the best criteria for sexual dimorphism in the studied population. Vertical diameter, transverse diameter, bicondylar angle and weight of the femur are also discriminate parameters in order of their accuracy.

Key words: Demarking Point, Femur, Sexual Dimorphism.

INTRODUCTION

Anatomist and forensic experts have been consulted frequently regarding identification of skeletal remains found under suspicious circumstances and are asked to pronounce an opinion which may form an important evidence in the court. Thus the physical anthropology makes an important medico-legal contribution through careful identification of skeletal remains and that law enforcement agencies appreciate this help.

Determination of sex of the skeletal remains of an individual from an examination of a single bone except the hipbone is considered to be difficult task and has been the subject of continuous investigation. Even when the entire human body, pelvis, and skull are available, not more than 95% accuracy can be achieved¹. Traditional method for the assignment of sex or stature estimation does not have an explicit

basis. Visual impression of the bone can seldom be as accurate because of the many pitfalls associated with subjective assessment of the observer.

Examination of the skeletal samples of the burials, are often fragmentary and found in mixed lots. For this reason there is a need for developing a technique for sex determination on skeletal parts, which are durable. The femur was chosen for this study since, the portion of this bone often remains in good condition and it is one of the important bones employed for anthropometric study.

Maharashtra is a big state where climatic conditions and nutritional status vary in different regions e.g. Vidarbha, Marathwada and western Maharashtra. The present study was undertaken on the samples of Vidarbha region of Maharashtra for determination of sex in an individual.

MATERIAL AND METHODS

140 fully ossified femurs belonging to 70 dissection hall cadavers, out of which 48 (96) were males and 22 (44) were females of known stature included in the study. The study was conducted in Government Medical College Nagpur and bones were collected from various medical colleges of Vidarbha region of Maharashtra.

The bones of each side of both the sexes were numbered and kept separately. The bones showing pathological deformities were excluded from the study. The bones along with their cartilages intact were measured on the osteometric board and recorded separately by vernier caliper and sliding caliper^{2,3}. The parameters used were diameters of head of femur, weight and bicondylar angle (obliquity of the shaft of femur) of femurs.

Various diameters of head of femur recorded were vertical diameter, anteroposterior diameter and mediolateral (transverse diameter). Vertical diameter was measured by keeping the head between the two limbs of calipers and maximum measurement was noted with the help of sliding caliper. Anteroposterior diameter was measured at right angle to the vertical diameter while mediolateral diameter was taken from the junction of the neck with the head up to the fovea centralis. Weight of femur was measured in grams. Bicondylar angles were measured by the method of Heiple and Lovejoy⁴. A per the method of Jit and Singh⁵ Demarking Points (DP) were obtained by calculated range. On the basis of DP, the percentage of bones in males and females were calculated. "t" test was applied to know the level of significance.

RESULT

None of the right femur in female had the maximum vertical diameter of head more than 43 mm while 80% male right femur had the maximum vertical diameter of head exceeding 43 mm. Similarly the smallest male right femur was 41 mm and 77% female right femur were found to be less than 41 mm. By this identification point (IP), 80% male and 77% female right femurs were identified. But on the basis of Demarking Points (DP), only 41.66% male and 68% of female right femora could be sexed accurately. In the case of vertical diameter bones falling in the range between the DP for males and females (i.e. 39.42 - 45.83 mm for right femora) sex cannot be identified by this method. Table- 1

In case of left femur, 92% of male femurs were larger than 42 mm while 81% of left female femurs were

Table 1. Vertical diameter of the head of femur

Measurements	Right		Left	
	Male	Female	Male	Female
Number of Femurs	48	22	48	22
Range in mm	41 - 49	35 - 43	41 - 49	35 - 42
Mean±SD	45.12±1.89	38.36±2.49	45.12±1.89	38.27±2.14
IP	> 43	< 41	> 42	< 41
Identified bones	80%	77%	92%	81%
Calculated range	39.42-50.79	30.89- 45.83	39.42 - 50.79	31.85 - 44.89
DP	> 45.83	< 39.42	> 44.89	< 39.42
Percentage beyond DP	41.66%	68.00%	66.66%	68.00%

smaller than 41 mm. But by DP, 66.66% male and 68% female bones could be assigned sex. In the case of bones falling in the range between the DP for males and females that is (39.42 - 44.89 mm for left femora) sex cannot be identified by this method. Table 1

We observed that 94% right male femora showed the anteroposterior diameter more than 43 mm. While 86% of right female femora showed the anteroposterior diameter less than 42 mm. But by DP 73% male and 73% of female right femora could be determined (Table 2). In left side, 96% of male femora showed the anteroposterior diameter more than 43 mm and 81% female femora showed it less than 42 mm. However by DP 75% of males and 54.54% female left femora could be identified. Table 2.

Table 2. Anteroposterior diameter of the head of femur

Measurements	Right		Left	
	Male	Female	Male	Female
Number of Femurs	48	22	48	22
Range in mm	42 - 50	36 - 43	42 - 51	36 — 43
Mean + SD	46.54 + 1.92	39.18 + 1.99	46.60 + 1.89	39.40 + 2.19
IP	> 43	< 42	< 43	< 42
Identified bones	93.75 %	86 %	96 %	81 %
Calculated range	40.78 - 52.3	33.21 - 45.15	40.93 - 52.27	32.83 - 45.97
DP	> 45.15	< 40.78	> 45.97	< 40.93
Percentage beyond DP	73 %	73 %	75 %	54.54 %

Maximum mediolateral diameter of the female right femurs was 41mm and minimum was 40mm. On the basis DP, 21% males and 73% females could be identified. But in left side 6.25% of male and 64% of left female bones could be sexed by demarking points. Table 3.

Table 3. Mediolateral diameter of the head of femur

Measurements	Right		Left	
	Male	Female	Male	Female
Number of Femurs	48	22	48	22
Range in mm	40 - 48	30 — 41	40 - 49	31 — 42
Mean + SD	44.40 + 1.96	35.86 + 3.50	44.54 + 2.06	36.13 + 3.71
IP	> 41	< 40	< 42	< 40
Identified bones	90 %	81 %	81 %	81 %
Calculated range	38.52 - 50.28	25.36 - 46.63	38.36 - 50.72	25 - 47.26
DP	> 46.36	< 38.52	> 47.26	< 38.36
Percentage beyond DP	21 %	73 %	6.25 %	64 %

No right female femur in the study was found to have a weight of more than 410 gm while in 56% of male, weight exceeded more than 410gm. Similarly the smallest male right femur was 202 gm and 50% of female right femora were found to be less than 202 gm. By these DPs only 16.66% of male femora and none of the female femora could be assigned sex (Table- 4). In left side, 58.33% of male femurs were heavier than 392 gm while 45.45% of female femurs were less than 182gm. However by DP, only 41.66% of male and none of the female left femora could be assigned sex. (Table 4)

Table 4. Weight of femur in grams (gm)

Measurements	Right		Left	
	Male	Female	Male	Female
Number of Femurs	48	22	48	22
Range in gm	202 — 646	130 — 410	182 — 660	140 — 392
Mean + SD	417 + 96.93	237 + 88.79	418 + 100.86	234 + 84.07
IP	> 410	< 202	< 392	< 182
Identified bones	56.25 %	50 %	58.33 %	45.45 %
Calculated range	126.21- 707.19	29.37-503.37	89.42- 720	70.21-43.21
DP	> 503.37	< 126.21	> 434.21	< 89.42
Percentage beyond DP	16.66	Nil	41.66	Nil

We observed that the bicondylar angle of the right femora was more than the left in both the sexes but this difference was statistically insignificant. There was statistically significant difference in bicondylar angles of femur in males and females. Table 5.

Table 5. Observations for bicondylar angle

Sex	Side	No	Range	Bicondylar angle	t-value	t-value
				Mean + SD		
Male	Right	48	30-80	4.77 + 1.05	2.73	0.0074
	Left	48	20-70	4.18 + 1.06		
Female	Right	22	50-150	8.22 + 1.05	1.344	0.185
	Left	22	40-140	7.04 + 2.96		

DISCUSSION

The present study reveals that anteroposterior diameter is the best criteria for sexual dimorphism of the human femur in which 73% male, 75% female of right side and 73% male and 54.54% female of left side bones could be identified. Vertical diameter, mediolateral diameter and bicondylar angle of femur are also important parameters in order of accuracy.

Singh and Singh conducted their study in Varanasi zone observed that 44.2mm mean vertical diameter in male and 39.8 in female and stated that vertical diameter of head of femur is good measurement for both sexes. If a bone crosses a demarking point, one can tell the sex with certainty⁶. Similarly Kate⁷ and Javadekar⁸ stated that vertical

diameter of head of femur is also the best criteria for sexing the femora.

Indian femora are shortest and most bowed anteriorly as compared to the other races⁶. Bicondylar angle in Indians is found to be lower than in whites⁴. The biomechanical arguments alluded above will associate the higher bicondylar angle with a broader pelvis and shortest stature which is consistent with the finding from female femora in parson’s data which show statistically significant higher bicondylar angle in females⁴. Similarly higher bicondylar angle in females was observed in our study.

Jit & Singh⁵ stated that by DP sex can be identified upto 99.75% accurately. A formula derived from one racial group may be unsatisfactory when applied to another population⁹. Hence the DP for one zone may not be safe to apply to another zone if 100% accuracy is required⁶. Thieme¹⁰ concluded that sexual dimorphism differ by measurements and some measurements are more useful for discriminating between sexes than others.

CONCLUSION

We conclude that demarking points (DP) are different for different races and zones and differ according to the side of the body. Demarking points give high degree of accuracy for sexual dimorphism. Anteroposterior diameter of the head of femur is the best criteria for sexual dimorphism in the studied population. Similarly Vertical diameter, transverse diameter, bicondylar angle and weight of the femur are also discriminate parameters in order of their accuracy.

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Cheiloscopy Profile of the Medical Students in Himachal Pradesh

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ABSTRACT

A difficult task is fixing the identity of a person and continuous new techniques are being evolved and the older techniques being tested and reporting done accordingly. This present study was done on the second year medical students according to the classification of Tsuchihashi and conclusion was made afterwards.

Key words: Lip Prints, Tsuchihashi K., Medical Students.

INTRODUCTION

Fixing the individuality of a person is a challenging task in medico legal studies. Identification is very easy when the person is sound mentally, physically and equally difficult when the person is not able to prove his identity or not able to identify himself. Various techniques have been applied since time immemorial as and when the circumstances need them. The bodies may be found absolutely intact with skin and hairs present and may be found without them or the body parts might be found in fragments where the identification becomes a challenging task. Hence new techniques are continuously evolved and tried after experimentation. Among these methods is the study of cheiloscopy which is study of lip prints.

Literature survey

Fischer R in 1902 was the first person to observe that the red part of the lips have a unique pattern of lines.

Edmond Locard in 1932 was the first person who identified the pattern of lips as the one which can be used for personnel identification and can also be used as one of the tools in criminal identification.

Snyder L.M. in 1950 showed characteristics of lips as same that of finger prints and mentioned the same in his book Homicide investigation. He concluded this with the help of a case in Los Angeles which he studied a lip print present on the left fender of a car and compared with the lips of the injured lady and the case was solved consequently.

Dr Santos M in 1967 said that nature of labial wrinkles and grooves could be divided into simple and compound types and further be subdivided in to eight types. He devised his own identification into four types 1) Straight lines 2) Curved lines 3) Angled line 4) Sine shaped curve.

Suzuki K et al in 1967 did detail investigation of measurement of lips, use and color of rouge, its differentiation from a blood stain, and method for its extraction to obtain data for practical forensic application.

Suzuki K, Tsuchihashi Y in 1970 conducted a study on 107 Japanese families aged 20-36 years. She proved that a groove pattern is present on the lips. Grooves on the labiorum rubrorum were named as sulci labiorum and the lip prints consisting of these grooves were named as Figura linearum rubrorum. The classification devised was Type 1-A clear cut groove running vertically across lips.

Type 1- Partial length groove of Type 1

Type 2 -Branched groove

Type 3- An intersected groove

Type 4-Reticular pattern

Type 5-Other pattern

A longitudinal study carried out to find out whether any changes occur throughout life by taking lip prints of same individuals at regular intervals. Results of the study proved dissimilarity among the individuals and also that the lip groove pattern could be influenced by the hereditary pattern.



Fig. 1.



Fig. 2.

Suzuki K and Tsuchihashi Y in 1970 studied lip prints on 280 individuals consisting of 150 males and 130 females aged 6 -57 years in Japanese population and in 18 pairs of twins aged 12-13 years of boys. They had analyzed lip prints using photographic method and lip prints were collected directly using finger printer traced on cellophane paper to be observed under magnifying lens and the conclusion was that lip prints are different for each individual and even for twins.

Ebihara K in 1971 reported dissimilarity of kiss marks in relation to a suspected case of theft where



Fig. 3.

kiss marks were obtained using rouge from 30 adults consisting of 27 males and 3 females.

Mac Donell in 1972 conducted a study on lip prints between two identical twins in which he proved that the identical twins can be differentiated on the basis of finger prints, hand writing, and lip prints.

Tsuchihashi Y in 1974 conducted a study on lip print on 1364 Japanese subjects consisting of 757 males and 607 females aged 3-60 years old and the study also included 49 pairs of uniovular twins and their parents to confirm whether any hereditary factor play a role and to prove that the lip prints remain unchanged throughout life, 3 males and 4 females were selected and the study was done for 3 years for regular monthly intervals to observe any change in the pattern of the lip prints.

Hirth L in 1975 conducted a study on 500 persons including 76 families with 133 children, 22 men and 17 dizogtic twins to study the variability and genetic basis or ridge pattern which showed branched pattern more frequently on the upper lips and simple pattern on lower lips out of which whirling figures were present at the upper lips namely simple and median and in the lower lip double and Para median were observed.

Suzuki K and Tsuchihashi Y in 1975 recorded two criminal cases where lip print proved in identification of the criminals, while in one case lips were picked up from an anonymous letter and in other case from magazines and undergarments.

Kenneth J Hoag in 1978 proved that a the wrinkles

and cracks present on lips do not change even when there is change in the general shape of lips due to differences in climate or any illness present around the mouth and even suggested multiple tracings of lip prints to be recorded for an accurate examination.

Russell LW and Anne E. Welch in 1984 reported analysis of lip prints conducted using combination of thin layer layer and gas chromatography to evaluate characterization and discrimination of small quantity of lipsticks smears.

Federal Bureau of Investigation in 1987 solved a case by lip prints where a male bank robber was using lipstick and other female apparels to disguise the police while committing the crimes.

Kasprzak J in 1990 conducted a research for a period of 5 years on 1500 persons to elaborate the practical use of cheiloscopy by using contour method in which the contours on the red part of the lips were transferred on a transparent foil and compared with lines on the photograph of evidential and comparative traces.

Williams TR in 1991 in his study on lip prints reported that besides finger prints, palm prints and foot prints lip prints can also form an important means of identification.

Choudhry MY in 1991 made comparison of minute smears of lipstick by micro spectro photometry and scanning microscopy in combination with energy dispersive spectroscopy by studying 30 samples.

Kumar TR. And Chandra Sekharam in 1993 conducted a study on 2063 Indian subjects about labial structural pattern for personnel identification.

Alvarez M et al in 2000 conducted a microscopic study about lip prints in 1500 subjects in which middle part of lower lip 10 mm wide was taken for the study and the predominance was noted.

Dr Vahanwala and Dr Parekh BK in 2000 conducted lip pattern in 50 males and 50 females in age 19-26 years to confirm permanence of lip pattern, the most common pattern among the sexes of group studied and also for any peculiar pattern if present.

Siegel J in 2001 stated that lip prints use is quite rare in forensic identification.

Moensrens A in 2001 stated that lip prints have become accepted in forensic community but it does not have any specific standards of reliability.

Ball in 2002 stated there being sebaceous glands on

the inner aspect of lips hence the latent lip prints are present.

Dr Anil Agarwal in 2004 in forensic files had analyzed the importance of lip prints. He stated that these fissures and criss cross lines are different in different people and can form a very good basis of identification at many times. He proved that lip prints be used for positive identification in identifying the criminal by investigation of lip prints on drinking glasses used by criminal. He traced out lip prints and compared that with 5 suspects.

Utsuno H et al in 2004 conducted a preliminary study of postmortem personnel identification of lip prints. The study was carried out in 6 cadavers for anatomy research consisting of 4 males and 2 females before and after 48 hrs of fixation with 10% formalin. Lip prints remains unchanged before and after fixation.

Dr Annie J. Verghese et al in 2009 did a lip print study on the people of Kerala in which a lip print were studied in which reticular

Singh NN et al in 2010 did a study on lip prints by using natural dyes and lysochrome dyes.

OBJECTIVES

1. To study the pattern of lip prints according to Tsuchihashi Y classification among the medical students of second year of igmc, shimla who are familiar with the terms of identification, importance of lip prints.
2. To contribute to national data base of the country if required.

Importance of Lip prints

1. To use the lip prints for identification by using the Tsuchihashi Y classification.

Reliability of lip prints

1. To use for negating the identity of the accused.

MATERIAL AND METHODS

1. A type white paper.
2. Lip sticks having dark colors'.
3. Cellotape to cover the lips.
4. Tissue to clean the lips.
5. Lips of the students who volunteered for the study.

The materials required were selected and taken to the laboratory where the students assembled for doing the work of lip prints. The matter was first put up in front of the students and when they gave their consent

in writing students were invited to participate for the study. A demonstration of the whole method was done first and then the students participated in the research activity.

1. Clean your lips with a wet tissue and let them dry naturally.
2. Apply lip stick to the upper lip, do not over do with the application and to do apply in a scanty quantity.
3. Cut the cello tape to a length of 10 cm and apply on the lip, do not put the fingers in any part of cello tape and always hold the cello tape from the corners.
4. Remove the tape from the lip and put on the white paper.
5. If the print does not come proper the lips should be wiped properly with tissue and the procedure should be repeated.
6. When the procedure is over the lips can be wiped with a tissue paper.
7. The recorded lip prints can be studied using a magnifying glass and the Tsuchihashi Y classification can be put to use and the classification done accordingly.
8. The procedure to be repeated again after six months to see for any change in the lip prints.

FINDINGS

As there were 20 men and 20 ladies studied for the research project it was taken that only the central portion of the upper lip was studied which was 1 cm in length from the central portion towards both the sides.

S No.	Type of lip print	Males	Females
1.	Type 1 clean cut vertical lines	7	6
2.	Type 1" partial length vertical lines	4	3
3.	Type 2 branched pattern	3	3
4.	Type 3 intersected pattern	1	2
5.	Type4 Reticular pattern	5	6
6.	Type 5 Other patterns	0	0

DISCUSSION

In the prospective observational study conducted on the medical students of second year of Indira Gandhi Medical College, Shimla in Himachal Pradesh in the month of February, 2011 and later on in the month of August, 2011 to see the lip print pattern on the central portion of the lip which extends to a length of 1 centimeter laterally on both the sides of the lip. Among the males the most common was the type 1 pattern followed by the type 4 pattern followed further by the type1" pattern. In the females the same

frequency in the patterns was observed that is the type 1 pattern being the most common followed further by the type 4 and further by the type 1".

There was a difference in the lip prints of each person and the lip prints did not change after a span of six months and remained same and the person could be negated easily from the pattern of lip prints record taken in the month of February, 2011 if the need for the same arises.

CONCLUSION

The lip prints can prove to an important point for identification of the individual and can be used as criterions for a national data base as the lip print are unique for every individual. It will not only help in nabbing the culprits but more important is that it will definitely exclude the innocent from the group of bad elements where ever the needs arises. Hence the lip prints are equally important as finger prints and other methods of identification.

ACKNOWLEDGMENT

The second year medical students did a wonderful job by activating participating in the study and hence our special thanks to them.

Conflict of Interest

This to certify that this is our original study and there is no conflict of interest among.

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Pattern of Alcohol and Tobacco Consumption among Transport Personnel in North Karnataka

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ABSTRACT

Background: Alcohol is a worldwide social and medical problem. Increased rates of drunkenness leads to involvement in road traffic accidents. Similarly use of tobacco is implicated in more deaths than all other psychoactive substances.

Objective: To study the prevalence of alcohol and tobacco consumption among drivers in Belgaum.

Method: A detailed pretested and validated questionnaire was used for interviewing the drivers. The information regarding basic socio-demographic variables, current habits (alcohol & tobacco use), past habits, frequencies/dosages, duration etc, were collected with the help of questionnaire.

Results: Of the drivers 91(24.9%) were current smokers, 27(7.4%) were ex-smokers and 247(67.7%) were non-smokers. The alcohol consumption rate was 35.1% and 25(6.8%) drivers had stopped consuming alcohol and were called ex-consumers.

Conclusion: The prevalence of alcohol consumption was high among drivers (35.1%) compared to general population. The use of smokeless tobacco was high among drivers (38.9%) compared to smoking form of tobacco (24.9%).

Key words: Alcohol, Tobacco, Transport, Drivers.

INTRODUCTION

Alcoholism is a worldwide social and medical problem. Over the past 30-40 years alcohol consumption has increased in quantity and frequency.¹ The age at which people start drinking has also declined.² According to current concepts, alcoholism is considered a disease and alcohol a disease agent which causes acute and chronic intoxication, cirrhosis of liver, toxic psychosis, gastritis, pancreatitis, cardiomyopathy, peripheral neuropathy etc. Also evidence is mounting that it is related to cancer of mouth, pharynx, and oesophagus.¹ Alcohol is a major risk factor for road traffic accidents as it impairs judgment and increases the possibility of involvement

in other high risk behaviors.³ Alcohol has been implicated in nearly 1.8million deaths globally, accounting for 3.2% of total deaths, 2.5% of total years of life lost, 6% of total years of disabled and 4% of the Disease adjusted Life years. Alcohol is the leading risk factor for deteriorating health status of population.⁴ It is also considered a risk factor for suicidal behavior and is associated with affective and non affective mental condition.⁵

Tobacco is the most widely distributed and commonly used drug in the world today. More deaths are due to tobacco than any other drug. Every year tobacco causes 3 million premature deaths.⁶ Tobacco is responsible for about 30% of all cancer deaths in developed countries. More people die from tobacco related diseases other than cancer such as stroke, Myocardial infarction, Aortic aneurysm and Peptic ulcer. There is evidence that earlier the person begins to smoke, greater is the risk of life threatening diseases like chronic bronchitis, emphysema, cardiovascular diseases and lung cancer.¹

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Transport personnel particularly the bus drivers are one such group who are at a risk of developing these habits due to nature of their profession. There are very few studies addressing this problem in this community. Hence we took up this study to know the prevalence of alcohol and tobacco consumption among the drivers in Belgauum.

MATERIAL AND METHODS

The present study is a cross sectional study undertaken to know the prevalence of alcohol consumption and tobacco smoking among drivers in Belgauum. The study was conducted in Belgauum for a period of one year i.e. from May 2007-April 2008.

Sample size: Since the prevalence of alcohol and tobacco consumption among drivers is not known, the sample size is calculated, considering the prevalence as 50%. And with a 10% relative error of prevalence, the sample size arrived at was 400. All the drivers were numbered and 400 drivers were selected at random by using 4 digits random number table. However, 365 drivers agreed to participate in the study.

Data collection: A detailed pretested and validated questionnaire was used for interviewing the drivers. The information regarding basic socio-demographic variables, current habits (alcohol & tobacco use), past habits, frequencies/dosages, duration etc, were collected with the help of questionnaire.

Study participants were questioned regarding their smoking habits and were labeled as

- i) Non-smoker: defined as a person who has never smoked tobacco or smoked <100 cigarettes/ beedies in his life time.
- ii) Ex-smoker: defined as a person who had smoked >100 cigarettes/ beedies in his life time before one year and is not smoking since last one year.
- iii) Current smoker: defined as a person who has smoked >100 cigarettes/ beedies and is currently smoking everyday or some day. They were asked regarding the details of smoking habits like number of cigarette or beedies and the duration of smoking.⁷

i) Smokeless Tobacco

Study participants were questioned regarding their habits of using smokeless tobacco like chewing tobacco, chewing ghutkha etc and were labelled as

- i) Non user: A person who had never used smokeless tobacco

- ii) Ex user: A person who was using smokeless tobacco before one year and is not using it at present.

- iii) Current user: A person who is using smokeless tobacco at present. They were asked about the total duration of tobacco use, in above forms.⁸

j) Alcohol consumption

Study participants were questioned regarding their habit of consuming alcohol and were labelled as

- i) Non alcoholic: A person had never consumed alcohol.
- ii) Ex alcoholic: A person who used to consume alcohol before one year and is not consuming alcohol at present.
- iii) Current alcohol consumer: A person who is consuming alcohol at present.⁸

They were enquired in detail regarding their drinking habit, number of times they consume alcoholic drinks in a week, quantity of alcohol consumed on the day they drink and the duration of alcohol consumption.

RESULTS

In the present study, participants comprised of 365 drivers and all of them were males.

Of drivers, majority 257 (70.4%) were in the middle (30-49) age group, Most of the participants (81.1%) were Hindus and only 19 (5.2%) had studied up to graduate level.

Out of 365 drivers, 212 (58.1%) were not consuming alcohol, 128 (35.1%) were currently consuming alcohol and 25 (6.8%) were ex-consumer. Out of 128 drivers who were currently consuming alcohol, 20 (15.6%) were consuming more than 360 ml alcohol per week and 43 (33.6%) were consuming it for more than 10 years. (Table 1).

Out of 365 drivers, 247 (67.7%) were non-smokers and 27 (7.4%) were ex-smokers and 91(24.9%) were current smokers. Out of 91 drivers who were smoking currently, 45 (49.4%) were smoking for more than 10 years and 7(7.7%) were smoking >20 cigarettes/ beedies per day. (Table 2).

Out of 365 drivers, 219 (60%) had never used smokless tobacco in any form, 142 (38.9%) were currently using smokeless tobacco and 4 (1.1%) were ex-users. (Table 3).

Table 1. Distribution of study participants according to alcohol consumption

Alcohol use	Drivers	
	No.	%
Non-users	212	58.1
Current Users	128	35.1
Ex-users	25	6.8
Total	365	100.0
Duration (in years)	Drivers (Current Users)	
	No.	%
Up to 5	38	29.7
6 – 10	47	36.7
>10	43	33.6
Total	128	100.0
Quantity (in ml)	Drivers (Current Users)	
	No.	%
Up to 90	70	54.7
91 – 360	38	29.7
>360	20	15.6
Total	128	100.0

Table 2. Distribution of study participants according to smoking status

Smoking Status	Drivers	
	No.	%
Non-smokers	247	67.7
Current Smokers	91	24.9
Ex-smokers	27	7.4
Total	365	100.0
No. of cigarettes/ beedies per day	Drivers (Current Smokers)	
	No.	%
1 – 10	73	80.2
11 – 20	11	12.1
>20	7	7.7
Total	91	100.0
Duration of Smoking (in years)	Drivers (Current Smokers)	
	No.	%
Up to 5	21	23.1
6 – 10	25	27.5
>10	45	49.4
Total	91	100.0

DISCUSSION

The extent of alcohol use and related problems has significant impact on public health. The spectrum of alcohol use in Indian society ranges from total abstinence (non use) to occasional use to harmful use. The proportion of population in different groups of this spectrum varies considerably among different societies.⁹

The prevalence of alcohol consumption in our study population was 35.1% in drivers. The prevalence

Table 3. Distribution of study participants according to use of smokeless tobacco

Use of smokeless tobacco	Drivers	
	No.	%
Non-users	219	60.0
Current Users	142	38.9
Ex-users	4	1.1
Total	365	100.0
Duration (in years)	Drivers (Current Users)	
	No.	%
Up to 5	51	35.9
6 – 10	55	38.7
>10	36	25.4
Total	142	100.0

is higher as compared to a study done on middle aged and elderly men from Western India where the prevalence was seen to be 18.9%.¹⁰

It was seen in our study that 33.6% of drivers were consuming alcohol for more than 10 years. It was also seen that 54.7% drivers had low consumption (<90ml of alcohol per week), 29.7 % drivers were moderate drinkers (91-360 ml) and 15.6% drivers were heavy drinkers (>360ml of alcohol per week). Although range of occupational and non occupational environmental factors is involved in alcohol consumption patterns, alcohol use among drivers has been suggested as a form of coping with occupational environmental stress.¹¹

The frequency of drinking as well as frequency of heavier drinking occasions are important dimensions of social meaning of drinking, and source of potential harmful consequences.¹² Increased alcohol consumption is related to increased risk of mortality and morbidity due to physical illness. There is an exponential relation between amount of alcohol consumed and criminal behavior. Adequate policies, programmes and legislation should be implemented to control alcoholism among the drivers.¹⁰

Tobacco use including both smoking and the nonsmoking forms of tobacco is common in India. Few reports of tobacco smoke use in different population groups report its prevalence from 15% to 50% among men.¹³ A substantial proportion of population in India has current or past smoking habits with a higher prevalence among males than females.¹⁰

In our study, it was seen that that the prevalence of tobacco smoking was 32.3% in drivers. However 7.4% of drivers were ex- smokers. A study conducted on a large population based sample of Delhi revealed that 45% of men were smokers.¹⁴ Another study, conducted among middle income subjects in Mumbai

showed that the prevalence of tobacco smoking was 23.6%.¹⁵ Another population based study, at four different centers in India suggested that the prevalence of smoking was 28.5%.¹⁰ The prevalence of smoking in our study is less as compared to Delhi population, but definitely high compared other places of India.

In a report by National centre for Health Statistics 2000 National Health interview survey, revealed that the prevalence of smoking is 23.5% among workers of transport industries.¹⁶ However another study conducted on bus and truck drivers revealed that 84% drivers had a smoking history, of which 13.5% were no longer smoking.¹⁷ The inclusion of truck drivers in the study may have attributed to the increased prevalence.

The use of smokeless tobacco was comparatively higher than smoking tobacco among drivers (38.9% vs. 24.9%). This difference could be because of use of smokeless tobacco for preventing themselves from feeling sleepy as well as the regulatory measures like no-smoking norms in the bus. Tobacco is often attributed to relieving the feeling of stress.¹¹

The prevalence of smoking and chewing tobacco vary widely and has association with individual socio-cultural characteristics including educational status and socioeconomic status.^{18,19}

CONCLUSION

Health related behaviors especially alcoholism and tobacco use are major determinants of health which are quite common among drivers. And non smoking form of consumption of tobacco is more in drivers compared to smoking form. Adequate policies, programmes should be implemented to change the behavior of this special occupational group to control alcoholism and tobacco use, especially of smokeless tobacco among drivers.

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Unplanned Complex Suicide- A Case Report

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ABSTRACT

Human suicidal behavior had always been a source of dread and wonder to mankind. Methods of suicide opted generally reflect the availability of the methods in the community and the mental make-up of the victim. The autopsy surgeon and the investigating agencies are posed with a challenge when multiple methods are opted for self-killing. The probabilities of homicide and accident had to be ruled out. Attributing the cause of death to the most lethal method amongst the multiple methods used is a rewarding task. A case of unplanned complex suicide by burn injuries and hanging, is presented and discussed. The cause of death was ascribed to hanging after a psychological autopsy and scene investigation.

Key words: Complex, Lethal, Psychological Autopsy, Suicide, Unplanned

INTRODUCTION

Terminating ones' life with multiple methods is called complex suicide.^{1,2} Primary or planned complex suicide is defined as a combination of more than one method, which was previously planned, in order to prevent the failure of the first method.³ Unplanned complex suicide, on the other hand, refers to the random inclusion of another method, after the first method had failed or was too slow or proved to be too painful.^{4,5} When multiple methods were used for self-killing, identifying the most lethal method as the cause of death is very essential. The primary opinion of the autopsy surgeon regarding the manner of death may guide the subsequent course of police investigations. A case of unplanned complex suicide by opting for burns and hanging had been presented where the cause of death was ascribed to the later.

Case Report

A corpse of an adult man aged 28 years was brought by police for post mortem examination to the department of Forensic Medicine, JSS Medical College, Mysore, with alleged history of hanging. The said hospital is a tertiary care teaching institute of Karnataka, India, which undertakes the Forensic autopsies of the locality under the jurisdictions of ten

police stations.

On the external examination of the case subject, 40% superficial burns were found present on the whole of the anterior aspect of the body excluding a few areas of outer aspects of right arm, forearm and inner aspect of right thigh. The scalp hairs were found to be singed in the temporal area. (Fig. 1) A partly burnt cotton cloth was found wrapped around the mouth with a knot on the right side of neck. An un-burnt portion of skin over an area of 18x5 cm was present beneath the cloth. (Fig. 2) A ligature material of un-burnt nylon cloth was present around the neck with knot on left side. The ligature material was overlying the cloth wrapped around the mouth at the back of the neck. Beneath the ligature material, an incomplete oblique ligature mark measuring a length of 32cm and a maximum width of 3cm, placed above the thyroid cartilage directed upwards and obliquely backwards, towards the mastoid processes was present. The surface of the lesion was reddish brown and dry. A bloodless layered dissection of the neck structures was made. A minimal contusion could be appreciated in the strap muscles of neck beneath the ligature mark. Hyoid bone and thyroid cartilage were intact. Internal examination was remarkable with cherry red colored blood and soot particles in the distal airways.



Fig. 1. Case subject with 40% superficial burns.



Fig. 2. Ligature material around the neck with partly burnt cloth wrapped around the mouth.

Investigation of the scene of occurrence

A retrospective examination of the scene of occurrence revealed the door of the room with a broken latch holder. This suggested a possibility of the latch being broken open from outside to gain access into the room. A suicide note of the deceased was also found.

Psychological autopsy

The immediate family members of the deceased were interviewed for possible information about the deceased. The deceased man was said to have had a progressive loss of vision since past 5 years. A history of depressive symptoms was noticed by the family members in the recent past. It was said to have been further precipitated after an ophthalmologist opined that the vision could not be restored. However no documentary proofs could be obtained about the said medical ailments.

DISCUSSION

Complex suicide specifies the use of more than one type of suicide method and may not denote the resourcefulness or intricacy of individual method.⁴ The victims of complex suicide were observed to be as

young to middle aged men with psychiatric disorders. Less lethal methods would have been tried before opting for more lethal ones, which would guarantee the death.^{3,6,9} In a complex suicide, the circumstance of death can be unfathomable, and a violent crime might be suspected at the very outset. This specially applies to cases where one of the methods used was fire, as flames are often employed in cases of homicide to cover up the crime.⁷ The observations and opinion of the autopsy surgeon about the manner of death as 'suicidal' may guide the subsequent course of police investigations. In the case series of complex suicides, a typical combination of 'two general methods' of suicide have been reported, like, drug overdose, hanging, use of firearms, drowning, fall from a height, and self mutilation by burning. An unplanned complex suicide mainly depends upon the availability of an alternative suicidal method and potentials for physical activities after the initial attempt had proved to be unsuccessful.⁴ In an unplanned complex suicide, several methods are said to be applied consecutively after the first method chosen has failed to achieve the intended effect. The passage from lesser to greater methods of lethality has been held as a characteristic feature of unplanned complex suicide.⁴ A case of unplanned complex suicide by an elderly man by self-strangulation and multiple sharp force injuries has been reported.⁴ In an unplanned complex suicide the medico legal queries that would arise are the antemortem or postmortem nature of the lesion, the cause and the manner of death.⁸

In the present case subject, the thermal lesions and ligature mark were held as antemortem from gross and microscopic examination. Soot in the distal airways and cherry red color of the blood were suggestive of antemortem nature of burn injuries. Crime scene investigation and psychological autopsy too were suggestive of suicidal manner of death. From the external examination, it was inferred that the deceased had wrapped the cloth to his mouth first and later set himself ablaze. Since death was not instantaneous and burn injuries were too painful, the deceased randomly resorted to hang himself. Hanging was the second method opted as the ligature material was unburnt and was overlying the cloth that was found wrapped around the neck. Therefore burns and hanging were the two different means of death in this case. Eventhough either one was sufficient by itself to effectuate death, it was more reasonable to suggest 'hanging' as the cause of death for the reasons explained. Hence the cause of death was ascribed to the compression of neck by hanging.

CONCLUSION

Methods opted for terminating ones' life varies widely from one geographic locale to another. The choice of the method opted usually depends upon the availability of the means, knowledge about the lethality and most obviously, the intent of the victim to terminate the life.⁹ This case represent an unplanned complex suicide where burn injury was the first method, which after being proved to be unsuccessful, hanging was opted as the second method. Such a case of complex suicide needs a multidisciplinary approach. A meticulous forensic autopsy along with scene analysis for the presence of suicide note, supplemented with a psychological autopsy for the history of precipitating factors like a previous suicide attempt and psychiatric disorders, shall prove to be beneficial.

Conflict of interest: None to declare.

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A Review of Vascular Pattern of Human Kidney by Corrosion Cast Technique

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ABSTRACT

Until the middle of nineteenth century, renal surgery had invariably been limited to drainage of the perirenal abscesses or pyonephrosis. By the end of the century, major renal surgical procedures, like nephrectomise etc did catch the surgeons' fancies. John hunter (1793) Brodel (1954) studied the renal vascular segments and enunciated the segmental structure of the kidney. These observations opened the new chapter in the anatomy of the kidney and tempted conservative genitourinary surgeons at modifications of their surgical procedures for dealing with serious renal pathologies. The realisation of the segmental nature of the distribution of renal arteries led to the attempts at preservation of significant healthy renal tissue, even with not so satisfactory renal function, than to its complete removal.

The advent of more conservative methods practised in modern genitourinary surgery, necessitated a perfect and precise knowledge of the renal vascular segments. The present study is a modest venture to further elucidate the renal vascular segments in autopsy material and provide a fairly precise anatomical data for the practise of modern urological surgery.

INTRODUCTION

Kidneys are derivatives from the caudal end of mesonephric ridge located on either side of dorsal aorta. These then undergo ascent to reach their postnatal anatomical location and in doing so there is disintegration of the old blood vessels with establishment of newer blood supply.

The renal parenchyma is divided into 5 segments- apical, upper, middle, lower and posterior as can be seen in the figure.

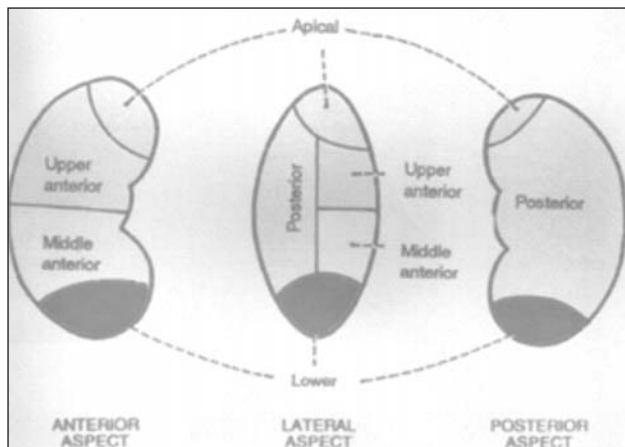


Fig. 1. Renal Vascular Segments

Graves (1954) observed a constant intrarenal arterial pattern for each of the 5 segments. Each has its own specific arterial supply with no collateral to neighbouring segments. John hunter (1793) from his studies enunciated that while the renal veins had anastomotic connections, renal arteries behaved like "end arteries"

Renal artery on each side arises from lateral aspect of abdominal aorta. Merklin and Michel (1958) observed that right happened to have a higher origin in 46.6%, lower in 23.6% while in 29.8% there was no relative variation. The renal artery then divides into an anterior and posterior segment. The posterior division continues as artery to the posterior segment with a constant origin and course while the pattern of branching of anterior division was variable and classified these variations into 3 groups.

Group1- the lower segmental arose prior to the common origin to the upper and middle segmental arteries

Group 2 – lower segmental artery arose with or more usually a little proximal to the upper segmental artery and middle segmental artery arose from the side of the lower segmental artery.

Group 3- all three had a common origin point from anterior division of renal artery.

Verma et al (1961) noted a fourth group where the main renal artery divided into two divisions in the upper part of hilum of the kidney. These descending branches enter the renal parenchyma and distributed by multiple branches which do not exhibit any segmental distribution.

Accessory renal arteries are reported by graves (1954)30% and Sykes (1964) 25.8%. Such arteries developmentally are persistent lateral segmental branches of the dorsal aorta escaping the usual oblitative phenomena. Machalister (1882) and Chatterji (1963) found a comparative preponderance of accessory renal arteries to the right lower pole of the kidney while reversed preponderance was observed by Brash and Jamieson (1947). Albarran (1909) found that the accessory arteries passing to the lower pole were twice that of the upper pole.

Looking into the arterial supply of the 5 segments as mentioned above, apical segment has an independent artery, the apical artery. The upper, middle and lower segments receive segmental branches from the anterior division while posterior segment gets its supply from posterior branch.

Apical artery has most variable origin of all segmental arteries. As classified by Kher (1960)

- Type 1- from anterior division 42.28%
- Type 2- from upper segmental artery 15.09%
- Type 3- from junction of anterior and posterior division 5.66%
- Type 4- from renal artery 1.86%
- Type 5- from aorta 2.44%
- Type 6- from posterior branch 22.64%

The upper segmental artery arises from anterior division of renal artery (Graves 1954) at hilum or under its anterior lip. Mostly inside the segment and sometimes at hilum itself it divides into two branches- apical, running upwards in front of upper calyx and lateral, which supplies lateral border of kidney.

Middle segmental artery from anterior division of renal artery (Graves 1954) divides at hilum into upper and lower branches supplying the middle segment of kidney.

Lower segmental artery, usually a branch of anterior division of renal artery but its origin from other sources eg. aorta, posterior division etc was always a possibility (Graves 1954, Kher et al 1960) it

goes in front of uretric pelvis to the lower segment where it divides into anterior and posterior branch and supply respective areas of lowest calyx and lower pole.

Posterior segmental artery which is a continuation of posterior division of renal artery enters at posterior border of hilum which internally is located at junction of upper calyx and renal pelvis and descends top reach the posterior segment where it divides into 3 groups.

Upper group-1 or 2 in number supplying posterior part of upper calyx

Middle group-interdigitate with arteries of middle segment

Terminal group- supply upper part of lower calyx and its posterior surface intrarenal tributaries of renal vein are freely anastomotic (graves 1954, unter1993). The venous tributaries draining 3 lobes unite intrarenally, in hilum or extrahilarly to form renal vein. Left renal vein is longer than right and courses in front of left renal artery and joins IVC. It receives left suprarenal and left gonadal veins. Right renal vein runs in front of renal artery and joins IVC. It does not receive any tributaries.

In our study 25 pairs of human kidney (both sexes) were obtained. They were removed en mass with segments of abdominal aorta, IVC, and ureter. Gross anatomy of hilar structures was studied and then corrosion casts prepared

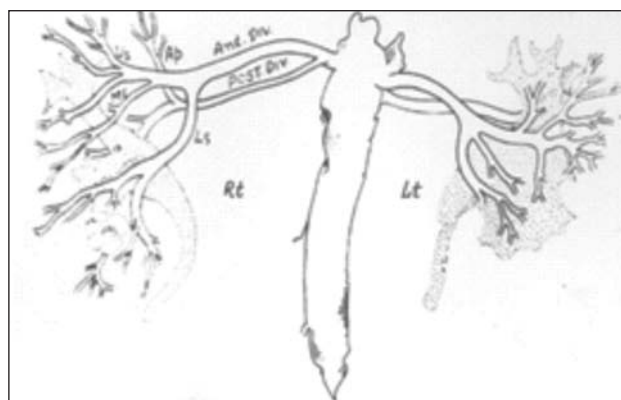
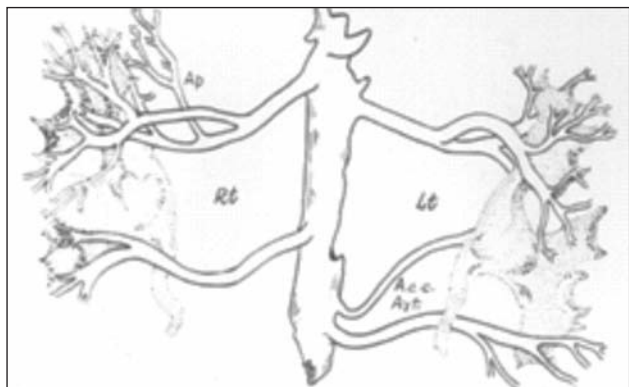
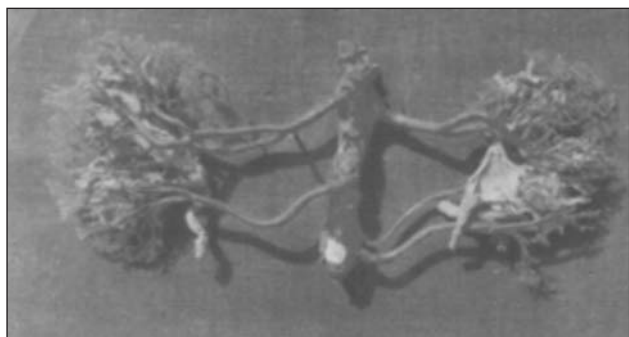
RESULT

In 90% of the specimens each kidney had single large renal artery. 10%, 3 being on right and 2 on left, 2 accessory renal arteries were found entering upper pole and 3 were found entering lower pole. In 48% of specimens right renal artery had a higher origin than left renal artery while 36% specimens showed left as higher and in 16% specimens they originated at same level.



Diagram and specimen showing accessory renal artery entering lower pole with precaval course





Specimen and diagram showing
Ap-apical artery
Acc Art-accessory artery

Specimen and diagram showing
Ant div-anterior division Post div-posterior division Ap-apical artery
Ls-lower segment artery Ms-middle segment artery Us-upper segment artery

92% of specimens where renal artery divided into anterior and posterior divisions, 52% were at hilum and 34% were between hilum and aorta. In rest of the 8% specimens no anterior and posterior divisions were seen. All segmental arteries originated directly from renal artery.

Posterior division of renal artery showed a constant system of branching pattern while anterior division showed variable branching patterns grouped as follows

Type 1-lower segmental artery originated from anterior division before its final division into upper and middle segmental arteries. 18%

Type 2- all segmental arteries arise from anterior division main trunk. 18%

Type 3- middle segmental artery arises from lower segmental artery which is a branch of anterior division which continues as artery to upper segment. 44%

The origin and distribution of apical artery was very variable. 42% from posterior division, 18% from upper segment artery 2 % from lower segment artery 24% from anterior division and 4% from abdominal aorta. 32% specimens had multiple apical arteries.

Upper segmental artery was observed to be supplying upper part of central area on anterior surface of kidney. In 80% specimens it was seen to arise from anterior division of renal artery, other lesser important sources being main renal artery in 8% specimens and from lower segmental artery and posterior division an 4% specimens for each.

Middle segmental artery supplied anterior and lower part of central area of the kidney. 48% specimens showed its origin from anterior division and 44% specimens showed it arising from lower segmental branch.

Lower segmental artery in 90% specimens arises from anterior division and in 8% specimens for m renal artery. It supplies the anterior and posterior surface and medial border of the lower pole of the kidney.

Posterior segmental artery was practically constant in its origin and course. N all 50 specimens it was a continuation of posterior division. Its terminal branches were observed to be distributed to the upper part of the posterior segment while the main posterior division got distributed to middle and lower parts of posterior segment.

Unlike the arteries, renal veins did not show a segmental pattern, although extensive anastomosis was seen in renal parenchyma. The tributaries formed renal vein either in hilum (30%) or medial to it (70%). Left renal vein had left gonadal, left suprarenal veins as its tributaries. An accessory renal vein for the right upper pole of the kidney was also observed.

DISCUSSION

In our study single renal artery was present in 90% specimens as against 72% observed by Merklin and Michel (1958). The comparative levels of origin of right and left renal arteries were in accordance to as reported by Merklin and Michel (1958).

The presence of accessory renal arteries has been a constant observation in the present study. Graves (1954) and Sykes (1964) had reported an incidence of 30% and 25.8% respectively as against the incidence of 10% in all the specimens examined. Their right sided preponderance observed in present series was in agreement to similar observations of Macalister (1882) and Chatterji (1963). In one specimen accessory renal artery had a precaval course. These variants in the incidence of rich accessory arteries could create problem to urological surgeons if not cared for.

Our observations on origin of anterior and posterior divisions of renal artery were similar to those reported by Graves (1954) and Verma et al (1961). The division usually occurred at the hilum (50%) but the possibility of earlier division cannot be completely ruled out as it has been observed in some of the specimens.

While the intrarenal branching of posterior division into its terminal segmental branches appeared to follow a fairly constant pattern, the anterior division exhibited no set pattern. Usually the upper, middle and lower segmental arteries arose from the anterior division and supplied the respective segments of the renal parenchyma. The possibility of one segmental artery completely substituting the segmental branch of the adjacent segment cannot be ruled out.

The origin and distribution of apical artery did not exhibit any set pattern. Most common origin in our study was from posterior division which was second in Kher's series. Each apical artery divided into

anterior a posterior branch and supplied anterior and posterior surface and medial border of upper pole.

No anastomosis between segmental arteries could be defined. These thus function as "end arteries". The intrarenal tributaries of the renal vein, on the contrary showed multiple anastomotic channels. There was a definite division of the kidney substance into five arterial segments- three anterior, one posterior and one apical. Each of these specimens had their specific arteries and ducts.

It is thus anticipated that the present conclusions drawn here should prove valuable anatomical guide to the surgeons who practise more conservative procedures of partial or segmental resections of rather unhealthy renal tissue.

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A Study of Psychiatric Morbidity among Patients Suffering from Pulmonary Tuberculosis

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ABSTRACT

Objective: 1. To study the psychiatric morbidity in patients hospitalized for pulmonary tuberculosis. 2. To study the psychiatric morbidity in relation to socio-demographic variables and clinical variables like duration of illness, duration of stay in hospital and complications of pulmonary tuberculosis.

Methodology: One hundred cases diagnosed with pulmonary tuberculosis and admitted in medicine and chest wards of a multispeciality hospital were evaluated for psychiatric morbidity. Chi-square test was used for statistical analysis.

Results: Psychiatric morbidity was seen in 46% of patients with pulmonary tuberculosis. Majority of these cases were depressive disorders followed by anxiety disorders. A statistically significant association was found between depressive disorders and duration of illness, length of hospital stay and anxiety disorders were associated with lower educational status.

Conclusion: Tuberculosis is a major public health problem which is associated with psychiatric morbidity. Hence measures to address psychiatric morbidity are necessary in improving the management of tuberculosis patients.

Key words: Psychiatric Morbidity, Pulmonary Tuberculosis, Depression and Anxiety Disorder

INTRODUCTION

Tuberculosis remains a leading infectious cause of mortality and morbidity worldwide. Despite the availability of inexpensive and effective therapy, tuberculosis remains a leading cause of death. Patients suffering from pulmonary tuberculosis are reported to have psychiatric disorders like depression, anxiety, psychosis and also psychosocial problems like increased smoking, increased alcohol consumption, divorce and isolation from the family. More attention has to be paid to the psychiatric manifestations in chronic illnesses like tuberculosis to alleviate the mental suffering of these patients.

In India there has been some attempt in this direction. Purohit et al (1978)¹ studied prevalence of

depression in patients suffering from pulmonary tuberculosis, Prakash and Sethi (1978)² reported about presence of hypochondriacal symptoms and their psychiatric status in patients attending medical out-patient department.

The present study has been conducted to study the psychiatric morbidity in patients with tuberculosis.

OBJECTIVE

1. To study the psychiatric morbidity in patients hospitalized for pulmonary tuberculosis.
2. To study the psychiatric morbidity in relation to socio-demographic variables and clinical variables like duration of illness, duration of stay in hospital, & complications of pulmonary tuberculosis.

MATERIAL AND METHODS

Study participants were selected from the in-patient department of Medicine, Chest and Tuberculosis in multispeciality hospital in Karnataka. One hundred

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patients who were diagnosed with pulmonary tuberculosis were included in the study. Patients were diagnosed either by sputum examination and/or X-ray examination. An informed consent was obtained from those who were willing to participate in the study.

Patients with pulmonary tuberculosis with other medical illness and patients already having psychiatric illness prior to the diagnosis of pulmonary tuberculosis were excluded from the study.

The socio-demographic data of the pulmonary tuberculosis patients was collected by using predesigned, pretested, semi-structured questionnaire with the help of socio-economic status schedule by Sodhi and Sharma (1986)³ and were assessed for psychiatric disorders using MINI (The Mini-international Neuropsychiatric Interview).⁴

Statistical analysis: Summary figures like rates, percentage were calculated. Chi-square test was used to test the association between psychiatric morbidity and various socio-demographic parameters, duration of illness and length of hospital stay.

RESULT

Majority (70%) of study participants were above the age of 30 years. 55% were from urban area while 45% were from rural areas. Majority (61%) of them were Hindus. Only 15% of the patients were illiterates. 44% of the patients were coolies, while 23% of the patients were housewives. Majorities (68%) of patients were married and 51 percent of the patients belonged to Class-III category of socio economic status Table 1.

Table 1. Socio-demographic Characteristics of Study Participants (n=100)

Socio-demographic Characteristics	No.	Percentage
Age Group (Completed Years)		
<20	13	13
20-30	17	17
30-40	23	23
40-50	34	34
50-60	13	13
Sex		
Male	64	64
Female	36	36
Religion		
Hindu	61	61
Muslim	20	20
Christian	19	19
Educational status		
Illiterate	15	15
Primary	15	15

Socio-demographic Characteristics	No.	Percentage
Age Group (Completed Years)		
Secondary	46	46
PUC/12 th Std.	18	18
Diploma	01	01
Graduates	05	05
Marital Status		
Unmarried	23	23
Married	68	68
Widow/er	09	09
Socio-economic Status		
Class I	00	00
Class II	08	08
Class III	51	51
Class IV	41	41
Domicile		
Urban	45	45
Semi-urban	14	14
Rural	41	41
Occupational Status		
Unemployed	08	08
Business	06	06
Coolies/Farmer	59	59
Service (Govt.)	03	03
Student	01	01
Housewife	23	23
Total	100	100.0

Table 2. Psychiatric Morbidity in patients with pulmonary tuberculosis

Sl. No.	Diagnosis	Frequency	Percentage
1.	Only Depressive disorder	20	20%
2.	Only Anxiety disorder	08	08%
3.	Both Depression and Anxiety	16	16%
3.	Manic disorder	02	02%
4.	Normal	54	54%
5.	Total	100	100%

Forty-six percent of the patients under study were having psychiatric disorders as co-morbidity. 36% were diagnosed as depressive disorder [Isolated depressive disorder (20) + both depression and anxiety¹⁶ and 24% as anxiety disorder [Isolated anxiety disorder (08) + both depression and anxiety¹⁶. Only 2% were suffering from Mania Table 2.

Table 3. a) Association between Depressive disorders and Duration of illness

Duration of illness	Depressive disorder		Total
	Yes	No	
< 3 months	15	59	74
> 3 months	21	05	26
Total	36	64	100

($X^2=31.084$, $p<0.001$)

b) Association between Depressive disorders and Duration of hospital stay

Duration of Stay	Depressive disorder		Total
	Yes	No	
≤ 15 days	25	59	84
> 15 days	11	05	16
Total	36	64	100

(X²=12.877, p<0.005)

Table 4. a) Association between Anxiety disorders and Education

Educational Status	Anxiety Disorders		Total
	Yes	No	
Illiterate	07	08	15
Primary	05	10	15
Secondary	09	37	46
PUC/12 th std.	02	16	18
Diploma	01	00	01
Graduates	00	05	05
Total	24	76	100

(X²=22.814, p<0.029)

b) Association between Anxiety disorders and Complications of Tuberculosis

Complication Status	Anxiety disorder		Total
	Yes	No	
Without Complication	16	67	83
With Complication	08	09	17
Total	24	76	100

(X²=6.511, p<0.039)

Depressive disorders were associated with the duration of pulmonary tuberculosis and length of hospital stay and anxiety disorders were associated with education and complications of tuberculosis. These associations were statistically significant. [Table 3 a) and b), Table 4 a) and b)].

DISCUSSION

The prevalence of psychiatric morbidity among the hospitalized pulmonary tuberculosis patients in the present study was 46% which is less in comparison with the studies done by Bhatia et al⁵, Immerman’s et al⁶, Meghanani et al⁷, Gupta et al⁸ which showed the prevalence of 78%, 64.7%, 54.1%, 53.6% and 41.6% respectively and more in comparison with the results of the study done by Manoharam et al⁹, Silverstone et al¹⁰, Mathai et al¹¹, Aghanwa et al¹², Sachdev et al¹³, Sriram et al¹⁴, Bagadia et al¹⁵ which showed the prevalence to be 17.3%, 27.2%, 28.8%, 30.2%, 31%, 31%, 36% respectively.

Out of 46 cases of psychiatric morbidity, majority 36 (78%) were having depressive disorder, 24 (52%)

were having anxiety disorder and only 2 (4%) were having manic disorder. Similar results were found in studies conducted by Yadav et al¹⁶, Tandon et al¹⁷, Westaway et al¹⁸, Aghnwa et al¹², Immermons et al⁶, which have shown that the depression followed by anxiety disorder are the major psychiatric co-morbidity among the patients who had medical disorder.

In the present study, there was an association between the depressive disorder and the duration of the pulmonary tuberculosis and this association was statistically significant. The longer the duration, the more prominent were the depressive disorders. Prolonged duration of illness could cause helplessness and could also lead to financial burden. Patients might develop fearfulness towards pulmonary tuberculosis leading to more depressive illness. It is comparable with the studies done by Purohit et al¹¹, Mathai et al¹¹, Bhatia et al⁵ which showed significant association between depression and duration of illness, but differs from study done by Yadav et al¹⁶ in which there was no association between these two variables.

The present study also showed statistically significant association between depression and duration of hospital stay. Longer the duration of stay more were the depressive disorders. The reasons for more depressive illness were patient’s ill perception about the disease. Somatic symptoms of pulmonary tuberculosis were also similar to the symptoms of depression. Hence there may be over inclusion of depressive disorders. Patients may have fear of spreading the illness to others.

The present study did not reveal any significant association between depressive disorder and other parameters like age, sex, religion, occupation, education, socio-economic status and marital status.

A statistically significant association was found between anxiety disorder and education in this study. Anxiety increases with decrease in educational status and was maximum in illiterate and primarily educated group. The probable reason being, the lesser educated people might still have stigma about tuberculosis and perceiving tuberculosis as a curse by GOD, fear of being separated from the family members and fear of spreading the illness to others. It is comparable with studies by Yadav¹⁶, John Mathai¹¹, Bagadia¹⁵, Gupta⁸, Immerman⁶ and Fulop¹⁹ which have shown similar results.

The present study also revealed that, anxiety disorders were more common in participants having complications of tuberculosis as compared to non-

complicated tuberculosis. This association between anxiety disorder and the complications of tuberculosis was statistically significant. Possible reasons were the patient's incapacitation, somatic symptoms of tuberculosis, social stigma, set back in occupation, and decreased self esteem.

There was no significant association found between anxiety disorder and other parameters like age, sex, religion, occupation, socio-economic status, marital status, duration of illness and length of hospital stay.

CONCLUSION

The prevalence of psychiatric morbidity among the patients who were admitted for pulmonary tuberculosis was 46%. Depressive disorders and anxiety disorders were the leading form of psychiatric morbidity. Psychiatric counseling and special camps like yoga, meditation should be carried out regularly for such patients so as to decrease the burden of psychiatric morbidity.

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A One Year Profile of Medico-legal Cases at Tertiary Care Hospital in Western Uttar Pradesh

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ABSTRACT

Profiling of Medico legal cases will help authorities for planning, prevention and treatment of casualties. This Study was carried out on Medico legal cases reporting to casualty of SIMS Panchsheel Nagar in one year duration from 1st Jan. to 31st Dec.2009. The main objectives of the study were to analyze pattern and study demographic variables of Medico legal cases and suggest preventive measures which would possibly reduce incidence of these case. Out of total 583 cases 4 were brought dead so excluded from study. Males (76.51%) outnumbered the females and maximum cases were of age group 21-30 yrs. (32.10%) more cases from rural area(62.5%) were reported, April month saw maximum no of cases (11.6%), Maximum admission were done during office hours (50.3%), maximum no. of incidence was seen on NH-24(63.4%), RTA was the commonest mode of injury (71.50%). Lacerated wound was the commonest injury (23.49%) and more than one region of body was involved in maximum cases (36.6%). Lower limb bones were involved in 7.43% of cases. 79.10% cases were treated effectively and discharged.

Key words: Medico-legal Case, Road Traffic Accidents, Poisoning, Distribution of Injury.

INTRODUCTION

Medico-legal case is a case of injury or illness resulting out of accidents, poisoning or any suspicious circumstances where the doctor thinks that inquiry by police and law is required to fix the responsibility to bring about the justice¹.Injuries are increasingly becoming a major health problem and leading causes of mortality and morbidity .They represent 12% of global burden of disease and third most important cause of overall mortality. Incidence of road traffic accidents has increased many folds throughout the world. By the year 2020 it is estimated that in countries like India, mortality from injury will be more than those from communicable disease^{2,3}.In developing countries current trend in population growth, industrialization and urbanization are putting heavy pressure on the transport network in general and lack of infrastructure, knowledge and initiative leave vast tracts of national highways, roadways and hazards zones unattended and underserved in the case of calamities, accident and disasters^{4,5}.

OBJECTIVE

1. To analyze pattern of Medico-legal cases
2. To study demographic variables of Medico-legal cases

3. To suggest preventive measures which would possibly reduce incidence of these cases.

MATERIAL AND METHOD

The study has an aim to find out profile of medico-legal cases reporting to the hospital. The study was conducted from 1st January 2009 to 31st December 2009 of all medico-legal cases reporting to casualty .The institute is situated at the NH 24 in NCR region of U.P. General information of each case was confirmed from hospital records, victims attendants and police. The collected data was analyzed, observation discussed and compared with other studies.

OBSERVATION AND RESULTS

Table 1. Age and Sex wise Distribution

Age	Male (%)	Female (%)	Total (%)	Sex Ratio
Up to 10	27(6.10)	13(9.60)	40(6.90)	2:1
11-20	84(19.00)	19(14.00)	103(17.80)	4.4:1
21-30	152(34.30)	34(25.00)	186(32.10)	4.4:1
31-40	82(18.50)	33(24.30)	115(19.90)	2.4:1
41-50	56(12.60)	16(11.80)	72(12.40)	3.5:1
51-60	27(6.10)	18(13.20)	45(7.80)	1.5:1
61&above	15(3.40)	3(2.20)	18(3.10)	5:1
Total	443(100)	136(100)	579(100)	3.25:1

Table 1 shows out of total of 579 cases 76.51% were males and (23.49%) were females. Male female ratio was 3.25:1 Indicating male predominance. In this age group analysis maximum incidence was seen in age group 21-30 years comprising (32.10%) cases, this was followed by age group 31-40 years (19.90%). Combining both factors it is very clear that young adult male forms maximum no. of medico legal cases.

Table 2. Urban rural distribution

Residence	Number	Percent
Urban	217	37.5
Rural	362	62.5
Total	579	100

Table 2 shows that rural victims (62.5%) are more than urban victims which comprised of (37.5%) of total cases.

Table 3. Month-wise distribution

Month wise Accident	Number	Percent
January	48	8.3
February	42	7.3
March	51	8.8
April	67	11.6
May	44	7.6
June	65	11.2
July	62	10.7
August	53	9.2
September	55	9.5
October	36	6.2
November	27	4.7
December	29	5
Total	579	100

Table 3 shows the distribution of cases according to months. Maximum cases were reported in the month of April (11.6%) followed by June (11.7%) and July (10.7%) respectively.

Table 4. Arrival time

Arrival Time	Number	Percent
8 AM – 4PM	291	50.3
4 PM – 12AM	207	35.8
12AM – 8AM	81	14
Total	579	100

Table 4 shows that 50.3% of cases reported to casualty between 8 AM to 4Pm in the evening. Least no. of cases was seen during midnight to early morning.

Table 5. Distribution according to place of Incidence

Place of Incident	Number	Percent
NH-24	367	63.4
Village Road	42	7.3
City Road	35	6
Railway track	3	0.5
Work Place	29	5
Home	103	17.8
Total	579	100

Table 5 shows majority of incidents occurred at NH 24(63.4%) followed by home (17.8%).

Table 6. Person who brought the patient to hospital

Brought By	Number	Percent
Police	60	10.4
Passerby	66	11.4
Relative	308	53.2
Self	31	5.4
College Ambulance	5	0.9
NH Ambulance	109	18.8
Total	579	100

Table 6 shows that majority of the patients were brought to hospital by their relatives (53.2%) followed by NH ambulance (18.8%). Small no. of cases came alone (5.4%).

Table 7. Mode of Injury

Mode of Injury	Number	Percent
RTA	414	71.50
Electrocution	3	0.52
Assault	18	3.11
Poisoning	62	10.71
Burn by flame	4	0.69
Chemical Burn	8	1.38
Fall from height	36	6.22
Fall of heavy object on head	4	0.69
Railway Injury	5	0.86
Accidental injury at work	20	3.45
Others	5	0.86
Total	579	100

Table 7 shows that RTA formed major part of study (71.5%) followed by poisoning (10.71%) and fall from height (6.22%) respectively. Others include cases of near strangulation, drowning, firearm injury and self-inflicted injury by sharp weapon.

Table 8. Manner of Injury

Manner of injury	Number	Percent
Accidental	518	89.5
Suicidal	42	7.3
Homicidal	19	3.3
Total	579	100

Table 8 shows the maximum incidence of accidental injuries (89.5%).

Table 9. Conscious/Unconscious

Status of patient	Number	Percent
Conscious	493	85.1
Unconscious	86	14.9
Total	579	100

Table 9 shows that 85.1% of cases were conscious when reported to casualty. Semiconscious patients were included in unconscious patients.

Table 10. Nature of injury

Nature of Injury	Number	Percent
Abrasion	107	18.48
Amputation	2	0.35
Laceration	136	23.49
Bruise	44	7.60
Sharp Injury	4	0.69
Burn by flame	4	0.69
Chemical Burn	8	1.38
Electrocution	3	0.52
Crush Injury	11	1.90
Multiple Injury	134	23.14
Absent	62	10.71
Blunt Injury	64	11.05
Total	579	100

Table 10 shows the nature of injuries sustained by patients. Maximum cases had lacerated wound (23.49%) alone followed by multiple injury (23.14%) where more than one kind of injury was present. 11.05% cases did not show any visible injury externally at the time of examination. 10.71% cases didn't sustain any injury.

Table 11. Distribution of Injury

Distribution of Injury	Number	Percent
Head, Neck, Face	147	25.4
Upper Limb	47	8.1
Chest	15	2.6
Abdomen	9	1.6
Pelvis & Genitals	10	1.7
Lower Limb	64	11.1
Back	9	1.6
Multiple region	216	37.31
Absent	62	10.71
Total	579	100

Table 11 shows distribution of injury on different body parts. Maximum no. of cases showed more than one region involved (36.6%) followed by head, neck and face (25.4%) and lower limb (11.1%) respectively.

Table 12. Distribution of Fracture

Fracture	Number	Percent
Skull	29	5.01
Upper limb	28	4.84
Thorax	11	1.90
Lower Limb	43	7.43
Teeth	6	1.04
Spine	2	0.35
Multiple	12	2.07
Pelvis	3	0.52
Indeterminate	15	2.59
Absent	430	74.27
Total	579	100

Table 12 shows distribution of fracture. Fracture was present in 23.14% of cases. Out of which lower limb showed maximum no. of cases (7.43%) followed by skull (5.01%) and upper limb (4.84%). There was no fracture in 74.27% of cases and in 2.59% cases it could not be determined due to referral or lama cases.

Table 13. Duration of stay in Hospital

No. of days	Number	Percentage
< 1	274	47.32
1-2	213	36.79
3	27	4.66
4	11	1.90
5	17	2.94
6	9	1.55
7	4	0.69
8-14	14	2.42
> 14	10	1.73
Total	579	100

Table 13 shows the duration of stay in hospital. Maximum no. of cases stayed in hospital for less than one day (47.32%) followed by patients who stayed from one to two days (36.79%). 2.42% of the cases stayed from one to two weeks and 1.73% of the cases more than two weeks.

Table 14. Outcome of the cases

Outcome	Number	Percent
LAMA	75	12.95
Dead	6	1.04
Referred	40	6.91
Discharged	458	79.10
Total	579	100

Table 14 shows the distribution of cases according to their outcome. Majority of cases were discharged (79.10%), (6.91%) cases referred to higher centers, 12.95% were LAMA and 1.04% died.

DISCUSSIONS

In the present study total 583 cases were reported to the casualty during one year duration from 1st of Jan to 31st Dec 2009. Out of these 4 cases were Brought Dead which were not included in the study. So study was conducted on 579 cases only.

Maximum no. of patient belonged to the age group 21-30yrs (32.1%) and age group 11-40yrs formed almost (70%) of the cases. Involvement of this age group which is most active and most productive puts huge burden on economy and social loss to the country. Similar findings have been noted in other studies^{2,4,6,8,9-13}.

In present study males (76.51%) outnumbered females (23.49%) which is consistent with other similar studies^{2,4,6,8,9-13} reason being the male member being earning member of family and is more exposed to risky business but in study done at Abbottabad Pakistan¹², there was marked disproportion between two sex in ratio of 38:1 reason could be the conservative approach of Muslim dominated society.

Rural population (62.5%) was affected more than urban population (37.5%). Similar findings are seen in some studies^{2,9} and opposite is seen in study of BR Sharma⁷. Reason could be the demographic situation of the hospital which is present in the rural area.

In this study maximum no. of cases were seen in the month of April (11.6%) followed closely by June (11.2%) and July (10.7%) respectively. Reason could be due to increased agricultural activity, increased movement and due to change in weather tempers are running high. More no. of cases in rainy season is due to slippery roads and bad road conditions. Similar findings are noted in other study also^{9,14}.

Almost 50% of cases were reported to hospital between 8AM to 4PM and least reported during midnight to early morning. Time matches with the working office hours where people are more active on roads or busy at work place and it coincides with the study of Nilambar Jha from South India⁶. These findings do not match with the studies^{2,9} where peak time was during evening or night time.

Maximum no. of injuries occur on road (76.7%) followed by home (17.8%) and work place (5%)

respectively. High incidence of trauma is due to lack of awareness of traffic rules strict implementation of these rules and improper structuring of roads. Similar findings have been seen in Suryanarayana study³.

In present study maximum no. of patients when came to hospital were brought by their relatives (53.2%) followed by NH ambulance (18.8%) and passerby (11.4%) respectively.

Among the various injuries RTA comprised of maximum no. (71.5%) followed by poisoning (10.71%) and fall from height (6.22%) respectively. These findings are consistent with other studies^{2,7,15}.

Most of the injuries in this study were accidental (89.5%) while suicidal were (7.3%) and least common were homicidal (3.3%). These findings are consistent with other studies^{2,3,9} while in one study from Abbottabad Pakistan¹² majority of the cases were homicidal in nature due to ongoing violence in the area. In accidental injury RTA was commonest mode, in suicidal injury poisoning was commonest mode and in assault cases blunt object constituted commonest mode which is also seen in Swarankar study⁹.

Alcohol intoxication was present in (5.2%) of cases and Similar scenario is seen in other studies also^{3,9}. majority of them were RTA cases (60%) while (23.33%) presented as a case of poisoning.

Patient when reported to casualty 14.9% were semiconscious or unconscious and majority of these cases were RTA victims (54.65%) followed by cases of poisoning (25.5%).

In present study majority of patients received grievous injury (52.5%) followed by simple injury (42.5%). Those patients who received dangerous injury (5%), (51.72%) were referred to higher center, (31%) were treated effectively and discharged while (10.34%) expired.

In present study maximum no. of cases sustained lacerated wound (23.49%) followed closely by multiple injuries (23.14%) and abrasion (18.48%) respectively. More no. of these injuries is consistent with the RTA injuries. While In Nilambar Jha study from South India⁴ abrasion was the commonest injury followed by lacerated wound and this presentation of injuries are also seen in RTA cases.

In present study of injury distribution, multiple regions was involved in (36.6%) cases followed by Head, Neck and Face (25.5%) and lower limbs (11.1%) respectively. In involvement of multiple region

majorities of the cases were associated with injury of Head, Neck and Face. So overall Head, neck and face were the most common region involved which is same as in other studies also^{4,3,10}.

In present study some element of Head injury was present in (13.5%) of cases. Out of these head injury cases (54.11%) cases were discharged after treatment, (25.88%) were referred and (4.7%) expired.

In present study Fractures were present in (23.14%) of cases in which lower limb (7.43%) was involved in maximum no. of cases followed by skull (5.01%) and upper limb (4.84%). Same findings are seen in studies^{4,8}.

Majority of cases were discharged/LAMA/died/referred with in 24 hrs (47.32%) followed by (36.79%) cases on second day, (2.42%) cases stayed up to second week and (1.73%) cases stayed even after second week. These findings are similar to Vishal Garg study².

Majority of the cases were discharged after taking treatment (79.1%), (6.91%) were referred to higher centers, (12.94%) went against medical advice and (1.04%) expired. Similar findings have been noted in Vishal Garg study². Out of expired person majority died due to RTA.

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RECOMMENDATIONS

After going through the study it is clear that the cases of RTA are making huge number to the admission of casualty and causing disability and death.

Following suggestion are made to prevent RTA and manage it better-

- Strict implementation of traffic rules.
- Stringent action against the rule violations.
- Don't drink and drive.
- Don't tailgate.
- Don't use cellphone while driving.
- Avoid road rage.
- Always use helmet and safety belt.
- Limit the speed at turns, curves and accident prone areas.
- Front and back of the vehicles should have reflectors.
- Proper maintenance of the roads.
- Widening of roads wherever required.
- Nothing should obstruct road signage.

- Visibility should be increased near curvatures.
- Zebra crossing should be provided.

Apart from RTA, poisoning also makes huge burden on health care especially in rural belt where it is most common occupation and accidental and suicidal use of pesticides and insecticides are common. So following suggestion are made-

- increasing awareness regarding the harmful effects of these.
- Educate farmers regarding handling and use of these.
- Educate people regarding prevention of common household poisons.
- Sale and supply should be controlled.

And finally emergency services should be improved to provide best medical care.

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Role of Forensic Odontologist in Medico - Legal Investigation- An Overview

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ABSTRACT

Forensic odontology is a specialty in dentistry, which occupies a primary niche within the total spectrum of methods applied to medico legal identification. Each practitioner has a responsibility to understand the forensic implications associated with the practice of his profession. The purpose of this article is to give an insight into this specialty with an emphasis on recent trends widening its horizon from identification of victim of mass destruction to solving medicolegal cases pertaining to abuse of children and elderly.

Key words: Forensic Odontology, Identification, Age estimation, Sex Determination.

INTRODUCTION

The most common role of the forensic odontologist is the identification of deceased individuals. Dental identification takes two main forms. Firstly, the most frequently performed examination is a comparative identification that is used to establish (to a high degree of certainty) that the remains of a decedent and a person represented by ante mortem (before death) dental records are the same individual. Information from the body or circumstances usually contains clues as to who has died. Secondly, in those cases where antemortem records are not available, and no clues to the possible identity exist, a post mortem (after death) dental profile is completed by the forensic dentist suggesting characteristics of the individual likely to narrow the search for the ante mortem materials.¹

Dental identification of humans occurs for a number of different reasons and in a number of different situations. The bodies of victims of violent crimes, fires, motor vehicle accidents and work place accidents, can be disfigured to such an extent that identification by a family member is neither reliable

nor desirable. Dental identifications have always played a key role in natural and manmade disaster situations and in particular the mass casualties normally associated with aviation disasters.²

Very often the forensic pathologist is faced with different problems of reconstructing the human remains like bones and teeth for identification either in a criminal case or accidental unwitnessed deaths, especially mass disaster like aircraft, train and fire accidents.³ For this purpose forensic pathologists often seek specialist in dentistry. Forensic dentistry embraces all the dental specialities. Therefore forensic dentistry calls for well integrated team work within the profession like forensic odontologist, the forensic pathologists and also police officers and the legal profession.⁴

Fields of Activity

It can be classified as -

1. Civil
2. Criminal
3. Research

Civil: It is concerned with mass disasters like airline accidents, earth quakes or train accidents, require identification of the victims in advanced stages of physical destruction, malpractice and different types of fraud.

Criminal: Identification of the persons from their dental remains alone in cases of rape, suicide or

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homicide through bite mark analysis, rugoscopy, cheiloscopy.

Research: Forensic Odontology training for dentist working in criminology or police department.⁵

METHODS OF DENTAL IDENTIFICATION

1. Comparative Dental Identification
2. Post-Mortem Dental Profiling.
3. Other methods of dental identification.
 - DNA in dental identification.
 - a. Genomic DNA
 - b. Mitochondrial DNA
 - Dental identification in mass disaster.

1. Comparative Dental Identification.

The central dogma of dental identification is that post mortem dental remains can be compared with ante mortem dental records, including written notes, study casts, radiographs, etc. to confirm identity. Clearly, individuals with numerous and complex dental treatments are often easier to identify than those individuals with little or no restorative treatment. The teeth not only represent a suitable repository for such unique and identifying features, they also survive most post mortem events that can disrupt or change other body tissues.

Often a presumptive or tentative identification is available (i.e. wallet or driving licence may be found on the body) and this will enable ante mortem records to be located. In other instances, the geographical location in which the body is found or other physical characteristics and circumstantial evidence, may enable a putative identification to be made, frequently using data from the missing persons' database. Ante mortem records are then obtained from the dentist of record. Once the post mortem record is complete, a comparison between the two records can be carried out.

A range of conclusions can be reached when reporting a dental identification. The American Board of Forensic Odontology recommends that these be limited to the following four conclusions:

Positive identification: The ante mortem and post mortem data match in sufficient detail, with no unexplainable discrepancies, to establish that they are from the same individual.

Possible identification: the ante mortem and post mortem data have consistent features but, because of the quality of either the post mortem remains or the ante mortem evidence, it is not possible to establish identity positively.

Insufficient evidence: The available information is insufficient to form the basis for a conclusion.

Exclusion: the ante mortem and post mortem data are clearly inconsistent.⁶

2. Postmortem dental profiling.

When ante mortem dental records are unavailable and other methods of identification are not possible, the forensic dentist can assist in limiting the population pool to which the deceased is likely to belong and thus increase the likelihood of locating ante mortem dental records. This process is known as post mortem dental profiling. This information will enable a more focused search for ante mortem records. A post mortem dental profile will typically provide information on the deceased's age, sex, race, socioeconomic status. In some instances additional information regarding occupation, dietary habits, habitual behaviours can be obtained.

Forensic anthropologists most often provide details of osteological studies, but forensic dentists can assist in the process. The determination of sex and ancestry can be assessed from skull shape and form. Generally, from skull appearance, forensic dentists can determine race within the three major groups: Caucasoid, Mongoloid and Negroid. Additional characteristics, such as cusps of Carabelli, shovel-shaped incisors and multi-cusped premolars, can also assist in determination of ancestry.

Sex determination is usually based on cranial appearance, as no sex differences are apparent in the morphology of teeth. Microscopic examination of teeth can confirm sex by the presence or absence of Y-chromatin and DNA analysis can also reveal sex. Dental structures can provide useful indicators to the individual's chronological age. The age of children (including foetuses and neonates) can be determined by the analysis of tooth development and subsequent comparison with developmental charts. Conclusions are accurate to approximately ± 1.5 years. Charts such as those developed by Ubelaker graphically illustrate the development of the dentition from 5 months in utero to 35 years, illustrating the deciduous, mixed and permanent dentitions.

It is important to note that when determining sub-adult ages, eruption dates of the teeth are highly variable and the actual developmental stages of the teeth are more accurate. Third molar development is used by some forensic dentists to assign age to young adults although doubts concerning the accuracy of this technique will be raised by the practitioner's own

experience of the variability of these teeth. Those who advocate third molar use claim an accuracy of ± 4 years.

If the post mortem profile does not elicit the tentative identity of the deceased it may be necessary to reconstruct the individual's appearance during life. This is the responsibility of forensic artists who use the dental profile to help with the facial reproduction.⁶ (Figure 1 & 2)

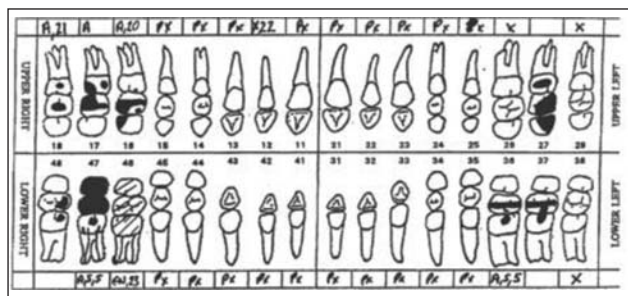
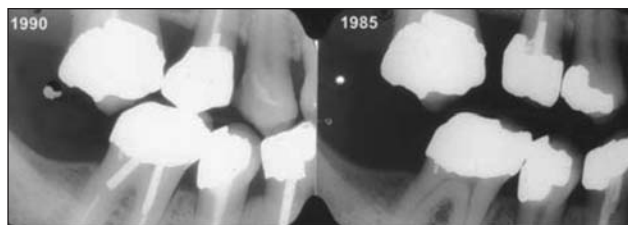


Fig. 1. A postmortem odontogram.



Postmortem (September 1990) Antemortem (August 1985)

Fig. 2. Comparison of antemortem and post-mortem records.

3. Other methods of dental identification

There have been a number of requests from individuals and dental organizations over the years to insist that dental prostheses are labelled with the patient's name or a unique number. The NHS provide a fee for dentists who label their patients dentures, although this is often only used in instances where the wearer is a resident in a care home or other establishment with a central sterilizing system for dental prostheses. Labelled dentures can be of great assistance in the identification of individuals.⁷

Role of DNA in dental identifications

Because of the resistant nature of dental tissues to environmental assaults, such as incineration, immersion, trauma, mutilation and decomposition, teeth represent an excellent source of DNA material. When conventional dental identification methods fail, this biological material can provide the necessary link to prove identity.⁸ With the advent of the polymerase chain reaction (PCR), a technique that allows amplification of DNA at pre-selected, specific sites, this source of evidence is becoming increasingly popular with investigators.⁹ Comparison of DNA preserved in

and extracted from the teeth of an unidentified individual can be made to a known ante mortem sample (stored blood, hairbrush, clothing, cervical smear, biopsy, etc) or to a parent or sibling.¹⁰ (Figure 3)



Fig. 3. Cryogenic grinding to extract DNA

AGE ESTIMATION

Estimation of age can play an important part in the forensic identification of skeletal remains. The age of an individual is the sign of maturity. It may be described in different ways as chronologic age, radiographic age, dental age, sexual age and mental age.¹¹

Radiographic Method

Determination of age during development of dentition can be obtained with an accuracy of "plus or minus one year" during the early part of this period. Microscopic examination of teeth may also provide the age with accuracy of "plus or minus few days".

In this method jaws are radiographed and state of development of the whole dentition compared with stages shown on "standard charts".¹²

Demirjian and Coworkers (1973) have developed a system for estimating the chronologic age based on 8 stages of tooth development. (Figure 4)

- A : Cusp tips mineralized but not yet coalesced.
- B : Mineralized cusps are united, so the mature coronal morphology is well defined.
- C : Crown is about half formed, pulp chamber is evident and dentin deposition is occurring.
- D : Crown formation is complete to dentino-enamel junction, pulp chamber has a trapezoid form.
- E : Formation of inter-radicular bifurcation has begun, root length is less than crown length.
- F₁ : Root length is atleast as great as crown length, root has funnel shaped ending.

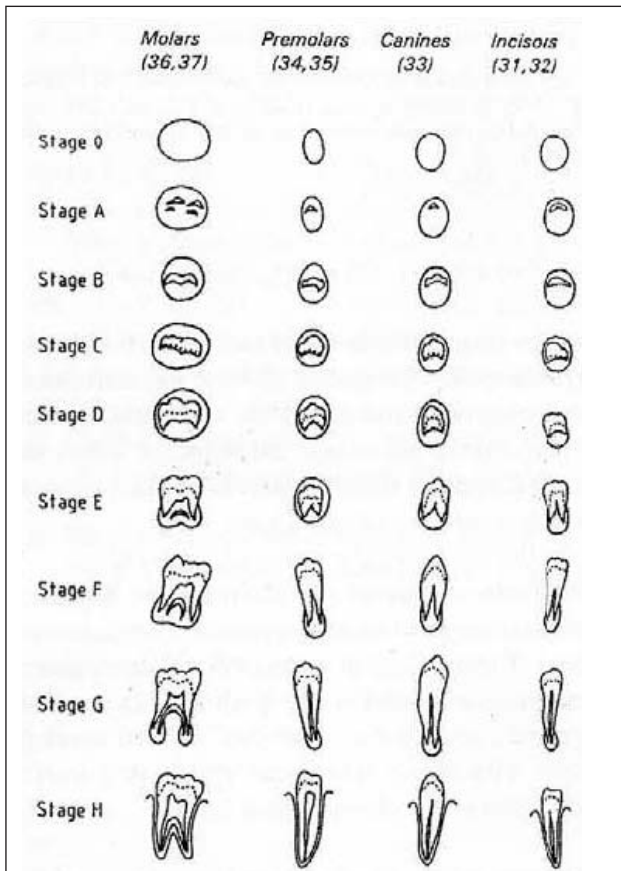


Fig. 4. Demirjian method of age estimation.

- F₂ : Root length is atleast twice the crown length, root still has funnel shaped endings.
- G : Root walls are parallel, but apices remain open.
- G₁ : Root walls are parallel, but apices not entirely closed. PDL space at apical ending is ³1.0 mm.
- H : Apical ends of roots are completely closed and PDL has uniform width around the root .¹³

Age Estimation Method Applied to Adult Dentition

Gustafsons Method

One of the initial and most popular methods of age estimation of adult dentition was that described by Gustafson (1950). He suggested the use of six progressive dental changes connecting with aging. They are:

- 1) Attrition
- 2) Apical migration of periodontal ligament
- 3) Deposition of secondary dentin
- 4) Cemental apposition
- 5) Root resorption
- 6) Transparency of root dentin

Using teeth of known age, he awarded a scale of points from 0-3 for each of the 6 criteria to each tooth (maximum score for one tooth = 18). The more severe

the age change, the higher the score. He drew a graph of tooth points plotted against age and constituted the appropriate regression line.

For age estimation by this method teeth of unknown age are allocated a points score using the same criteria as described. When the score is entered on the graph, place where it interrupts with the regression line indicates the estimated age. The average error for this technique was claimed to be ±3.6 years.¹⁴

SEX DETERMINATION

Based on Dental Development and Eruption

To establish the sex of a victim is essential in the initial stage for identification. In cases where post cranial bones are fragmented or unavailable, the remains of teeth may provide a means for determining the sex.¹⁵

Female skeletal development precedes that of male by one year, whereas dental development differs by only 1 to 4 months. Hunt and Gleiser (1955) using lateral jaw radiographs and standard developmental film of the hand, compared the dental age from the chart of Schour and Massler (1941) with the osseous age as determined from chart of Greulich and Pyle (1950). They concluded that if dental and osseous ages were similar, the individual is probably male, but if bone age is in advance of dental age, then the individual is probably female.¹⁶

Mandibular canine index was developed by Rao et al (1989). This index can determine the sex of individuals between 15 to 21 years of age with an accuracy of 84.3% in males and 87.5% in females. This method is found to be very simple and inexpensive, and could be carried out rapidly.¹⁷

BITE MARK ANALYSIS

Biting is a primitive type of assault. It is often used as the weapon of last resort. Consequently, bite injuries are seen in circumstances of forcible rape, skirmishes between young children and hand-to-hand mortal combat.² (Figure 5)

The foundation of bite mark analysis lies in the following premises.

- a) Each individual’s dentition is presumed to be unique.
- b) This presumed uniqueness is accurately recorded in the characteristic of the injury on the skin or object.¹⁸



Fig. 5. Bite mark analysis

Bite mark identification entails several cognitive steps-recognition of the wound, documentation and interpretation.

I. Description of the bite mark

Human bite mark characteristics include elliptical or ovoid pattern containing tooth and arch marks. The injury may be shaped like a doughnut with characteristics recorded around the perimeter of the mark. Class characteristics of the marks may also be identified. Incisor marks are rectangular, whereas canine marks are triangular. Premolar marks are usually triangular, circular or diamond shaped.¹⁹

II. Evidence Collection from the Bite Victim

A. Photographs-

Colour or black and white visible light photography for documentation

Ultra violet light photography for surface details
 Infra red photography for recording surface below the skin.

B. Saliva Swabs

Saliva is deposited on the skin during biting or sucking. Salivary DNA can be compared to DNA sample of the victim and the suspect should be compared with salivary DNA, to enable analysis of any mixtures and determine if the contribution is from the depositor or suspect to the victim.

C. Bite Mark Impression

Accurate preservation of bite mark indentations is vital for analysis of the evidence. Impression techniques record the three-dimensional aspects of the bite mark. Bite marks inflicted on human skin are especially transient in nature, therefore preservation of the evidence is necessary to link the assailants to the crime.²⁰

III. Evidence Collected from Bite Suspect

Suspect's intraoral and extraoral structures should be examined and significant findings like diastema, fractures, restorations etc should be noted. If needed, 2 sets of study casts should be prepared and maintained in secure storage for release to police authorities. A sample of the suspects bite must be recorded in centric occlusion using either a wafer of base plate wax or a sample of silicone putty material and photographed immediately and compared later.²¹

CONCLUSION

Forensic dentistry plays a major role in the identification of those individuals who cannot be identified visually or by other means. The unique nature of our dental anatomy and the placement of custom restorations ensure accuracy when the techniques are correctly employed. In this brief overview, the authors have shown the reader some of the traditional and upcoming techniques in this fascinating field.

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Use of Maxillofacial Radiology in Forensic Dentistry

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ABSTRACT

Maxillofacial radiographic systems of identification are classified as reconstructive and comparative. The reconstructive systems aim to determine age, sex, and race from unknown remains. The comparative methods make use of an ante mortem radiographic record of the victim and comparisons are made with the post mortem radiographs of the remains. The paper discusses use of maxillofacial radiology in forensic identification.

Key words: Maxillofacial Radiology, Forensic Dentistry, Human Identification

INTRODUCTION

As we enter a new millennium, society is faced with fresh challenges in every conceivable area. The bodies of victims of violent crimes, fires, motor vehicle accidents and work place accidents, can be disfigured to such an extent that identification by a family member is neither reliable nor desirable.

Under favourable conditions, the identification of human remains is done with comparison of ante/postmortem records. Unfortunately, when confronted with a corpse that is unrecognizable due to its state of decomposition, simple identification by comparison becomes impossible.

Teeth are chosen as means of identification as a result of inherent complexity. They are highly mineralised and can withstand extreme temperatures. The bones of the craniofacial skeleton are expressed by a large variability in size, shape, and proportions, which leads to identification of an individual.

In general terms the techniques of human identification may be classified into two major categories: (1) Reconstructive group (2) Comparative group. Second category belongs to techniques based

upon previous records, classified and kept in a central file, to which given remains or documents may be referred.

Both the groups function together to obtain a positive identification of the dead.

METHODS FOR IDENTIFICATION BY COMPARING RECORDS

A number of methods are used for forensic identification by estimating the age and sex of the person by comparing ante and post mortem dental records.

Estimation of Age

1. From dentition

From the calcification of deciduous ones to the loss of permanent ones, the teeth, with their sequence of formation and eruption, have been used as indicators of age, mostly in the period from early childhood to adulthood.

Gustafson¹ has proposed a systematic classification of certain dental traits for the identification of age. He noted the following characteristics suitable for age estimation from the teeth. These are no attrition, no secondary dentin, no periodontitis, normal layer of cementum laid down, no root resorption visible, attrition within enamel, secondary dentin has begun to form in upper part of pulp cavity, periodontitis has just begun, apposition a little greater than normal, root resorption only on small isolated spots, attrition reaching dentin, pulp

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cavity is half filled, periodontitis along first third of root, great layer of cementum, greater loss of substance, attrition reaching pulp, pulp cavity is nearly or wholly filled with secondary dentin, periodontitis has passed two thirds of root, heavy layer of cementum, great areas of both cementum and dentin affected His study had been based on direct examination and sectioning and not primarily on radiographs. However, it is mentioned here because it could be in part applied by means of X-ray.

Miles² proposed the use of a lateral jaw radiograph to evaluate the age on the basis of the formation of first permanent molar and has tested the accuracy of age estimation from lateral jaw radiographs of the mandibles of 58 children.

Nolla³ has given a minute description of tooth formation divided into ten stages namely Stage of absence of crypt, presence of crypt, initial calcification, one third of crown completed, two third of crown completed, crown almost completed, crown completed, one third of root completed, two third of root completed, root almost completed open apex, apical end of root completed. A point classification permits reference to corresponding tables and by comparison, determination of the age. This assessment should be done through the dental radiographs.

2. From sutures

At present, the estimation of age from the cranial and facial sutures is best done by direct examination instead of using skull radiographs. Caffey⁴ has presented a survey of ossification and fusion of the sutures showing time of appearance and fusion of different ossification centres. This procedure is worth mentioning because radiography permits longitudinal studies of suture closure and may at a later date provide standards that are now lacking.

3. From size of the skull

Tallgren⁵ has done one of the best radiographic studies of the change in facial height due to long-term wear of full dentures.

4. Based on sinuses

The paranasal, frontal, and sphenoidal sinuses provide sharply defined outlines easily recorded from lateral or frontal radiographs. Their developmental stages afford the possibility of the assessment of age. Caffey⁴ illustrates the localization, size, and expansion of the maxillary frontal and sphenoidal sinuses during

infancy and childhood. Because of their variabilities and arabesques, the sinuses can provide additional traits to the mosaic of the puzzle in age determination.

Estimation of Sex

1. From dental radiographs

Timing of calcification differs in boys and girls, as shown in Nolla's data. Hurme⁶ has pointed out that "the largest time difference in the emergence of the teeth in boys and girls is furnished by the mandibular canine which appears about eleven months earlier in an average girl than in an average boy."

2. From cephalofacial radiographs

Krogman⁷ has described certain traits distinguishing skulls of males and females. He has compared the following characteristics of skull in male and female. These are general size, architecture, supra orbital ridges, mastoid process, occipital areas, frontal and eminence, orbits, forehead, teeth and palate. He has found significant differences in the characteristics between both the sexes. Many of these traits have not been investigated by means of radiographs, but they present potential guides.

Ceballos and Rentschler⁸ have made apparently the only systematic radiographic study of identification of sex based on adult skull characteristics. They have used the posteroanterior projection, from which they measured four diameters: total craniofacial height, mastoid height, bicondylar width, and mandibular width. They have concluded from extensive tests that "sex can be predicted in 88 per cent of the cases by utilization of these measurements."

The sinuses have not yielded much discriminatory information. Certain types of intracranial hyperostosis seem to be sex-linked and to be found predominantly in females. Similarly, certain pathologic features are considered to belong to one sex.

Estimation of Race

1. By dental radiographs.

Many traits best estimated by direct examination have been defined on the crown of the teeth. Very few require radiography. Lasker and Lee⁹ have referred to the pulp cavity in the Mongoloid race as exceptionally wide and deep. Hurme⁶ has compared dental-eruption analysis from Japanese sources with his own compilation. His evaluation is that "Japanese data suggest that the maxillary canine emerges earlier in Japanese than in Caucasians, on the average."

2. By cephalofacial radiographs

Krogman⁷ has summarized the most characteristic racial traits determined by direct examination of the skull. Only some of these can be ascertained radiographically.

USE OF ADVANCED MAXILLOFACIAL RADIOLOGY IN FORENSIC ODONTOLOGY

Chronological age of an individual can be determined with the help of panoramic radiographs by determining dental development. Digital imaging is more reliable than conventional radiography and is used for comparison of dental images by reducing dental noise with digital image subtraction technique.¹⁰ Cone beam Computed tomography (CBCT) was established as a non-invasive method to estimate the age of a person based on the pulp-tooth ratio.¹¹ Recently, the use of micro focus tomography has been employed as a non invasive modality for the age estimation using pulp tooth volume and has an extremely high resolution. In cases of evaluation of injuries sustained by the deceased or the factors that resulted in death, computer tomography (CT) and micro-computed tomography can be used in the assessment of the degree of fit of a weapon to a wound in cases of blunt force skull injury and sharp force injury respectively.¹¹ The progress in computer science and the advances in radiology in recent years have demonstrated the usefulness of MRI and CT in craniofacial reconstruction with the help of 3 Dimensional reconstructed CT images. Biometroscopy has also helped in facial imaging and craniofacial reconstruction.¹²

CONCLUSION

With the advent and the diffusion of both conventional and advanced radiographic techniques, maxillofacial radiography can be used for identification of a deceased. The use of maxillofacial

radiography in forensic odontology overweighs its limitations. Thus, the maxillofacial radiologist is an essential member of the forensic team. The reliance of legal community on the dental profession to continue to provide expertise in civil and criminal proceedings ensures that forensic dentistry will remain a viable component of forensic sciences and the practice of dentistry.

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Anomalous Left Coronary Artery from Main Pulmonary Artery – A Case Report

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ABSTRACT

Anomalous left coronary artery from pulmonary artery (ALCAPA) is a rare congenital coronary artery malformation. Left uncorrected, nearly 90% of patients will die within one year. The clinical presentation of ALCAPA is variable during infancy and can mimic common conditions such as infantile colic, gastro-esophageal reflux disease, food intolerance and respiratory infections. Without surgical repair, surviving patients are subjected to risks of myocardial ischemia with global cardiomyopathy, chronic mitral regurgitation, and sudden death. However, in some cases collateral blood supply from the right coronary artery is sufficient and symptoms may be subtle or even absent. With early surgical correction the prognosis is good, but awareness of this condition is essential for prompt diagnosis and referral to a tertiary cardiac centre. We present the unusual case of a 13 year old asymptomatic boy who was referred to the tertiary healthcare centre for investigation of incidentally detected murmur during school health check which was later found to be resulting from previously undiagnosed anomalous left coronary artery arising from the pulmonary artery (ALCAPA) with preserved left ventricular function. This case stresses the need for high index of awareness among paediatricians and general practitioners regarding this entity so as to enable early detection and therapeutic intervention with improved prognosis for these children.

Key words: ALCAPA; Congenital Coronary Artery Malformation; Coronary Artery; Sudden Death.

INTRODUCTION

A coronary artery anomaly (CAA) is found in about 1% of the population.¹ This abnormality may be in relation to the coronary artery origin, their number, course, termination or structure. Most CAAs are discovered as asymptomatic incidental findings during coronary angiography. However, some CAAs are associated with clinical manifestations such as arrhythmias, myocardial ischemia, congestive heart failure and even sudden cardiac death.² Anomalous left coronary artery (LCA) originating from the pulmonary artery (ALCAPA) is a rare congenital

cardiovascular anomaly with significant mortality during childhood.³ An embryological defect during foetal cardiac development leads to the left coronary artery arising from the pulmonary artery instead of the aorta. At birth the infant is asymptomatic but as the pulmonary artery pressure decreases during the neonatal period, desaturated blood flows under low pressure from the pulmonary artery via the left coronary artery to the left ventricle.⁴ This predisposes the left ventricle to myocardial ischaemia, especially at times of stress such as feeding. Survival beyond infancy is usually uncommon because of consequent myocardial necrosis and left heart failure.⁵ However, there are several reported cases in adolescents and adults, with the oldest reported patient being 72 years at diagnosis.⁶⁻⁸

Herein we report an unusual case of a 13 year old asymptomatic boy in whom ALCAPA was incidentally diagnosed while evaluating a murmur detected during routine school health check up.

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CASE HISTORY

A 13 year old boy was referred to our hospital to determine the clinical significance of an incidentally detected continuous cardiac murmur which had been discovered during a routine school health check up by a general practitioner. He had no cardiac antecedents.

Physical examination revealed a continuous murmur with diastolic accentuation in the left 2nd and 3rd parasternal intercostal spaces. Pulmonic second heart sound (grade P₂) was of normal intensity. There was no cyanosis, clubbing or any evidence of dysmorphic features. Haematological and biochemical parameters were within normal limits. Electrocardiogram (ECG) showed antero-lateral 'Q' waves. Echocardiogram showed the origin of left coronary sinus from the pulmonary artery with continuous turbulence and hugging the medial wall of the main pulmonary artery. The right coronary artery arising from the normal right coronary sinus was dilated. The left ventricle was mildly dilated with a hypokinetic anterolateral wall. There was mild mitral regurgitation (MR) and there were no septal defects.

Multi-detector computerized tomography (MDCT) scan study of the patient further confirmed the diagnosis of anomalous origin of left coronary artery from pulmonary artery with dilated and tortuous right coronary artery with collateral filling of left coronary system (Figure. 1). The patient currently is awaiting surgical repair to establish double coronary myocardial perfusion.

DISCUSSION

Anomalous origin of the left coronary artery from pulmonary artery (ALCAPA) is a rare congenital anomaly first described in 1908 in a 60 year old woman.⁷ White and Garland in 1933 observed the association of this anomaly with the clinical syndrome of angina, myocardial ischemia and death in early infancy on the basis of clinical and necropsy findings.⁹ The estimated incidence of ALCAPA is 1/300,000 live births (between 0.24% and 0.46% of all congenital cardiac anomalies and accounts for 0.25%-0.5% of all congenital heart defects.^{10,11,12} It usually manifests as an isolated defect, but in 5% of cases it may be associated with other cardiac anomalies such as an atrial septal defect, a ventricular septal defect, and aortic coarctation.¹³ Some believe that this is a significant underestimation of the true incidence, as many patients may be asymptomatic until their death and therefore remain undiagnosed.¹¹ This rare

syndrome manifests itself in early infancy with congestive heart failure, often mimicking dilated cardiomyopathy with severe mitral valve regurgitation and is associated with a high mortality.¹⁴ Severe heart failure leads to death in 65% to 90% of patients before 1 year of age, usually 2 months after birth.¹⁵ Only about 15% of patients reach adulthood, thanks to adequate collateral vessel development between the normal right and abnormal left coronary artery, which allows retrograde perfusion of the left coronary artery.^{15,16}

In foetal life, this anomaly is well tolerated because pulmonary pressure equals systemic pressure and oxygen content is identical in the main pulmonary artery (PA) and aorta. Therefore, coronary collateral growth is not especially promoted before birth. After birth, as soon as pulmonary pressure and saturation fall, left ventricular (LV) oxygen demands can no longer be accommodated by the left coronary artery (LCA), and ALCAPA leads to myocardial ischemia. Subendocardial ischemia can occur even in the presence of well-established coronary collateral vessels because of preferential coronary blood flow into the low-pressure pulmonary circulation instead of high-resistance myocardial blood vessel (i.e., coronary steal). It is not surprising that up to 9 out of 10 children with ALCAPA will die within the first year of life without surgical intervention. The asymptomatic individual presenting in adulthood is rare and must have a well-developed coronary collateral circulation with retrograde perfusion of the LV from the right coronary artery (RCA). Some of these patients have an ostial stenosis of the LCA, limiting the coronary steal and increasing myocardial perfusion pressure. Even if asymptomatic, uncorrected adult ALCAPA patients are at risk of sudden death, which is classically precipitated by exercise.¹⁷

Historically, ALCAPA syndrome was diagnosed by conventional angiography. However, the development of electrocardiographically gated multidetector computed tomographic (CT) angiography and magnetic resonance (MR) imaging now enables accurate non-invasive imaging. MR imaging and multidetector CT angiography allow direct visualization of the left coronary artery arising from the main pulmonary artery.¹⁸ Diagnosis is usually established by a coronary angiogram, which shows a dilated and tortuous right coronary artery with collateral filling of the left coronary artery system; variable degrees of shunting to the pulmonary artery may be present.

Explanatory Legends:

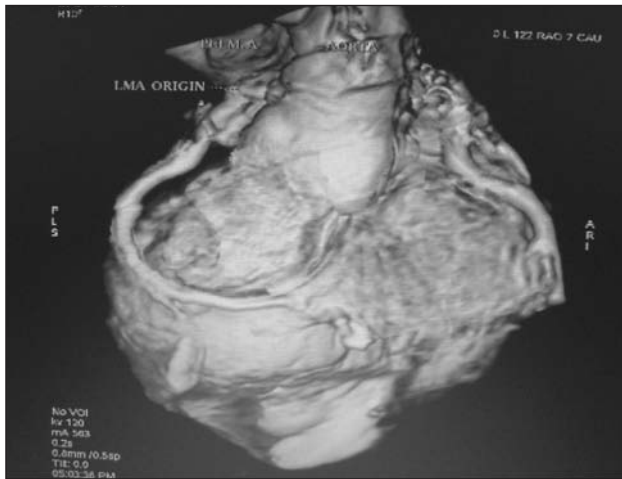


Fig. 1. (MDCT) scan showing anomalous origin of left coronary artery from pulmonary artery with dilated and tortuous right coronary artery with collateral filling of left coronary system

Interestingly, our patient is asymptomatic even in his second decade. The absence of symptoms and preservation of left ventricular function in our patient is likely because of the dominant right coronary artery along with the quantity and quality of his collateral coronary circulation. The intercoronary circulation of our patient allowed for abundant filling of all left-sided epicardial vessels.

The natural history of untreated ALCAPA in patients surviving the infant years is unfavourable secondary to the progressive left ventricular dysfunction and risk of sudden death.¹⁹ Rapid recognition of the acute presentation of this condition and appropriate management will improve the chances of survival in such patients.

CONCLUSION

In conclusion, although having survived the infant years, adults presenting with ALCAPA are not free from life-threatening complications. The risks of heart failure, mitral dysfunction, and sudden death warrant surgical correction upon identification of the anomaly thereby preventing these devastating complications.

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An Epidemiological Study of Burn Injuries in Under Five Children Admitted in Tertiary Care Hospitals in Belgaum, North Karnataka

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ABSTRACT

Under five children are naturally curious and they come in contact with objects that can cause burn injuries. This study was undertaken to know the demographic profile, types, causes and outcome of burn injuries in under five children. A one year cross sectional study of 34 under five children admitted with burn injuries in two tertiary care hospitals of Belgaum city was conducted between April 2004 to March 2005. Maximum numbers of injuries (88.24%) was accidental and were due to hot water (29.4%). The overall mortality was 14.70%. Flame injury caused 60% of the deaths.

Key words: Under Five Children, Burn Injuries

INTRODUCTION

Under five children are naturally curious. The moment they start crawling and also when they start walking and become independent, they want to explore their surroundings and play with new objects. Although this is the natural learning process it means that they come in contact with objects that can cause burn injuries leading to intense pain and often long term consequences. This creates suffering not just for the children but also for their families and the broader community.¹

A greater understanding of burn epidemiology in under five children is essential in order to direct more effective burn prevention strategies.²

This study was undertaken to know the demographic profile, types, causes and out come of burn injuries in under five children.

MATERIAL AND METHODS

A one year cross sectional study of all under five children admitted with burn injuries in two tertiary

care hospitals of Belgaum city was conducted between April 2004 to March 2005. Ethical clearance was obtained from Institutional Ethical Board. Burn injury was defined as a body lesion due to an external cause either intentional or unintentional resulting from a sudden exposure to energy (Mechanical, thermal, radiant) generated by agent-host interaction.³ Total Burn surface area was calculated by using Rule of 9.⁴ Data was obtained by a face to face interview with the parents by using a pre-designed and pre tested questionnaire and analyzed using chi-square test and percentages.

RESULTS

A total of 34 under five children (17 males and 17 females) with burn injuries were admitted in both the hospitals during the study period. The male to female ratio was 1:1. Majority of burn injuries (26.47%) were observed in children between 3-4 years of age followed by 23.53% between 1-2 years of age and 17.65% less than 1 year of age. (Table I)

Table 1. Age & sex distribution of burn injuries

Age in years	Male	%	Female	%	Total	%
0-1	03	17.65	03	17.65	06	17.65
1-2	05	29.41	03	17.65	08	23.53
2-3	02	11.76	04	23.53	06	17.65
3-4	04	23.53	05	28.41	09	26.47
4-5	03	17.65	02	11.76	05	14.70
Total	17	100.00	17	100.00	34	100.00

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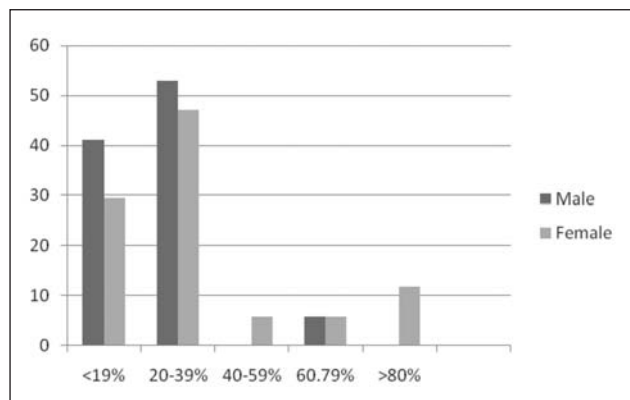
Maximum number of injuries (70.59%) was seen in children from rural areas. Majority of children (52.94%) were from Nuclear families (p=0.039) It was observed that in 64.71% cases there was overcrowding in their homes and 44.12% were living in kutchha houses. Majority (47.06%) were poor and belonged to class V Socio-economic group. Maximum number of burn injuries (88.24%) was accidental. It was observed that majority of injures (29.4%) were due to hot water. (Table 2)

Table 2. Source of burn injury

Flame	Male	%	Female	%	Total	%
Kerosene	03	17.65	01	05.88	04	11.76
Kerosene Lamp/Lamp	01	05.88	04	23.53	05	14.70
Cooking appliance	02	11.76	03	17.65	05	14.70
Havan (pooja fire)	01	05.88	01	05.88	02	05.88
Warming appliance	01	05.88	00	00.00	01	02.94
Total	08	47.05	09	52.94	17	50.00
Scald						
Hot water	06	35.39	04	23.53	10	29.41
Hot milk	02	11.76	01	05.88	03	08.82
Hot sweet	00	00.00	01	05.88	01	02.94
Hot oil	00	00.00	01	05.88	01	02.94
Steam	00	00.00	01	05.88	01	02.94
Total	08	47.05	08	47.05	16	47.06
Mechanical	01	05.88	00	00.00	01	02.94
Total	17	100.00	17	100.00	34	100.00

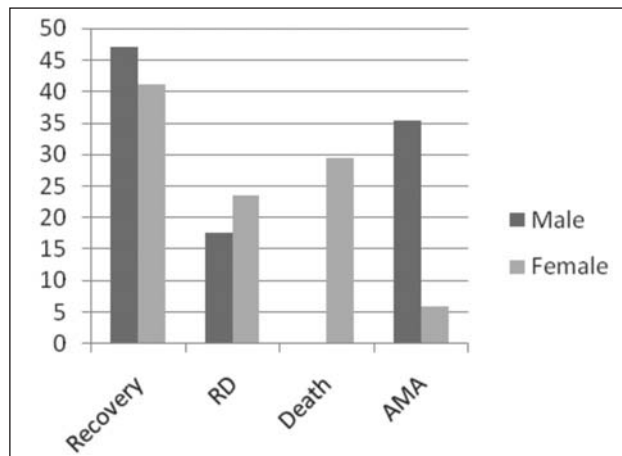
Maximum injuries (91.18%) were sustained at home and 64.70% were in the kitchen. At the time of injury, 38.24% children were wearing cotton clothes. Majority (32.35%) of underfive children suffered from burn injuries between 8-12 noon followed by 26.47% sustaining injures between 4-8 pm. It was observed that 41.18% of children received no first aid soon after the burn.

In the present study, 50% children had total burn surface area (TBSA) between 20-39% followed by 35.30% having TBSA less than 19% and 11.77% female children had TBSA more than 80%. (Graph I)



Graph I. Distribution of burn injuries according to sex and TBSA

The overall mortality was 14.70%. In female children, 29.41% of them succumbed to their injury while 35.29% male children were discharged against medical advice (p=0.032) Graph-II. Flame injury contributed to 60% of the deaths and the remaining were due to Scalds



$X^2 = 8.781 \quad DF=3 \quad p=0.032$

Graph II. Distribution of burn injuries according to sex and outcome

DISCUSSION

Burn injuries in under five children is unique as it shares its characteristics with acute injury with chronic sequel with protracted period of pain and permanent disfigurement and has negative psychosocial and economic impact.²

An equal number of male and female children were admitted during the study period. The age distribution shows that children between 3-4 years of age have the highest risk for burn injury. This finding is similar to other studies.^{5,6}

The rural areas have substandard housing with overcrowding and these small dwelling places have become the most dangerous zone of burn injuries especially in the kitchen.⁷

Children from nuclear families belonging to class V Socio-economic state were affected more and this finding is similar to the world report on child injury prevention ¹ and indicates importance of joint and extended joint families where other members look after the young children when the mother is busy with her household chores.

Hot water falling on the child was responsible for maximum number of injuries and is similar to another study ⁸ and indicates the need to be extra careful when

children are around. Mothers or care takers seem to have been negligent.

There is a high peak between 8-12 noon and another peak between 4-8 pm and these periods coincide with the time to heat water for bathing and to prepare meals at home and are also reflected in other reports.^{8,9}

About 40% of children received no first aid after the injury and indicates the need for adequate first aid with water at room temperature for 30 minutes. The overall mortality was 14.70 % and is alarmingly high and a matter of concern when compared with other studies.^{9,10}

CONCLUSION

This descriptive study shows the epidemiological profiles of 34 under five children admitted with burn injuries in Belgaum city. In our study, hot water was the leading cause and most of them were from nuclear families with low socio economic status and were burned at home. All the information from this study showed some unique distributions that reflected certain socio economic and cultural background and it should be applied to design and promote more aggressive burn prevention programmes keeping in mind the mothers of the young children.

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Conflict of interest

No conflict of interest regarding the study.

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Phenytoin Induced Gingival Overgrowth - A Case Report

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ABSTRACT

Gingival overgrowth is a rare disorder characterized by the proliferative fibrous over growth of the gingival tissue. It usually develops as an isolated disorder but can be a feature of a syndrome. Anticonvulsants, immune-suppressant drugs and calcium channel blockers have been known to produce similar gingival overgrowths in susceptible patients.

Phenytoin, an anti epileptic has been frequently used in the management of all forms of epilepsy except petit-mal. The potential of phenytoin to induce gingival hyperplasia has been well-established.

This article documents a severe gingival enlargement in a patient under anti-epileptic therapy and provides a rational model for its clinical management.

A case of 15 year old male is reported who presented a generalized severe gingival overgrowth, involving the maxillary and mandibular arches and covering all teeth. Treatment included phase 1 therapy, substitution of the drug, and surgical excision of the excessive gingival tissue, maintenance and supportive therapy resulting in excellent clinical outcome. Post surgical follow up demonstrated no recurrence.

Key words: Phenytoin, Antiepileptic, Gingival over Growth, Gingivectomy.

INTRODUCTION

Gingival enlargement or gingival overgrowth is one of the most important clinical features of gingival pathology¹. Gingival hyperplasia due to the concomitant unesthetic appearance and the formation of new niches for the periopathogenic bacteria is considered a serious adverse drug reaction².

There are many factors (causal or modifying) involved in gingival overgrowth. Plaque accumulation on teeth causes gingival inflammation and its resultant enlargement. Gingival hyperplasia can be seen in patients with familial gingival enlargement, pregnancy and leukemia³.

Gingival overgrowth or gingival enlargement, is consequence of the administration of three groups of medicaments which are broadly classified as— anti-convulsants, calcium channel blockers and immunosuppressants⁴. An increasing number of medications are associated with gingival over growth. Currently there are more than 20 prescription medications associated with gingival enlargement⁵.

Epilepsy is a disease where a person has recurrent seizures due to a chronic underlying process⁶. Anti-epileptic drugs are among the most commonly prescribed centrally active agents. They are used widely to treat conditions other than epilepsy, including migraine, neuropathic pain, anxiety, and bipolar disorder⁷.

The currently available anti-epileptic drugs act either by depressing the neuronal activity at the focus of origin, or by blocking the spreading mechanisms⁶. The tolerability of available anti-epileptic drugs differs substantially and the likelihood of specific adverse effects is the most important consideration when selecting a drug for a given patient. These adverse effects can be broadly classified into those that are reversible and dose-dependent (such as ataxia, sedation, dizziness, and cognitive dysfunction) and those that are chronic and not rapidly reversible (such as changes in body weight, hirsutism, and gingival hyperplasia).⁷

Phenytoin (PHT 5, 5 —diphenylhydantoin), first introduced as an antiepileptic drug in 1938⁸, is

commonly used as a therapeutic agent in patients with epilepsy, either alone or in combination with other anticonvulsant drugs. It is slowly absorbed from the gastrointestinal tract, extensively metabolized in the liver by microsomal enzymes, with major metabolite being 5-(p-hydroxyphenyl)-5-phenylhydantoin⁹. This metabolite is implicated in the pathogenesis of gingival overgrowth⁶.

The drug acts via stabilization of neuronal cell membranes and through suppression of synaptic transmission. At the cellular level it acts by affecting the (Na+K) pump, Ca⁺⁺ transport or the sodium influx¹⁰.

Advantages of phenytoin include its effectiveness, low cost, availability, and frequency of administration (once a day). Among the side effects of phenytoin therapy, gingival hyperplasia is a well-recognized adverse effect, occurring on average among approximately 50% of patients receiving this drug. The first case of phenytoin induced gingival overgrowth was first reported in 1939¹¹.

Although several studies have been conducted regarding phenytoin-induced enlargement, the pathogenesis of this gingival lesion still is not understood. The literature has suggested an association between phenytoin-induced gingival enlargement and a variety of conditions, including multiple anti-epileptic therapies, plaque accumulation, host genetic predisposition, and reduced serum folate levels¹¹.

High levels of dental plaque and calculus also have been reported to be a critical co-factor. Risk factors associated with phenytoin-induced gingival enlargement may have a synergistic effect¹¹.

This article describes the clinical history and management of a case of gingival hyperplasia in a patient under anti-epileptic therapy (phenytoin). This report demonstrates the value of consultative planning between oral care practitioners and physicians for the prevention and treatment of gingival lesions in these medically compromised patients.

CASE REPORT

A-15-year-old male presented himself at the Department of Periodontics, A.B. Shetty Memorial Institute of Dental Sciences, Mangalore with a chief complaint of swelling of gums all over his mouth. The swelling caused difficulties in speech, mastication, and it also had obvious implications for his aesthetic appearance.

He reported that the enlargement had begun with the eruption of permanent teeth, when he noticed a small bead like nodular enlargement of the gums which gradually progressed to the present state covering almost the entire crowns of the teeth. The intraoral examination revealed generalized, severe gingival overgrowth involving both the mandibular and maxillary arches, covering the entire crowns. (Figure 1 and 2) (GOI=3 according to Angelopoulos & Goaz index)

Pre Operative Photographs



Fig.1. Overgrowth of anterior gingiva



Fig. 2. Overgrowth of posterior gingiva.

The gingiva was pink, with a firm and dense consistency. No acute inflammatory signs were present.

The extra oral examination revealed that the patient was unable to close his lips because of the protrusion of the enlarged tissues.

Panoramic radiograph examination did not reveal

any evidence of bone loss indicating absence of periodontitis and an outward growth rather than a vertical enlargement of gingiva.

The patient's medical history revealed that he had suffered epilepsy attacks, with variable intervals since the age of 5 years. He had been administered phenytoin (100mg once daily) He reported that the enlargement had begun with the eruption of permanent teeth, with a slow progression.

Histopathological investigations after excisional biopsy revealed hyperparakeratinised hyperplastic stratified squamous epithelium with elongated rete pegs and dense fibro collagenous tissue, with a few sparse inflammatory cells. (Figure 3)

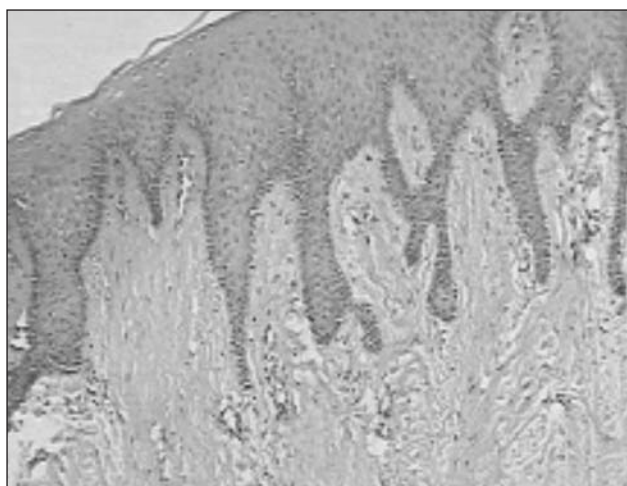


Fig. 3. Biopsy specimen showing Parakeratinised epithelium with dense collagenous tissue & inflammatory cell infiltration.

Routine hematological laboratory investigations did not reveal any abnormality. On the basis of medical, family, drug histories and clinical findings it was diagnosed as Phenytoin induced gingival overgrowth.

Case management

1. Drug substitution / withdrawal

- The most effective treatment related to drug enlargement is withdrawal or substitution of the medication. Hence prior to local management, the patient was thoroughly assessed by a neurologist and a suitable drug substitution therapy was instituted. The neurologist substituted the drug with carbamazepine

2. Non surgical treatment

Professional debridement with scaling and root planning was performed. Patient was instructed to maintain good oral hygiene with chlorhexidine rinses. The patient response to nonsurgical treatment was

moderate hence surgical approach was the preferred line of treatment.

3. Surgical treatment

The treatment consisted of external bevel gingivectomy of all quadrants with a Krikland's gingivectomy knife (Hu-Friedy). The surgical intervention was carried out quadrant wise under local anaesthesia. After the surgical intervention periodontal pack (Coepack) was placed. The periodontal pack was removed after 7 days and the postoperative course was uneventful. The post surgical follow up till 6 months did not show any recurrence. (Figure 4 and 5)

Post operative Photographs



Fig. 4. Postoperative healing after 6 months



Fig. 5. Postoperative healing of posterior gingiva after 6 months.

DISCUSSION

Gingival overgrowth is a common feature of gingival diseases. There includes various kinds of gingival overgrowth, varying according to the etiological factors and the pathological processes producing them.

Drug induced gingival overgrowth is known as an adverse effect with three types of drugs namely: phenytoin, an antiepileptic; cyclosporine A, an immunosuppressant; and calcium channel blockers such as dihydropyridines (nifedipine), verapamil, and diltiazem, which are widely prescribed for the treatment of various cardiovascular diseases⁴.

Although the pharmaceutical effect and primary target tissues of an antiepileptic, an immunosuppressant, and calcium channel blocker are different, they act similarly on gingival connective tissue, causing fibrous gingival overgrowth¹².

Pathogenesis

1. Accumulation of Type I Collagen In Gingival Connective Tissue¹²

Drug-induced gingival overgrowth, previously termed as gingival hypertrophy or gingival hyperplasia by finding an increased number of fibroblasts in gingival connective tissue with histological analysis. However, these earlier terms, "hypertrophy" or "hyperplasia" did not accurately reflect the histologic composition of enlarged gingiva. Not increase proliferation of gingival fibroblasts, but the severe accumulation of extracellular matrix within the gingival connective tissue, particularly collagenous components, was observed in human gingival overgrowth. These disorders are therefore suitable to be considered as fibrosis in gingival connective tissue. "Gingival overgrowth" or "gingival enlargement" is the preferred term for all drug-related gingival lesions.

2. Synthesis and Degradation of Type I Collagen¹²

The metabolism of collagen is precisely balanced by collagen synthesis and degradation to maintain tissue volume. Generally, fibrosis is caused by the loss of homeostasis of the synthesis and degradation of collagen fibers, resulting in the excess accumulation of collagen fibers

Collagen may be degraded *via* an extracellular pathway involving the secretion of collagenase¹⁵ and *via* an intracellular pathway involving phagocytosis by fibroblasts.

McCulloch and Knowles showed decreased collagen phagocytosis of fibroblast isolated from human phenytoin-induced gingival overgrowth than healthy gingiva, type I collagen and collagenase mRNA expressions were significantly suppressed by,

phenytoin administration in these rat experimental models. Hence it can be concluded that drug-induced gingival overgrowth is not due to the increased synthesis of type I collagen but the decreased degradation through the reduction of collagen phagocytosis of fibroblasts.

3. ROLE OF α -2 INTEGRIN¹²

Integrins are a large family of heterodimeric transmembrane receptors for extracellular matrix molecules, and acts as the principle mediators of the molecular dialogue between a cell and its extracellular matrix environment. Each heterodimer consists of an α and β subunit. There are approximately 17 α and 8 β subunits in mammals.

α 2 β 1 integrins have been shown to serve as specific receptors of type I collagen in fibroblasts.

One etiological factor of drug-induced gingival overgrowth may be the inhibition of collagen phagocytosis by reducing a β 2 integrin expression or decrease of the binding activity in gingival fibroblasts. It has been hypothesized that subjects with the 807 C genotype of a β 2 integrin express less a β 2 β 1 integrin on the gingival fibroblasts surface, leading to the decreased potential of fibroblast binding to type I collagen and collagen phagocytosis by administered drugs, and, hence, an increased the risk.

4. Role of Calcium In Collagen Phagocytosis¹²

Phenytoin is known to act as a calcium channel antagonist and inhibit calcium ion flux. Intracellular calcium signaling participate in a positive feedback loop that enables integrin-mediated cell adhesion by altering integrin-binding affinity. Drug-induced gingival overgrowth may be induced through the reduction of a β 2 β 1 integrin-binding affinity in collagen phagocytosis in fibroblasts by disturbing the intracellular calcium flux.

The clinical appearance of phenytoin induced gingival overgrowth is usually characteristic, although variants are seen depending on the location of lesions, the irritants involved and the extent of inflammation. Gingival hyperplasia with its potential cosmetic implications and also providing new niches for the growth of microorganisms is a serious concern for both the patients and clinician.

Gingival overgrowth usually begins in the interdental papilla region of the labial surfaces of the anterior region. As the condition progresses, the marginal and papillary gingiva may develop into a

massive tissue and may interfere with speech, mastication and aesthetics. With time the untreated case may develop into more severe periodontitis with future loss of periodontal attachment and bone loss.

In the present case the patient noticed the enlargement corresponding with the eruption of permanent teeth with gradual progression. Phenytoin induced gingival enlargement began as a painless bead like enlargement of the interdental papilla which gradually progressed into a massive tissue fold covering considerable portions of the crown. Patient had difficulties in mastication, in opposing his lips together, in speech and to maintain the oral hygiene. This resulted in psychological stress to the patient.

The histological features of the excised biopsy tissue showed the typical appearance of gingival lesions in drug induced gingival enlargement. The epithelium was stratified squamous, parakeratinized. The rete ridges were narrow and elongated extending deeply into connective tissue. The connective tissue consisted of hypo cellular collagenous tissue which formed numerous interlacing bundles running in various directions and mild inflammatory cell infiltrate of lymphocytes arranged in foci between the collagen bundles.

Based on the family, medical & drug histories to this case, it was termed as phenytoin induced gingival enlargement.

The presence of overgrowth makes plaque control difficult, resulting in secondary inflammatory process complicating the gingival hyperplasia induced by the drug. Although the exact role played by dental plaque in the pathogenesis of drug induced gingival enlargement is unclear. Evidence indicates that the elimination of local factors and maintenance of good oral hygiene reduces the severity of gingival enlargement.

The suggested treatment varies according to the degree of severity and on medication being used. When the enlargement is minimal, scaling of the teeth and home care may be sufficient to maintain good oral health. As the excess tissue increases, appearance and functional impairment dictate the need for surgical intervention.

An initial single episode of crown and root debridement was performed under local anesthesia using ultrasonic scaling and root planing. This first treatment protocol also integrated oral hygiene instruction, including the Bass technique of brushing and interdental cleaning with dental floss and

interdental brushes. In addition, 0.12% chlorhexidine gluconate rinses were prescribed twice a day as an adjunctive antimicrobial.

The neurologist was consulted to change the ongoing anticonvulsant program, establishing a level of seizure management without sacrificing attentiveness and mood control. The physician was willing to adjust the therapy and the patient started to take carbamazepine (Tegretol). and phase 1 therapy was performed.

Because of the severity of the involvement of the gingiva and absence of bone loss in this case, an external bevel gingivectomy followed by gingivoplasty was the favored treatment which was performed quadrant wise under local anaesthesia. The post surgical follow up did not show any signs of recurrence.

Treatment relieved the problems of speech, mastication, esthetics. Maintenance of oral hygiene was also much easier. This boosted the psychological condition of the patient.

CONCLUSION

Drug induced gingival enlargement is characterized by the proliferative fibrous overgrowth of the gingival tissues, with varying degrees of involvement. Among the old and relatively new pharmacologic agents involved in gingival enlargement, phenytoin still has the highest prevalence rate (approximately 50%), with calcium channel blockers and Cyclosporine associated enlargements about half as prevalent. Ideally, patients receiving anti-epileptic medications should expect multidisciplinary treatment care and more rational anti-epileptic therapies.

Current studies on the pathogenetic mechanism of drug associated enlargement are focusing on the direct and indirect effects of these drugs on gingival fibroblast metabolism.

Newer molecular approaches are needed to clearly establish the pathogenesis of gingival overgrowth and to provide novel information for the design of future preventative and therapeutic modalities.

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Estimation of Length of Femur Based on the Measurements of its Distal Fragments

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ABSTRACT

The skeletal remains presented to forensic anthropologists are often fragmentary. The objective of this study is to assess the feasibility of estimation of the length of femur from the measurements of its distal fragments. Then the stature could be estimated either by using multiplication factors or with the application of regression equations.¹ A sample of 100 femora (50 male and 50 female) were obtained from Anatomy Department. Regression equations for the estimation of maximum femoral length have been calculated. The applicability of these equations to a forensic sample is addressed.

Key words: Human Identification, Distal Femoral Fragments, Femur Length Estimation.

INTRODUCTION

Bones, especially the long ones, played an important role right from the onset of medical revolution, in understanding the physiological, racial and ethnographic affinities besides providing the major forensic experts with the anatomical and compositional agenda.¹ The growing field of Anthropology is set for proper analysis of skeletal remains in determination of species, race, sex, age and stature of the individual as a part of identification which is the determination of an individuality of a person based on certain physical characteristics.²

Stature estimation is an important aspect in identification of an individual from available skeletal remains especially in medico legal conditions like deliberate mutilation of the dead bodies, mass disasters e.g., earthquakes, terrorist bomb attacks, aeroplane accidents etc. Many a times, the exhumed remains are in fragmentary state. Bones recovered in forensic situations may be mutilated by nature, sometimes even by animals. Thus, forensic investigators have an uphill task to analyse whatever

remains are found and draw inferences of medico legal importance.³

Among all individual long bones, femur is the strongest and longest bone.⁴ It is one of the most frequently recovered bones in forensic situations being a large, durable bone protected by large amount of soft tissue.⁵ It has been extensively studied and will provide best results due to its highest correlation with stature.⁶ It has been said that in calculating stature lower limb long bones give a closer estimate than those of upper limb.¹

In our study, anthropometric assessment of various fragments of distal end of femur is undertaken. An attempt is made to relate these measurements of the distal segments to its full length. After estimating the total length of long bone, suitable statural formulae can be applied to get a reasonably accurate stature. This can contribute in a substantial way to identify the deceased.

MATERIAL AND METHODS

The present study was done in Anatomy department of Sri Siddhartha Medical College, Tumkur, Karnataka. A total of 100 adult totally ossified dry femora were included in the study. These femora before sexing them were considered as 'unknown-sex'. Later the femora were grouped into male and female.

By using Osteometric board and Vernier callipers, following measurements were taken.

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1. Maximum Length of Femur (FML): The linear distance between the most superior part of the head of the femur and the most inferior part of the medial condyle.
2. Bicondylar breadth (BCB): The most lateral and posterior projection of the lateral condyle, to the most medial and posterior projection of the medial condyle.
3. Epicondylar breadth (FDL): The linear distance between the most projected points on the epicondyles. The measurement is taken right angle to the shaft axis.⁷
4. Medial condyle length (MCL): The linear distance between the most anterior and the most posterior points on the medial condyle.
5. Lateral condyle length (LCL): The linear distance on the lateral condyle measured in an anteroposterior direction.

Except FML for which osteometric board was used all the other measurements were taken using Vernier Callipers. After estimating the total length of long bone, suitable statural formulae can be applied to get a reasonably accurate stature. This can contribute in a substantial way to identify the deceased.

Data were entered to SPSS Ver.14 (Statistical Package for the Social Sciences) software. Using this software descriptive statistics, correlations and regression equations with constants were determined. Hence in the present study, an attempt has been made to formulate sex specific multilinear regression formulae for the estimation of femoral length.

RESULTS AND OBSERVATIONS

In the present study, both taking measurements and estimation of FML from its fragments are done based on methods of Simmons et al.⁵ A total of 100 adult femora were examined. This set of femora, prior to sexing them was classified as “unknown-sex”.

The descriptive statistics of this group is shown in Table 1. All the measurements are taken in cms. We can see the minimum, maximum, mean and standard deviations of all the measurements taken from them. Later the femora were grouped into male and female.⁸ The descriptive statistics of the male and female samples are explained in Table 2 and Table 3 respectively.

Table 1. Descriptive Statistics of all the femora before sexing: N=100

Measurement	Minimum	Maximum	Mean	Std Deviation
FML	35.4	47.6	42.5	3.1
BCB	5.3	8.5	6.7	0.74
FDL	5.9	8.6	7.4	0.73
LCL	4.9	7.3	5.7	0.61
MCL	4.6	7.5	5.8	0.76

Table 2. Descriptive Statistics male: N=50

Measurement	Minimum	Maximum	Mean	Std Deviation
FML	40.2	47.9	44.10	1.88
BCB	5.9	8.5	7.2	0.58
FDL	7.3	8.7	7.9	0.36
LCL	5.1	7.4	6.2	0.51
MCL	5.2	7.5	6.3	0.62

Table 3. Descriptive Statistics female: N=50

Measurement	Minimum	Maximum	Mean	Std Deviation
FML	35.4	42.6	39.53	1.42
BCB	5.3	7.1	6.1	.33
FDL	5.9	7.1	6.6	.32
LCL	4.8	6.3	5.4	.31
MCL	4.7	5.8	5.2	.26

Table 4. Correlations of measurements of femur fragments with FML

Fragment	FML(males)	FML(females)	FML (unknown sex)
BCB	0.844*	0.310**	0.878*
FDL	0.872*	0.434*	0.918*
LCL	0.849*	0.320**	0.854*
MCL	0.863*	0.627*	0.913*

Correlations between the measurements of the fragments of the femur with its maximum length is shown in Table 4.

Correlation is significant at 0.01 level** and 0.05 level*

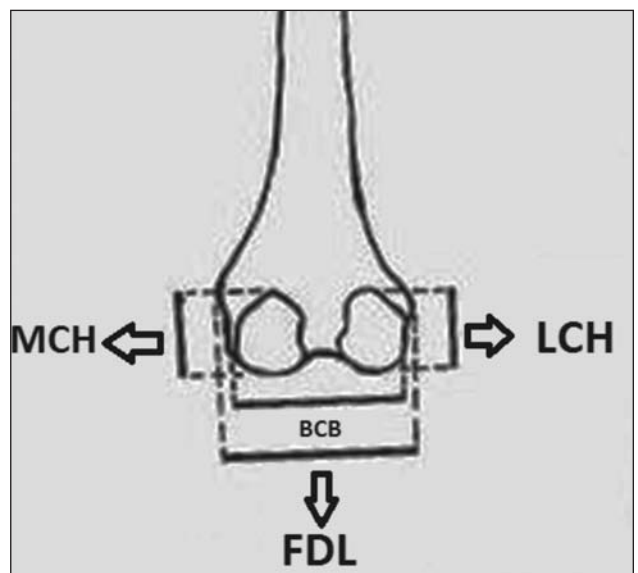


Fig. 1. Schematic representation showing measurements of distal end of femur used for estimating maximum femoral length (FML).⁵

DISCUSSION

Analysis of data revealed non significant bilateral differences in all fragments of femur and hence they are not highlighted in this study.

We can see that males consistently show higher mean value in Maximum Femoral Length (FML) compared with females. It can therefore be inferred that males are generally taller than females, which is in support of previous studies on stature estimation.⁹ Males show higher mean values compared to females for all fragmentary measurements, there by emphasizing the sexual dimorphism of these femoral dimensions.⁹

Correlation between the measurements of the fragments of the femur with its maximum length(FML) are scripted in Table 4. When correlation coefficients of individual measurements with Maximum Femoral Length are determined in unsexed femora, all of them show good degree of association.

After sexing them, we can see that individual measurements of the fragments of male femora show better correlation than those of the female.

Correlation coefficients between 0.00 and 0.30 are weak, 0.30 to 0.70 are moderate and 0.70 to 1.00 are high. In males the measurements showing the degree of correlation with FML in descending order are FDL, MCL, LCL and BCB.

Tables 5, 6 and 7 show the regression equations used to estimate FML from its proximal fragments in males, females and unknown sex samples respectively. Only the statistically significant and reliable best indicators are described and are arranged in descending order of SEE and increasing order of correlation.

Table 5. Equations for estimation of FML, correlation and SEE from measurements of distal fragments of femur in males

Equations	Correlations	SEE
16.78+0.652(BCB)+1.814(FDL)+0.861(LCL) + 0.539(MCL)	0.830	0.768
14.927+0.752(BCB)+2.141(FDL)+1.149(LCL)	0.825	0.772

Table 6. Equations for estimation of FML, Correlation and SEE from fragments of femur in females

Equations	Correlations	SEE
22.089-0.928(BCB)+0.848(FDL)-1.154(LCL)+4.505	0.444	1.077
24.012-0.512(BCB)-0.945(LCL)+4.577	0.435	1.080
22.7-0.970(LCL)+4.375(MCL)	0.429	1.091
21.593+3.453(MCL)	0.408	1.111

Table 7. Equation for estimation of FML, Correlation and SEE from fragments of femur in unknown sex:

15.553+0.56(BCB)+2.138(FDL)-0.20(LCL)+1.825(MCL)	0.894	1.027
15.615+0.55(BCB)+2.117(FDL)+1.822(MCL)	0.884	1.022
15.559+2.166(FDL)+1.844(MCL)	0.895	1.015

Table 8 shows the comparison between the descriptive statistics of our study with those of Bidmos study. The mean values of our male samples are lower than those of SED males. In males, mean values of FDL are higher than Indigeous South Africans but mean values of BCB, LCL, and MCL are lower than those of SED and ISA females.

Table 8. Comparison of descriptive statistics with bidmos MA and the present study

STUDY	FDL		BCB		LCL		MCL	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Bidmos SED males	8.07	.42	7.60	.33	6.52	.35	6.53	.37
Bidmos ISA males	7.87	.40	7.49	.46	6.47	.36	6.45	.37
Bidmos SED females	7.22	.39	6.74	.41	6.30	.35	5.95	.32
Bidmos ISA females	6.99	.50	6.66	.50	5.98	.44	5.78	.36
Present study males	7.9	.36	7.2	.58	6.2	.51	6.3	.62
Present study females	6.6	.32	6.1	.33	5.40	.31	5.2	.26

SED: South African of European Descent; ISA- Indigenou South Africans

Table 9. Comparison of correlation coefficients with bidmos MA and the present study

Study	FDL	BCB	LCL	MCL
SED males	0.459	.400	0.537	0.426
ISA males	0.529	0.560	0.626	0.711
SED females	0.781	0.722	0.753	0.724
ISA females	0.720	0.746	0.696	0.619
Present study males	0.872	0.844	0.849	0.863
Present study females	0.434	0.310	0.320	0.627

In our study males displayed greater degree of correlation than females. This is in contrast to earlier investigations where females showed better correlation than females.

Hence when only when ‘ small fragment’ of femur is available for medicolegal investigation, for eg. Medial or lateral condyle, then Maximum femoral length can be calculated from metric evaluation of that fragment. Hence we can derive simple linear regression equation (Y=a+bX) by univariate regression analysis against the individual measurements to calculate FML from any one of these markers. Table 10 shows the regression constants for estimating Maximum Femoral Length

from its fragmentary remains based on sex. The Standard Error of Estimate (SEE) is the standard deviation of the differences between the actual values of the FML and predicted FML. The calculated 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.

Table 10. Regression constants for estimating FML from femur fragments

Predictor variable(BCB)	Slope (b)	Intercept (a)	SEE
Males	2.75	24.80	0.979
Females	1.29	31.509	1.263
Unknown sex	3.673	17.342	1.431

Predictor variable(FDL)	Slope (b)	Intercept (a)	SEE
Males	4.613	8.043	0.883
Females	1.950	26.516	1.270
Unknown sex	3.939	13.347	1.106

Predictor variable(LCL)	Slope (b)	Intercept (a)	SEE
Males	3.143	25.102	0.962
Females	1.488	31.436	1.338
Unknown sex	4.438	16.348	1.566

Predictor variable(MCL)	Slope (b)	Intercept (a)	SEE
Males	2.647	27.899	0.916
Females	3.453	21.683	1.105
Unknown sex	3.756	20.618	1.212

CONCLUSION

Thus it can be concluded that using these equations, the estimated maximum length and stature can be calculated in both sexes. The results of this study have demonstrated the feasibility of estimating femur length from small segments using standard measurements.

Therefore these results can be viewed as an indicative of the feasibility of the technique and providing formulae applicable for forensic science work. Hence when a dead body has become skeletonised and the anatomical relationship is lost, even a fragment of a long limb bone like femur can help in estimation of stature as there exists a relatively high correlation between femur length and stature.

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Analysis of Burn Injuries Admitted in a Tertiary Care Teaching Hospital in Bagalkot, Karnataka, India

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ABSTRACT

Burns are one of the most frequent injuries seeking emergency treatment in any trauma care centre. An effective burn prevention programme is based on studies about high risk groups involved, causes for the injury and when and where the injury has occurred. These data are provided by analysis of burn injuries admitted in the hospital. The objectives of this study were to identify distribution and determinants of burn injuries in our community to bring about a much needed prevention program. All the patients admitted to the Burns ward in Hangal Sri Kumareshwar Hospital and Research Centre, Navanagar, Bagalkot, Karnataka from January 1st, 2010 to December 31st, 2010 were retrospectively reviewed and formed the study population. Majority (59.38%) of the burn cases were between 21-40 years of age. Majority of the injuries (90.62%) were alleged accidental. Most of the burn injuries (85.94%) were due to flame. The overall mortality was 42.18%. Among the total deaths, 88.89% were females. (p=0.003)

INTRODUCTION

Burns are one of the most frequent injuries seeking emergency treatment in any trauma care centre. They are an important public health problem because of the morbidity, post burn sequelae and mortality.¹ Burn injuries involve an extremely important medical, social and economical cost on the individual and family concerned. The best way to deal with the problem is to prevent it. An effective burn prevention programme is based on studies about high risk groups involved, causes for the injury and when and where the injury has occurred. These data are provided by analysis of burn injuries admitted in the hospital. The objectives of this study were to identify distribution and determinants of burn injuries in our community to bring about a much needed prevention program.

MATERIAL AND METHODS

All the patients admitted to the Burns ward in Hangal Sri Kumareshwar Hospital and Research

Centre, Navanagar, Bagalkot, Karnataka from January 1st, 2010 to December 31st, 2010 were retrospectively reviewed and formed the study population. Burn injury data was retrieved from the admission register and the hospitals computer database records. The case records were reviewed in terms of demography of the study population, mode and cause of the injury, total burn surface area (TBSA), type of burn and outcome. Data was analysed by percentages and chi-square test.

RESULTS

A total of 64 burn injury patients were admitted during the study period. Majority of the patients were females (67.19%). The male to female ratio was 0.5:1. The mean age was 28.73 years ranging from 2 years to 85 years. Majority (59.38%) of the burn cases were between 21-40 years of age. Children < 20 years of age contributed to 29.68% of the cases. (Table 1)

Table 1. Age and Sex distribution of burn patients

Age in yrs	Male		Female		Total	
<20 yrs	06	28.58%	13	30.23%	19	29.68%
21-40 yrs	11	52.38%	27	62.79%	38	59.38%
41-60 yrs	03	14.28%	00	00.00%	03	04.69%
>60 yrs	01	04.76%	03	06.98%	04	6.25%
Total	21	100%	43	100%	64	100%

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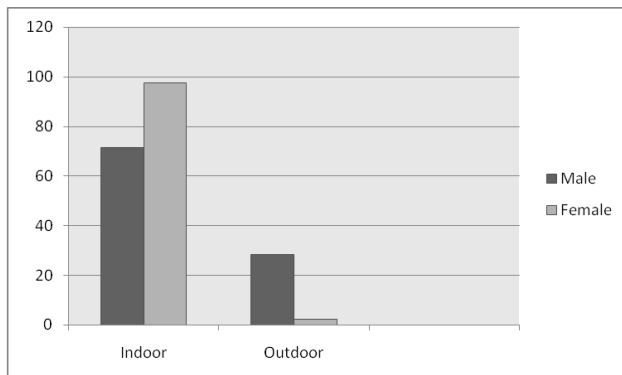
Maximum numbers of admissions (67.19%) were from rural areas and were Hindus (90.63%) followed by 9.38% Muslims. Majority of the injuries (90.62%) were alleged accidental followed by 9.37% injuries due to attempted suicide. Most of the burn injuries (85.94%) were due to flame. (Table 2)

Table 2. Distribution according to type of burn injury

Type of burn	Male		Female		Total	
Flame	18	85.72%	37	86.05%	55	85.94%
Scald	01	04.76%	05	11.63%	06	09.38%
Electrical	01	04.76%	01	02.32%	02	03.12%
Chemical	01	04.76%	00	00.00%	01	01.56%
Total	21	100%	43	100%	64	100%

Majority of the females (97.68%) sustained burn injuries in their home. (p=0.005) Graph 1.

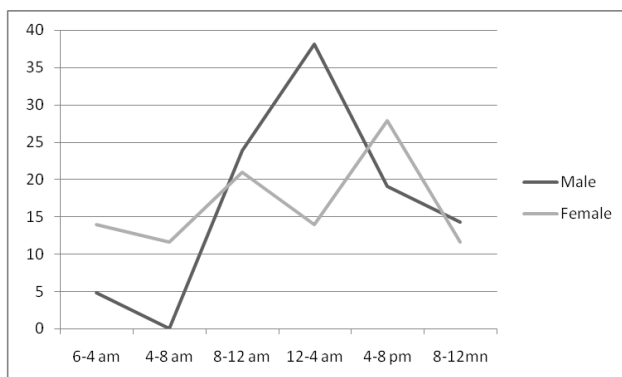
Graph 1 Distribution according to location of Burn Injury



X² with Yates correction=7.464 DF=1 p=0.005

Maximum number of injuries were noted in April (14.06%) followed by 12.5% each in December and January. In this study, 25% of the incidents occurred between 4.00 to 8.00 pm. Graph 2.

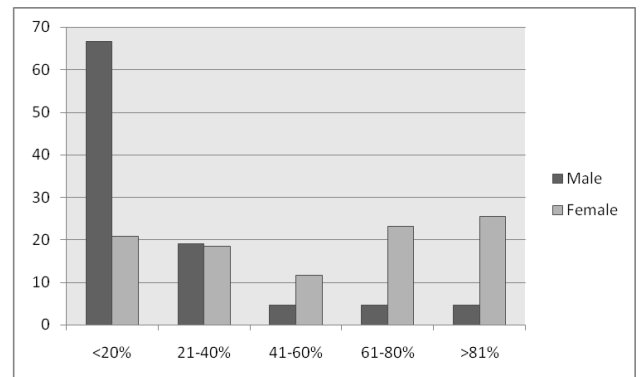
Graph 2. Time of Burn Injury



It was observed that 73.44% of the admissions were within 6 hours of the injury. Most of the females (25.58%) sustained more than 81% total burn surface

area. (p=0.005) Graph 3

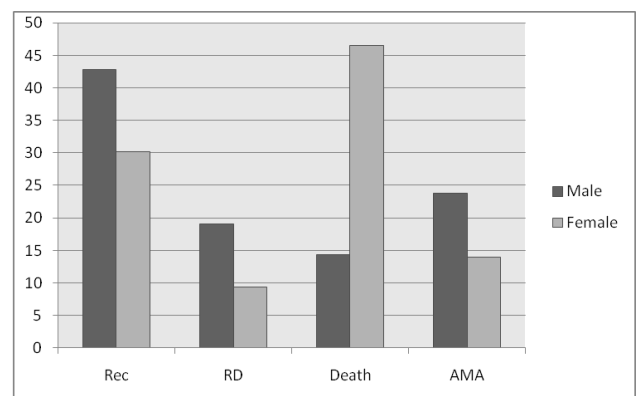
Graph 3 Distribution according to sex and TBSA



X²=14.993 DF=4 p=0.005

The overall mortality was 42.18%. Among the total deaths, 88.89% were females. (p=0.003) Graph 4.

Graph 4. Distribution according to sex and out come



X²=18.31 DF=3 p=0.000

Majority of deaths (66.66%) occurred in the age group of 21-40 years. (p=0.0178). **Table 3**

Table 3. Distribution of burn cases according to Age and Mortality

Age in yrs	Male		Female		Total	
<20 yrs	01	33.33%	04	16.67%	05	18.52%
21-40 yrs	01	33.33%	17	70.83%	18	66.66%
41-60 yrs	01	33.34%	01	04.17%	02	07.41%
>60 yrs	00	0.00%	02	08.33%	02	07.41%
Total	03	100%	24	100%	27	100%

X²=8.05 DF=2 p=0.0178

DISCUSSION

Burn injuries have become a focus of public health practice because they pose a serious health threat, occur frequently and are in most situations preventable. Burn injury data is an important component in the cycle of surveillance, risk factor

assessment, prevention and evaluation.

In the present study, about two-thirds of the burn injury admissions were females. This finding is similar to studies done in India and abroad^{1,3-7}. Women are involved in cooking with cheap, unstable kerosene stoves and wear loose flowing clothes like sari in the rural areas of India which catch fire easily^{3,8,9}

Almost 60% of the patients were between 21-40 years of age which is similar to other studies.^{1,4,10,11} Men and women in this age group are the most active and engaged in activities involving fire both at home and at work.

Children less than 20 years of age contributed to about 30% of the admissions and this finding is lower when compared to another study.¹ Children are unaware of the dangers of fire and become innocent victims of the tragedy.

Majority of the injured (67.19%) were from rural areas and this finding is similar to another study.³ This could be due to their ignorance regarding safety measures while handling heat producing equipment.

Alleged accidental burns contributed to 90.62% of the admissions and indicate the need to bring about awareness regarding this issue.

More than three-fourths (85.94%) of the burn injuries were due to flame and similar reports have been documented in India and other countries^{4,6,7,12}. Flame producing equipment is still the most common source used for cooking, heating water and lighting purpose in the rural areas of India.

More than 90% of the females sustained burn injuries in their residence and is similar to another study³. This indicates the need for women to be careful while handling equipment at home and protect themselves every time they use them.

One-fourth of injuries occurred between 4.00 pm and 8.00 pm and these findings are similar to other reports (3, 8, 13). This is the time period when evening meals are being prepared at home.

Nearly three-fourths of the admissions were within 6 hours of the incident and is similar to another study⁶. This indicates the emergency seeking response of the individual and their concerned family members.

Total burn surface area (TBSA) involving more than 81% was observed in about 25% of females in this study while in another study conducted in Varanasi, 32.84% females suffered more than 81% TBSA¹⁴. These findings

indicate the seriousness of the issue on hand and interventions that are to be taken to protect our women from such dangers in their own home environment.

The overall mortality was 42.18% and is similar to another study conducted in Belgaum, Karnataka³. Out of the total deaths, 88.89% were females and more than half of the females injured have succumbed to their injuries. Two-thirds of deaths have occurred in the most productive age group of 21-40 years. These findings highlight the horrifying situation of women being burnt in the 21st century due to ignorance of safety measures in their own homes resulting in a terrible tragedy to their families.

CONCLUSION

Burn injuries which are frequent events with potentially devastating physical and emotional consequences, represent an under recognized public health burden. Preventive medicine specialists have a key role in the process as advocates for safety and burn injury prevention².

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A Study of Maternal Mortality at a Tertiary Health Care Centre in Mangalore, Karnataka

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ABSTRACT

Pregnancy-related death is defined by the International Classification of Diseases, Tenth Revision (ICD-10) as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the cause of death. A six year retrospective hospital record-based research regarding maternal deaths conducted at Department of Obstetrics & Gynecology, AJ Institute of Medical Sciences, Mangalore, situated in coastal Karnataka, South India. It included the data regarding age, parity, status of the patient on admission mode of delivery and cause of death. Of the total 3621 females delivered 17 maternal deaths were reported. The majority (29.4%) of the cases were from age group of 21–25years. Multigravida and in antepartum state had a greater number (10) of deaths. Majority (29.3%) of the patient succumbed for sepsis. Sepsis and obstetrical haemorrhage are still major causes of maternal deaths. Most maternal deaths are preventable. The provision of timely management of complications can lower maternal mortality.

Key words: *Antepartum, Gravida, Maternal Mortality, Sepsis.*

INTRODUCTION

Pregnancy is the normal healthy event in the reproductive life of women, reproductive life of women, yet this life-affirming process carries the risk of death and disability for many women. Globally every year an estimated 5,29,000 maternal deaths occur due to pregnancy related preventable causes like haemorrhage, hypertensive disorders, sepsis, obstructed labour and unsafe abortions. Although the risk of death from complications of pregnancy has decreased dramatically during the 20th century, the Centers for Disease Control and Prevention (CDC) reports a fairly static maternal mortality ratio (MMR, the risk of death once a woman has become pregnant)

of approximately 7.5 maternal deaths per 100,000 live births.^{1,2} Deaths from maternal causes represent the leading cause of death among women of reproductive age in most developing countries.³ The MMR was highest in Africa (830) followed by Asia (330), Oceania (240), Latin America and Caribbean (190) and developed countries (20).⁴ Maternal death, as defined by the 9th and 10th revisions of the International Statistical Classification of Diseases and Related Health Problems (ICD), is "the death of a woman while pregnant or within 42 days of the end of the pregnancy, irrespective of the duration and site of pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes."⁵ Although varying levels of maternal mortality are reported in hospital settings, which vary from one state to another, we have no such data available in our tertiary care hospital attached to a medical institution in Karnataka, situated in coastal Karnataka, South India. This study is an attempt to collect such information.

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MATERIAL AND METHODS

This is a retrospective hospital record-based study conducted at Department of Obstetrics & Gynecology, AJ Institute of Medical Sciences, Mangalore, situated in coastal Karnataka, South India, for a period of 6 years from January 2005 to December 2010. The study included 17 cases of maternal mortality and data regarding age, parity, status of the patient on admission mode of delivery and cause of death were collected in the pre-structured proforma. The data collected using the proforma was entered in the computer in data base and analyzed using SPSS 11.0 software.

RESULTS AND OBSERVATIONS

A total of 3621 females delivered between January 2005 and December 2010. Of those who delivered in the hospital, 2107 (58.19%) of the deliveries were by normal vaginal delivery and 1514 (41.81%) were by lower segment cesarean section (LSCS). Seventeen maternal deaths were recorded during this period. Females in the age group of 21–25 years had a greater risk of dying than other age groups followed by those between 31–35 years as shown in Table 1. Multigravida had a greater risk of dying than primigravida as depicted in the Table 2. Ten women died in antepartum state, 6 died in postpartum, and 1 death was intrapartum as shown in Table 3. The major cause of death was sepsis (29.3%) followed by hemorrhage as depicted in Table 4. A majority (10) of the deaths were recorded for patients who delivered by normal vaginal delivery as compared with only 7 of patients who delivered by cesarean section (LSCS) as shown in Table 5.

DISCUSSION

Death of mother is a catastrophic event. In practical life, it has a severe impact on the family, community and eventually the nation. Reduction of maternal mortality is an important Millennium development Goal (MDG) especially in low income countries, where one in 16 women dies of pregnancy related complications.⁶ Avoidance of unwanted births, proper antenatal care by trained staff supported by institutional quality care, and delivery coupled with the empowerment of women has made maternal deaths during pregnancy a rare phenomenon in the industrialized world. In the developing world, however, it is still a commonly encountered phenomenon, where even these figures are considered as underestimates because of under reporting from

Table 1. Distribution of women by age

Age in years	Number of women (%)
<20	4 (23.5)
21-25	5 (29.4)
26-30	3 (17.7)
31-35	4 (23.5)
>35	1 (5.9)

Table 2. Distribution of these women by parity

Party	Number of women (%)
Primigravida	6 (35.3)
Multigravida	10 (58.8)
Grandmultigravida	1 (5.9)

Table 3. Status of the patient on admission

Period	Number of women (%)
Antepartum	10 (58.8)
Intrapartum	1 (5.9)
Postpartum	6 (35.3)
Postabortal	0
Total	17

Table 4. Causes of maternal deaths

Direct causes	Number of cases %
PPH	423.5
Sepsis	529.3
PIH	211.8
Cardiac disease	15.9
Amniotic fluid embolism	211.8
H1N1	15.9
ARDS	211.8

Table 5. Type of delivery

Type of delivery	Number of cases
Vaginal	10
LSCS	7

various countries. There is no systematic mechanism of death reporting in general and particularly of maternal deaths in our country, especially in rural areas and thus it becomes extremely difficult to assess the maternal mortality rate.⁷

A total of 3621 females delivered between January 2005 and December 2010, seventeen maternal deaths were recorded. In a study conducted in a tertiary care hospital in a neighboring country, Pakistan, Begum, et al. showed the maternal mortality rate as 12.7/1000 live births.⁸ Berg, et al. in the United States reported the maternal mortality rate as 10.3 in 1991 and 12.9 in 1997 per 100,000 live births.⁹ The maternal mortality rate from a study conducted in Ethiopia was 9.6/1000 live births.⁷

In our study, a higher number of deaths were recorded in the 21–25 year age group followed by age group of 31–35 years. We also found that Multigravida have a greater risk of dying than primi gravidas. In a 10-year study reported from a Rajasthan, it is observed that 54.9% deaths in the age group of 20–30 year olds, 29% deaths in primigravidas, and approximately 56% deaths among multigravidas.¹⁰ Study from Pakistan reports that 61.5% of maternal deaths occurred in the age group >30 years old and 69% of maternal deaths occurred in grand multiparas.⁸ Study from Eastern Tanzania showed a lifetime risk between the age groups as relatively stable and declining with no higher risk of mortality with older age, although lower age group (15–19 years) values were higher than the rest.¹¹

Our study showed that the major cause of death was sepsis (29.3%) followed by hemorrhage. This is in concurrence with the previous studies reported from India.^{10,12,13} A hospital based study reported from Safdarjang Hospital in New Delhi revealed that 120 maternal deaths occurred between July 2003 to June 2004 with post-partum hemorrhage (26%) as the leading direct cause of death.⁵ Similar a study from a tertiary care hospital reports that the leading cause of death was obstetric hemorrhage followed by other causes. Socioeconomic status and educational status could not be ascertained from the case records to conclude that they have an impact on the maternal mortality rate. A review article on the causes of maternal mortality and its geographic distribution has shown that the Indian subcontinent has a higher maternal mortality attributed to sepsis, infection and hemorrhage.¹² Although hospital-based maternal mortality figures do not give the true picture in the community, they tend to provide a more thorough assessment of the underlying cause of death and contributing factors that provide useful data in planning various strategies or interventions. It is concluded that good quality antenatal care supported by assisted deliveries can reduce the maternal mortality rate. Timely identification and intervention of risk factors through proper referral to better health facilities will go a long way in the reduction of maternal mortality rates.

CONCLUSIONS

- Out of 3621 females delivered during the period between 2005 to 2010, seventeen maternal deaths were recorded.
- Majority of maternal deaths were in the age group of 21–25 years.

- Multigravida had a greater risk of dying than primigravida.
- Most of the deaths occurred in antepartum state.
- Sepsis was the commonest cause of death.

SUMMARY

India's millennium development goal is to reduce MMR to 109 by the year 2015. This goal faces tough resistance from rising social inequalities and shortages in primary healthcare amenities. This study was done to measure the incidence of maternal mortality at a tertiary teaching institute as well as to analyze the common causes leading to such a high maternal mortality.

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Significance of Serum Cholinesterase Level in Organophosphate Poisoning

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ABSTRACT

Consumption of Organophosphorus compound is one of the commonest modes of committing suicide in rural India. This study was conducted with aim to correlate the serum cholinesterase level and severity of organophosphorus poisoning. Estimation of serum cholinesterase levels are widely used to measure the esterases which clear acetyl choline. Calorimetric procedure of Ellman as described by Venkatraman was used to measure the acetyl cholinesterase activity in patient admitted at Vasantnao Naik Government Medical College, Yavatmal with clear diagnosis of organophosphorus poisoning and postmortem cases autopsied at mortuary of Vasantnao Naik Government Medical College, Yavatmal.

Key words: Poisoning, Organophosphate Compound, Serum Cholinesterase Level, Calorimetric.

INTRODUCTION

Organophosphate compounds are extensively used in the developing countries in agriculture and public health programs⁹. Agriculture is the biggest industry in unorganized sector in which total labour force in agriculture work is more than any other sector¹. In developing countries like India, it is means of earning daily livelihood for many.

Organophosphate compounds are irreversible inhibitors of the cholinesterase enzyme and hence highly toxic to the mammals^{5,6,8}. Use of the Organophosphate compound is on increasing as Organochlorine compounds accumulate unchanged in human and animal tissues and have adverse effect on animal ecology. Acute poisoning is leading most cause of unnatural deaths and third common cause of emergency hospitalization in Yavatmal District.

With this background and the fact that organophosphate act by inhibiting cholinesterase enzyme, this study was undertaken to evaluate the significance of serum cholinesterase level for medicolegal opinion especially when diagnosis is in doubt or chemical analysis for detection of poison comes negative.

AIMS AND OBJECTIVES

This study was under took to evaluate the utility of serum cholinesterase estimation in medicolegal cases from various medicolegal viewpoints viz – as a substitute for negative chemical analysis report in known poisoning cases, in exposure cases, and in mild and chronic cases.

MATERIAL AND METHODS

A study of correlation of serum cholinesterase activity in organophosphate poisoning is carried out in postmortem cases whose postmortem was carried out in mortuary at Shri Vasantnao Naik Government Medical College, Yavatmal from Aug 2004 – July 2005. Total 43 numbers of cases of organophosphate compound poisoning was studied.

Diagnosis of the organophosphate compound poisoning was done on the following basis:

- 1) A positive history of consumption of the poison by deceased as obtained from deceased relatives and friends, and
- 2) Physical verification of the container for their chemical ingredients.

All cases of organophosphate poisoning were subjected to: -

Detailed history regarding present and past illness of the deceased was obtained from relatives as well as police record followed by thorough autopsy of the deceased, Name of the compound consumed, Route of poisoning, Intention of poisoning (Accidental, Suicidal, or Homicidal), and Any past history of the suicidal tendency, and Chemical analysis.

Serum Cholinesterase Estimation

Collection of blood sample: (Kevin L Klette et al)

Blood sample for estimation of serum cholinesterase was collected on autopsy. After opening chest cavity 5ml blood was collected directly from heart by syringe and needle or scooped out from pleural cavity before removing stomach in EDTA bulb. Sample was centrifuged at 3000 RPM for 15 min and supernatant plasma is collected in separate plastic vials. Separated plasma was stored at 2⁰-7⁰ C in refrigerator.

PRINCIPLE

Cholinesterase hydrolyses Butyrylthiocholine to Butyric Acid and Thiocholine that reacts with DTNB (5-5'-Dithiobis-2-nitrobenzoic Acid). This reaction liberates 5-thio-2-nitrobenzoic acids with the formation of a strong yellow colour (measured at 405 nm). The rate of formation of colour is directly proportional to the activity of Cholinesterase in the sample.

PROCEDURE

Serum cholinesterase was measured by modified colorimetric method of Ellman et al (1961) as described by Venkatraman et al (1990) on Bayer's autoanalyzer, by using kit manufactured by Bayer Diagnostic India Ltd, Baroda, Gujarat, India, code 931.

Normal Value

Normal value of serum cholinesterase level is 3700-11500 (at 30°C)

Observations and results

Study population comprises 43 post mortem cases (postmortem was conducted at mortuary, Shri Vasantnao Naik Government Medical College, Yavatmal). From the analysis of data, following observations were made.

Table 1. Overview of age and sex distribution of cases.

Age Group	Male	Female	Total
11 to 20	3 (6.98%)	7 (16.28%)	10 (23.26%)
21 to 30	8 (18.60%)	3 (6.98%)	11 (25.58%)
31 to 40	7 (16.28%)	2 (4.65%)	9 (20.93%)
41 to 50	4 (9.30%)	1 (2.33%)	5 (11.63%)
51 to 60	2 (4.65%)	2 (4.65%)	4 (9.30%)
61 & Above	3 (6.98%)	1 (2.33%)	4 (9.30%)
Total	27 (62.79%)	16 (37.21%)	43 (100%)

Table 2. Overview of type of poison

S. N.	Poison	Postmortem (n=43)
1	Monocrotophos	23 (53.49%)
2	Rogar	05 (11.63%)
3	Tik 20	02 (4.65%)
4	Cypermil	03 (6.98%)
5	Thimet	03 (6.98%)
6	Novacron	07 (16.28%)

Table 3. Overview of occupation in poisoning.

Occupation	Postmortem (n=43)
Farmer	14 (32.56 %)
Labour	22(51.16 %)
Other	7(16.28 %)

Table 4. Overview of Residence in poisoning.

Postmortem	(n=43)
Rural	39 (90.70%)
Urban	4 (9.30%)

Table 5. Overview of Manner of poisoning

Postmortem	(n=43)
Suicidal	39 (90.70%)
Accidental	4 (9.30%)

Table 6. Overview of stomach changes in organophosphate poisoning

Stomach	N=43
Smell	
Abnormal	21 (48.83%)
Kerosene oil like	05 (11.63%)
Turpentine oil like	06 (13.95%)
Intestinal poison like	11 (25.58%)
Mucosa	
Congested	30 (69.77%)
Hemorrhagic	10 (23.26%)
Erosions	06 (13.95%)

Table 7. Overview of internal changes in organophosphate poisoning

Parameter	N=43
Larynx, Trachea	
Secretions	35 (81.40%)
No secretions	08 (18.60%)
Lungs	
Congestion	43 (100%)
Oedema	43 (100%)
Froth	18 (41.86%)
Brain	
Congestion	43 (100%)
Oedema	43 (100%)
Smell	07 (16.28%)

Out of 43 cases that were included in the study, 9 cases were brought dead, 16 cases were admitted in the medicine ward and received treatment but unfortunately succumb and 18 cases were brought in emergency ward and were alive for short period (30 minutes to 1 hour) and succumb.

Table 8. Cholinesterase level of admitted cases

Postmortem	(n=16)
Mean	2076.52
S D	1213.09

The blood samples from 16 admitted cases were analysed for cholinesterase level. Mean and Standard Deviation were calculated and it was found to be statistically non significant but in comparison to the 9 brought dead cases, cholinesterase levels are high.

Table 9. Co-relation of serum cholinesterase brought dead cases

Brought Dead	(n=09)
Mean	1382.58
S D	1227.23

Cholinesterase levels of 9 brought dead cases were compared and were found to be statistically significant. ($P < 0.05$)

Table 10. Serum cholinesterase level of partially treated & brought dead cases.

Postmortem	(n=27)
Mean	1224.29
S D	942.89

Cholinesterase level samples of partially treated as well as brought dead cases were found to be statistically highly significant. ($P < 0.001$)

DISCUSSION

Present study is an effort to study the utility of serum cholinesterase level in organophosphate poisoning in various medicolegal points of view like a substitute for negative chemical analysis of viscera in known poisoning cases, exposure cases and in mild and chronic cases involving 43 postmortem cases.

Majority of cases 20 (46.51%) were falling into age group of 21-40 years. Same observations, that is 53.4% in Batra (2003)², 64.7% in Zine (1990)²² and 67.56% in Dalal et al (1990)⁹ were noted.

Present study revealed 27 (62.79%) and 16 (37.21%) male and female respectively. Similar proportions of male and female cases were concluded by Shaikh et al (2004)¹⁸ and Batra et al (2003)².

Being agriculture country, insecticides are commonly used by farmers and it is more easily available poisonous substance. Because of easy availability, it is most common poisoning reported by Bagadia et al (1979)³, Sharma et al (2002)¹⁷ and Batra et al (2005)³.

Present study of organophosphate poisoning reveals 23 (53.49%) cases of monocrotophos poisoning followed by novacron 07 (16.28%), because being commonly used as insecticides in cotton growing district. Similar proportion was observed by Shaikh et al (2004)¹⁷.

In this study 22 (51.16%) cases were occupationally labourer followed by 14 (32.56%) cases of farmers. Though the labourer is most common class of occupation involved in this study, it doesn't represent the actual occupation. Due to free treatment available for low socioeconomic class (i. e. below poverty line) everyone has tendency to enrol the occupation as a labourer to extract benefits. At the same time persons with minimum land also do not consider themselves as a farmer.

39 (90.70%) postmortem cases were belonging to rural areas as compared to 4 (9.30%) cases from urban areas which is statistically significant ($P < 0.0001$). Similar differences were noted by Batra et al (2003)² and Sharma B R et al (2002)¹⁷.

When both sexes combined, poisoning is the most leading method of committing suicide adapted by 39 (90.70%) cases. Such a high rate of suicidal manner of poisoning in our study was due to easy availability of

insecticidal poison compared to Batra et al (2003)² and Singh B et al (1982)¹⁹ 36.6% and 39.8% respectively in overall poisoning. Such a high rate of suicidal poisoning 71.79% was reported by Singh S et al (1984)²⁰ in Chandigarh.

Dalal et al (1998)⁹ in his 5-year study on 1067 necropsies, described the cyanosis of finger nails in more than half of the cases i. e. 53.01%, froth at mouth and nostrils in 59.50% cases and in 41.71% cases respectively out of which almost one quarter were blood stained. In present study, froth was seen in 44.79% cases in mouth and nostrils out of which froth was blood stained in 20.93% cases. Genital secretion was observed in 34.88% cases while anal purging was in 20.93% cases as a nicotinic effect. Cyanosis of nails was observed in 65.12% cases in our study as a predominant finding on external examination. Similar proportional finding was also reported by Limaye et al (1996)¹³ and suggested that when we find congestion of internal organs with cyanosis and froth, chances of detecting poison are more on chemical analysis.

Congestion and oedema of brain and lungs were observed in all postmortem cases and secretions were present in larynx and trachea in 81.40% cases. Similar findings were noted by Limaye¹³ and various standard textbooks. Smells of poison after opening the skull were noted in 7 (16.28%) cases in present study. Similar finding is described in standard textbooks.

Limaye¹³ reporting on 76 necropsies found stomach contents were blood stained and mucosa congested. In present study, stomach mucosa was congested in 69.77% cases, hemorrhagic in 23.26% and erosions were observed in 13.95% cases. Abnormal smell on opening stomach was perceived in 48.83% cases and insecticidal poison like smell in 25.58% cases while kerosene oil like smell and turpentine oil like smell were noted in 11.63% cases and 13.95% cases respectively. Textbook of Forensic Medicine and Toxicology by Modi, Parikh and Reddy has also described the similar type of smell on opening stomach and oesophagus in poisoning cases. Stomachs contents are mostly blood stained but are often brown, yellowish, white or greyish in colour depending on colour of diluents used.

Holmstedt B O¹¹ described the cholinesterase in two types, true (specific enzyme) acetyl cholinesterase that has an almost specific affinity for naturally occurring substrate acetylcholine and non-specific enzyme (pseudocholinesterase) which has ability to hydrolyse quite wide range of naturally occurring and synthetic esterase in addition to cholinesterase.

A histochemical survey of cholinesterase disclose low to high concentration of acetylcholinesterase in most neurons in central nervous system, Anterior and lateral horn of spinal cord, ganglion, Striated muscles, end plate of neuromuscular and in number of other tissues such as smooth muscles of bronchioles, urinary bladder, salivary glands, carotid body, hepatic cells, muscularis mucosa of intestinal canal and decortical cells of zona glomerulosa of adrenals. (Holmstedt B O 1971)¹¹.

Even though the function of cholinesterase in blood remains unknown, but both erythrocyte acetylcholinesterase and plasma cholinesterase serve as very useful indices of the degree of absorption of poison. Though estimation of erythrocyte cholinesterase (AChE) is to be preferred, estimation of plasma-cholinesterase (PChE) has advantage because measurement is simpler and more accurate than the estimation of erythrocyte cholinesterase (Namba et al 1971)¹⁴

Rider et al (1957)¹⁶ published the first major study of cholinesterase values by using Michel method. There are various methods of cholinesterase estimation including electrometric, colorimetric, Trimetric, Tintometric and field spectrophotometric method. In our study, we use colorimetric method for estimation of pseudocholinesterase. Same method for estimation of PChE is preferred in various studies (Nouria et al¹⁵, Bobba R et al⁸ and Venkatraman et al²¹).

In our study, Cholinesterase level of 9 brought dead cases (1382.58 / 1227.23) were found statistically significant ($P < 0.05$). Similar type of result was observed by Klette et al (1993)¹² between directly battlefield cases having chemical weapon exposure and organophosphate poisoning. Reactivation of cholinesterase enzyme is a known fact with administration of pralidoxime chloride (PAM). Because of partial treatment and brought dead there was significant decrease in cholinesterase level in these cases (Namba et al 1971)¹⁴. Similar significant result ($P < 0.05$) is also observed in postmortem samples of succumbed cases and postmortem samples of partially treated and brought dead cases.

There was no significant difference between postmortem samples of brought dead cases (1382.58 / 1227.32) and partially treated cases (1145.1 / 794.34).

Thus, cholinesterase inhibition, which is an indirect indicator to monitor the organophosphorus exposure, also helps to differentiate O. P. and non- O. P. poisoning. It is also signified that the serum

cholinesterase level is significantly raised after treatment. And as such can be used as diagnostic tool for organophosphorus poisoning in cases where viscera turn negative.

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A Study of Acute Organophosphate Poisoning at a Tertiary Hospital, Belgaum, Karnataka

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ABSTRACT

Pesticide poisoning is a major health problem in India and many developing countries. Organophosphates are the most popular and most widely used insecticides in India. Organophosphates have become source for more incidences of insecticide poisoning than any other chemical class of insecticides. The present study is a 1 year retrospective analysis of 57 acute organophosphate poisoning cases admitted to the KLE's Dr.Prabhakar Kore Hospital & MRC, Belgaum, Karnataka. In this study, incidence was more among men (63.2%) compared to women (36.8%) and there were more married persons (54.4%) than unmarried (45.6%). The most predominant age group involved was 21-30 years (38.60%). Suicide was the commonest manner poisoning (94.74%). Highest number of cases occurred in the winter (54.38%). Agriculture was the primary occupation of the family in 71.93% cases. Most of the patients were from rural area (80.7%). Pseudo-cholinesterase enzyme level was below the lower limit of normal value in 77.19% cases. The most common organophosphate compound detected was monocrotophos (42.10%). Maximum number of suicide cases was observed during the weekend (Saturday - 27.8%; Sunday - 20.4%). Of the 57 cases admitted, only 4 (7.02%) patients expired.

Key words: Organophosphates, Acute Poisoning, Socio-demographic Profile, Monocrotophos, Pseudo-cholinesterase enzyme, Poison Control Centre.

INTRODUCTION

As per World Health Organisation, 2 million people die of pesticide poisoning every year. Most of the cases occur in Asia and at least 50% are due to organophosphates.¹ According to National Crime Record Bureau of India, poisoning was adopted as the mode in committing suicides by 34.8%, 34.8% and 33.6% of victims in the year 2007, 2008 and 2009 respectively. Moreover, consumption of insecticides was accounted for more than 50% of cases in all the three years.² Organophosphates are the most popular and most widely used insecticides in India.³ Organophosphate pesticide self-poisoning is estimated to kill around 2,00,000 people each year, largely in the Asia-Pacific region and the mortality rate varies from 10-20%.⁴ The present paper gives a picture of the socio-demographic profile of victims of acute organophosphate poisoning along admitted to a Tertiary Hospital at Belgaum, Karnataka and the types of organophosphate compounds involved.

METHODOLOGY

In the present study, retrospective analysis of hospital records of patients of acute organophosphate poisoning admitted during the period 01-01-2010 to 31-12-2010 to the KLE's Dr.Prabhakar Kore Hospital & MRC, Belgaum, Karnataka was done. This analysis was carried out to know the socio-demographic profile of the victims; month wise and season wise distribution of cases; manner of poisoning; most common day of poisoning in cases of suicide; type of organophosphate compound detected; and, the mortality rate. Cases were also analysed with respect to the pre-interventional pseudo-cholinesterase enzyme level. Diagnosis of acute organophosphate poisoning was based on the characteristic clinical features of organophosphate poisoning and chemical analysis (Thin Layer Chromatography and UV-Vis Spectrophotometry) report from our Poison Detection Centre. Data pertaining to the objectives of the study were collected from the clinical records in the structured proforma and analysed.

RESULTS

In the present study, a total of 57 cases of acute organophosphate poisoning were analysed. Incidence was more among men (63.2%) compared to women (36.8%) (Table 1); and, there were more married persons (31 cases; 54.4%) than unmarried (26 cases; 45.6%). Maximum patients were between 21-30 years (22 cases) accounting for 38.60%, followed by 11-20 years (20 cases; 35.08%) (Table 1). Majority of the cases were of self poisoning (54 cases; 94.74%) (Table 2). Highest number of cases occurred in the winter (31 cases; 54.38%) (Table 3) and most of the cases were admitted in January (15 cases; 26.3%) (Table 4). Agriculture was the primary occupation of the family in 41 cases (71.93%) [Table 5] and 46 patients were from rural area (46 cases; 80.7%) (Table 6). Pseudo-

cholinesterase enzyme level was below the lower limit of normal value (7000-19000 IU/ml) in 44 cases (77.19%) (Table 7). Monocrotophos was detected by chemical analysis in maximum number of cases (24 cases; 42.10%) followed by quinalphos (17 cases; 29.83%) [Table 8]. Highest number of cases of suicide was observed during the weekend i.e on Saturday (15 cases; 27.8%) and Sunday (11 cases; 20.4%) (Table 9). Of the 57 cases admitted, only 4 (7.02%) patients expired.

DISCUSSION

Pesticide poisoning is a major health problem in many developing countries. Organophosphates are the most widely used insecticides available today especially in India and they have become a common household item in rural areas. Organophosphates have become source for more incidences of insecticide poisoning than any other chemical class of insecticides. Organophosphorus compounds cause most self-poisoning deaths in southern and central India.⁵ Ingestion of organophosphates in an attempt to commit suicide is a major problem especially for developing countries and severe cases are mostly due to suicidal use.⁶

Table 1. Age and sex wise distribution of cases

Age Group (in years)	Male	Female	Total	
			Number	%
• 10	01	02	03	05.27
11-20	09	11	20	35.08
21-30	15	07	22	38.60
31-40	07	01	08	14.03
41-50	02	00	02	03.51
51-60	02	00	02	03.51
Total	36 (63.2%)	21 (36.8%)	57	100

Table 2. Manner wise distribution of cases

Manner	Number	%
Suicidal	54	94.74
Accidental	03	05.26
Homicidal	00	00.00
Total	57	100

Table 3. Season wise distribution of cases

Season	Number	%
Summer (February-May)	13	22.81
Rainy (June-September)	13	22.81
Winter (October-January)	31	54.38
Total	57	100

Table 4. Month wise distribution of cases

Month	Number	%
January	15	26.3
February	06	10.5
March	01	1.7
April	03	5.3
May	03	5.3
June	03	5.3
July	01	1.7
August	02	3.5
September	07	12.3
October	07	12.3
November	05	8.8
December	04	7.0
Total	57	100

Table 5. Family Occupation

Occupation	Number	%
Agriculture	41	71.93
Others	16	28.07
Total	57	100

Table 6. Place of residence

Place	Number	%
Rural	46	80.70
Urban	11	19.30
Total	57	100

Table 7. Pseudo-cholinesterase (PChE) level

PChE level	Number	%
Normal level	13	22.81
Reduced level	44	77.19
Total	57	100

Table 8. Distribution of cases based on type of organophosphate compound:

Type	Number	Percentage
Monocrotophos	24	42.10
Quinalphos	17	29.83
Dimethoate	04	07.02
Chlorpyrifos	05	08.77
Triazophos	05	08.77
Profenophos	02	03.51

Table 9. Distribution of suicidal cases by day of the week

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Total
Number	06	04	07	04	07	15	11	54
%	11.1	7.5	13.0	7.5	13.0	27.8	20.4	100

In the present study, men outnumbered women in the ratio 2:1 approximately. Higher incidence of organophosphate poisoning was also observed in the studies by Thunga G et al,⁴ Bashir MSM et al,⁷ Gannur DG et al,⁸ Krupesh N et al,⁹ Patel DJ et al¹⁰ and Ather NA et al.¹¹ In the rural India, men are the bread earners of the family. Also, they take the entire responsibilities of the needs of their family. If they fail to fulfil the basic requirements of their family members, they attempt to end their lives due to frustration. Other probable reasons like failure in examinations or love affairs and economic adversity are generally more common in men than women. Moreover, women are well guarded from the adversities of life starting from childhood to old age. But, contrast to our result, a study by Kar SM et al¹² reported higher incidence of organophosphate poisoning in females (67.29%) than males (32.31%). A 10 year retrospective study by Yurumez Y et al⁶ at Turkey, recorded more number of female patients of organophosphate poisoning admitted to the Kocatepe University Hospital Emergency Room. In a 2 year study by Sahin HA et al,¹³ among the organophosphate poisoning patients admitted to the Emergency Department of Yüzüncü Yil University Medical Faculty Hospital in Turkey, 67.1% were females and 32.9% were males. We observed in our study that married persons were slightly more than unmarried. Our result is consistent with the study by Yurumez Y et al (67.3%)⁶, Gannur DG et al (51.68%)⁸ and Patel DJ et al (74.65%).¹⁰

In our study, majority of the patients admitted due to acute organophosphate poisoning were in their 3rd decade of life (38.6%). Similar result was also observed in the studies by Thunga G et al (60.5%),⁴ Bashir MSM et al,⁷ Gannur DG et al (45.6%)⁸ and Patel DJ et al (44.44%).¹⁰ In the study by Yurumez Y et al⁶ at Turkey most frequently affected age group was 15-24 years (41%). In a study conducted at National Poison Control Centre, Karachi, by Turabi A et al,¹⁴ the age group most affected was 15-20 years (44.77%), followed by 21-30 years (33.21%). These data point out that it's the younger individuals who are more prone for poisoning. Generally, it is suicidal intent rather than accidental which is killing factor among the younger generation. Higher incidence of poisoning among the people of productive age group will be a big loss to any society or nation. Reasons appear to be many; for

example, inability to face adverse situations in life like unemployment in spite of being graduates, failures in love and examinations, failure of crops, family disputes, poverty, mental instability etc.

Intentional self poisoning accounted for more than 90% of cases in the present study. This reflects the increasing rate of use of organophosphates to end life. In many Indian reports, the rates of poisoning as suicidal method ranges from 20.6% (10.3% - organophosphorus) to 56.3% (43.8% - organophosphorus).¹⁵ Nowadays, poisoning is replacing the other modes of committing suicide. India recorded a 31.6% rise in number of suicide cases between 1993 (84,244 cases) and 2003 (1,10,851 cases) and the most common method chosen for suicide was by consumption of poison in general and agrochemicals in particular.¹⁶ Most of the admitted cases were of suicidal in nature in the studies by Thunga G et al (98%),⁴ Bashir MSM et al,⁷ Gannur DG et al (98%)⁸, Patel DJ et al (86.8%)¹⁰ and Singh B et al (72%).¹⁷

More than 50% cases occurred in the winter season and analysis of month wise distribution of cases reflected maximum number of cases admitted in the month of January. According to the study done at Nepal by Kar SM et al,¹² incidences of organophosphate poisoning were very large in the months during May to August (56.92%). In a South Indian study done by Bashir MSM et al,⁷ seasonal variations were observed in male organophosphate poisoning cases. Incidence increased from the month of June (6.38%) with peak during September (9.07%) and lowest during May (3.23%). In females, there was no seasonal variation but peak cases were seen during April (3.92%) and lowest in June (1.61%). Further, day wise analysis of the suicidal cases showed maximum number cases on weekends in our study.

About 2/3rd of total victims admitted in our study with organophosphate poisoning were either farmers or their family members. Agriculturists accounted for 45.1% of cases in the study by Thunga G et al.⁴ Gannur DG et al⁸ observed in their study that 34.78% patients were agricultural workers and labourers. This could be due to their easy availability and accessibility, since pesticides are commonly stored in the houses of agriculturists. Lack of awareness about the safe storage of pesticides at home among most of the agriculturists

can lead to the accidental poisoning in children. Our study shows that 80% patients were from rural areas. This result is similar to the results of the studies conducted by Thunga et al⁴ (65%) and Gannur DG et al⁸ (66.6%).

Pseudo-cholinesterase (PChE) level was reduced in 77.19% patients. In the study by Ather NA et al,¹¹ 56% had serum cholinesterase level below normal range. Turabi A et al¹⁴ reported that in their study 44.97% patients had PChE level below normal. Study carried out at Turkey by Yurumez Y et al⁶ showed that, 69.6% of the male patients and 74.1% of the female patients had depressed PChE levels by 50% or more at admission. In our study, PChE level was normal in 22.81% cases, but, these cases were tested positive for the presence of organophosphate compound by Qualitative analysis at our Poison Detection Centre. In the developing countries, PChE level is used in general for the diagnosis of suspected organophosphate poisoning cases when history and clinical features are not clear. Depression of PChE activity to less than 50% of normal indicates organophosphate pesticide toxicity.³ Not all cases of decreased organophosphate activity are due to organophosphate poisoning, but all cases of organophosphate pesticide poisoning will show variation in organophosphate activity towards the lower aspect. Reduction in PChE level can occur in chronic infections, malignancy, extensive burns, malnutrition, liver disease, uraemia, use of medications like anticholinesterase inhibitors, contraceptives. Congenital absence of PChE is also been reported in the literature.¹⁸ Hence, the tertiary health care centres should have Poison Control Centres with the facilities for the analysis of samples for poisons.

In the present study, most common organophosphate compound detected by chemical analysis was monocrotophos (42.1%). This could be due to the fact that monocrotophos is one of the most commonly sold insecticides in this region. As per the study by Rao CHS et al,⁵ of the 653 cases of organophosphate poisoning reported in the year 2002, most commonly consumed compound was monocrotophos (39.4%). Higher incidence of poisoning due to a compound depends upon the use and sale of that particular compound in the region. Dichlorvos was the commonest compound observed in the study by Yurumez Y et al⁶ and Methyl Parathion in the study by Kar SM et al.¹²

In this study, the mortality rate was 7.02% which is significantly lower than the death rate observed in the

studies by Thunga G et al⁴ (25%), Bashir MSM et al⁷ (20%). But, in a 2 year prospective study done at Turkey by Sahin HA et al,¹³ the mortality rate was 4.7%.

CONCLUSION

Organophosphate poisoning is an important preventable public health problem especially in the developing countries. Though most of the cases are suicidal, accidental poisoning do occur especially in children due to unsafe storage of pesticides at home. Accidental poisoning can also occur in adults if suitable protective measures are not employed during the use of pesticides. Occurrence of accidental poisoning can be minimised by educating the farmers, who constantly use the pesticides, by awareness programmes about the safe use and storage of pesticides. The farmers should also be educated regarding the appropriate measures which have to be taken in cases of accidental exposure. Stringent legislature is required to curb the indiscriminate sale and purchase of these dangerous substances in the open local market. Pesticides are sold even from grocery shops in many villages. Amendments are necessary in the Government policies pertaining to the agriculture in order to make them more farmers supportive. Morbidity and mortality due to organophosphate poisoning can be reduced by the early and proper detection of the compound by chemical analysis. In this regard, each district should have at least one Poison Control Centre. Organophosphate pesticides which are meant to protect crops are unfortunately abused by humans to kill themselves.

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Correlation Between Palatal Rugae, Dermatoglyphics and Blood Group - A Forensic Study

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ABSTRACT

The palatal rugae is a unique feature in human beings, which retains its shape throughout life. Dermatoglyphic patterns too are constant and individualistic. Both can be used reliably as a source of identification of individuals. The epithelium of the primary palate as well as the finger buds develop from the same site and are of ectodermal origin. Embryogenesis has a genetic basis; so does the determination of the blood group of an individual. Hence, the present study was undertaken to find out the association between the palatal rugae pattern, dermatoglyphic pattern and blood group of an individual. Subjects with known blood group, aged between 10-15 years, were selected at random and informed consent was taken. Bilateral digit prints were obtained using endorsing ink and plain duplicating paper. The maxillary arch casts were prepared with alginate and type IV dental stone. The blood group of the subject was recorded. The general distribution of pattern of fingerprints showed highest frequency of loops while the predominantly seen palatal rugae pattern was wavy. The statistical analysis done were chi square test and ANOVA and it revealed a significant correlation between blood group and dermatoglyphic pattern.

Key words: Palatal Rugae, Dermatoglyphics and Blood Group.

INTRODUCTION

Forensic odontology is one of the most unexplored and intriguing branches of forensic medicine¹. It has emerged in recent times as one of the most important offshoots of forensic medicine and has proved to be invaluable in criminal investigations of all types².

Identity is a set of physical characteristics, functional or psychic, normal or pathological that defines an individual. Recently, there has been an increased interest in biometric technologies that is human identification based on one's individual features. A fingerprint is an impression of the finger ridges of all parts of the finger³. They are constant and individualistic and form the most reliable criteria for identification^{4,5}. Fingerprint patterns are genotypically determined and remain unchanged from birth till death⁴ in the absence of trauma⁷. Dermatoglyphics has a primary aim of identifying an individual's gender, race ethnic differences as well as serving as a tool for the diagnosis of congenital malformations⁷.

Palatal rugae comprise about 3-7 ridges radiating out tangentially from the incisive papilla. The pattern

of these rugae is genetically determined⁸. At birth, the palatine rugae are well-formed, and the pattern of orientation typical for the person is present. This is a unique feature in human beings, which retains its shape throughout life and can be used reliably as a source of identification of individuals. The anatomical position of the rugae inside the mouth surrounded by cheeks, lips, tongue, buccal pad of fat, teeth and bone keeps them well protected from trauma and high temperatures. Thus, they are a stable reference landmark during forensic identification⁹.

Embryogenesis has a genetic basis; so does the determination of the blood group of an individual. Blotterogel and Blotterogel expressed a correlation between physical characteristics and blood groups¹⁰.

While extensive work has led to the rapid development of the subject of forensic odontology in Western countries, there is a need for heightening the awareness about the importance of this specialty amongst Indian pediatric dental professionals². There is a paucity of studies done on forensic odontology among children in India, hence the need for the present study.

Due to the immense potential of fingerprints as an effective method of identification an attempt has been made in the present work to analyze their correlation with blood group and palatal rugae pattern. Any correlation between these parameters may help in determining one when we possess knowledge about the other.

MATERIAL AND METHODS

After obtaining ethical clearance, this double blind study was carried out over a period of two weeks among students of Our Lady Queen of the Missions School, Kolkata. Total 100 students (all female) belonging to the age group 10-15 years voluntarily participated in the study.

Healthy individuals with known blood group and no history of any genetic disorders were included in the study⁵.

Students with permanent scars on their fingers or thumbs, with any hand deformities due to injury, birth defect of disease, those having worn fingerprints, extra webbed or bandaged fingers, were excluded from the study³. Also, subjects with orofacial clefts, craniofacial anomalies or those who were syndromic, were not included. Medically or mentally compromised children were excluded.

Each subject was asked to wash his hands thoroughly with soap and water and dry them using a towel. She was then asked to press her fingertip on the stamp pad and then to the paper to transfer the fingerprint impression. The same method was repeated for all the fingers of both hands. In this way, the plain fingerprints of all the ten digits were taken separately on the respective box for that finger on the same sheet of paper. Care was taken to avoid sliding of fingers to prevent smudging of the print. The fingerprint patterns were studied with the help of a magnifying lens and were identified as: Loops, Whorls and Arches based on the appearance of the ridge lines³ (In 1892, Galton classified the ridge patterns depending upon their primary pattern into three groups i.e. arches, loops and whorls^{5,11}).

Impressions of the upper arch were made by using alginate impression material and type IV dental stone was used to prepare the cast. Impressions were poured immediately to minimize dimensional changes¹¹. All casts were free of air bubbles and voids, especially at the anterior thirds of the palate¹².

All palatal rugae except those with length less than 2mm were included in the study and highlighted in

colour. The highlighted rugae form were examined for the different rugae patterns which can be straight, wavy, curved, unification and circular, according to the classification given by Thomas and Kotze in 1983^{9,12}.

Each subject was assigned a serial number. Details such as name, age and blood group were noted from their school identity cards.

FINDINGS

Majority of the subjects, 41%, in the study belonged to blood group B; followed by blood group O and A which were 28% and 21% respectively. While blood group AB comprised the least number of students 10%. All subjects were Rh positive (Fig 1).

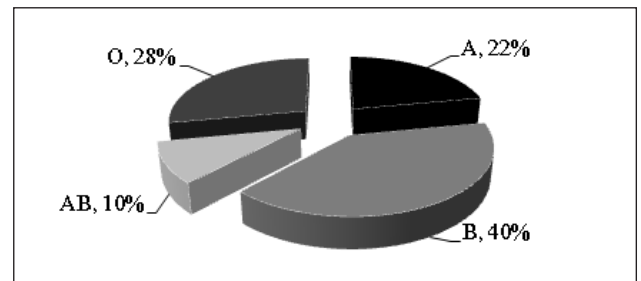


Fig 1. ABO Blood Group Frequency.

Fingerprint analysis showed that, loops was the most common pattern in the study (52.4%), followed by whorls (32.8%) while arches were present in a smaller percentage (13.9%) of the study group (Fig 2).

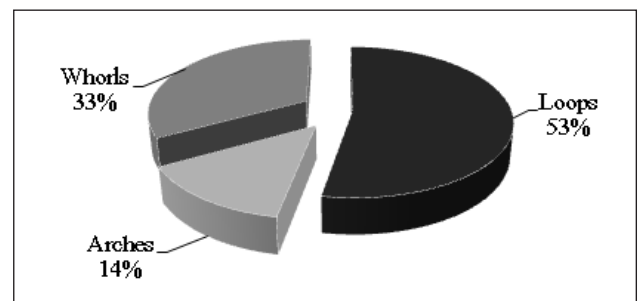


Fig. 2. Frequency of occurrence of dermatoglyphic pattern.

Study of palatal rugae showed that the wavy rugae occurred with maximum frequency (46.13%) followed by the curved pattern (36.72%). Straight rugae pattern occurred with the least frequency (1.97%) (Fig 3).

Chi square analysis showed a significant association between blood group and dermatoglyphic pattern but there was no significant association between palatal rugae pattern and blood group. There was a maximum association between curved rugae and blood group B (44.63%) (Fig 4 and Fig 5).

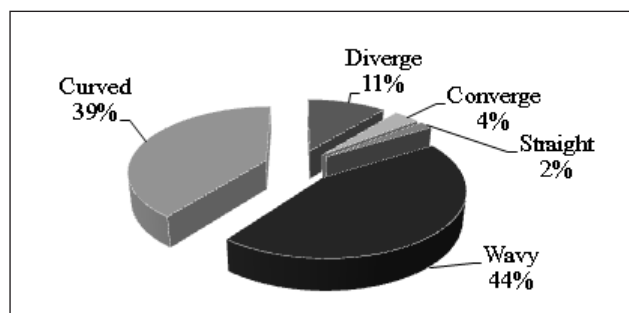


Fig. 3. Frequency of occurrence of palatal rugae pattern.

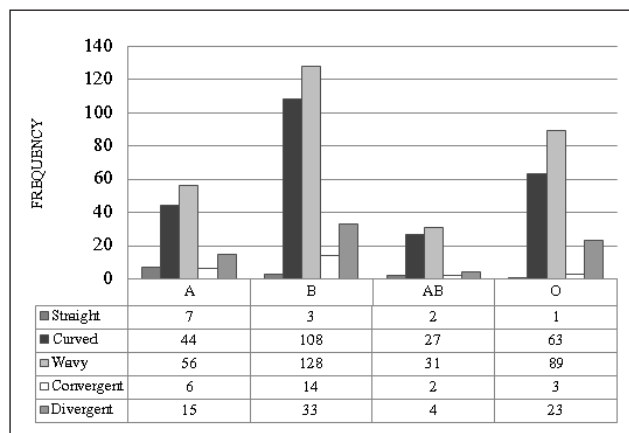


Fig. 4. Palatal rugae pattern vs abo blood group system.

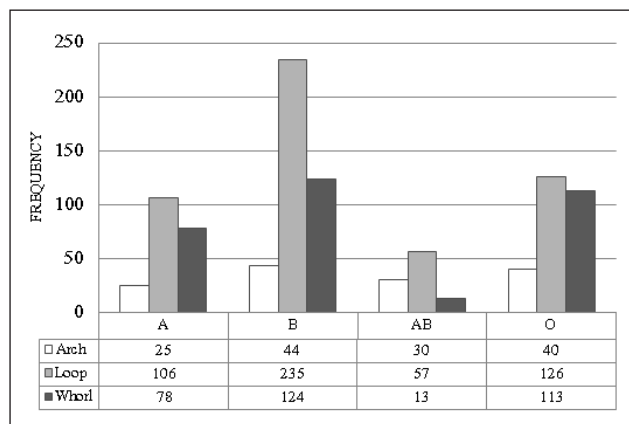


Fig. 5. Fingerprint pattern vs blood group $\chi^2=43.136$ $p<0.001$ vhs.

To study the correlation between all the three parameters the Spearman’s Correlation Coefficient statistical analysis was performed. The following were the notable correlations:

In blood group A

- straight and wavy palatal rugae pattern are in negative relation (significant)
- curved and divergent palatal rugae pattern are in negative relation (highly significant)

- tented arch and ulnar loops are both in negative relation with the whorl dermatoglyphic pattern (significant and highly significant respectively)

In blood group B

- curved and wavy palatal rugae pattern are both in negative relation with the divergent pattern (highly significant)
- the divergent rugae pattern and arch dermatoglyphic pattern are in negative relation (significant)
- tented arch and ulnar loops are both in negative relation with the whorl dermatoglyphic pattern (highly significant and very highly significant respectively)

In blood group O

- curved and divergent palatal rugae pattern are in negative relation (significant)
- tented arch and ulnar loops are both in negative relation with the whorl dermatoglyphic pattern (highly significant and very highly significant respectively)

In blood group AB no such significant association was seen.

As a significant correlation was achieved between the blood group and the dermatoglyphic pattern further association between them was studied. The frequency of occurrence of each pattern in each finger of the hand was noted and the pattern occurring with the maximum frequency was calculated (Tables 1, 2, 3 and 4).

Table 1. Blood Group A

	Left	Right
Thumb	12 Whorls	11 Whorls/Loops
Index Finger	9 Whorls	16 Loops
Middle Finger	11 Loops	12 Loops
Ring Finger	8 Loops	20 Whorls
Little Finger	13 Loops	15 Loops

Table 2. Blood Group B

	Left	Right
Thumb	23 Loops	27 Loops
Index Finger	19 Whorls	25 Loops
Middle Finger	19 Loops	29 Loops
Ring Finger	18 Loops	20 Whorls
Little Finger	30 Loops	32 Loops

Table 3. Blood Group AB

	Left	Right
Thumb	5 Loops	4 Loops
Index Finger	4 Arches	5 Arches
Middle Finger	5 Arches	7 Arches
Ring Finger	7 Loops	7 Loops
Little Finger	8 Loops	11 Loops

Table 4. Blood Group O

	Left	Right
Thumb	14 Whorls	12 Whorls / Loops
Index Finger	11 Whorls/Loops	14 Whorls
Middle Finger	14 Whorls	16 Loops
Ring Finger	13 Whorls	15 Whorls
Little Finger	16 Loops	18 Loops

DISCUSSION

The importance of dental identification is on the increase year after year. This is due to the increasing incidence of mass disasters because of natural phenomena as well as non-natural occurrences and terror acts. Apart from mass disasters, carnal and heinous acts culminating in homicide of victims particularly children are also common.

These facts should fuel our efforts to improve the scenario of forensic odontology in India. Our study is a small step towards this proposed end. The facts that it adds on to the already existing or non-existing information has helped us advance our knowledge of the correlation between the three chosen parameters. As the study has been conducted on a pediatric population group the significance of this study is further enhanced.

The purpose of classifying fingerprints is that they can be filed and retrieved when needed. The various classification systems used throughout the world are based on the pattern of friction ridges seen on pulp of terminal part of all the ten fingers. These patterns fall into three general classes called arches, loops, and whorls. Arches are the simplest patterns and also the rarest. In this type the ridge lines flow into the print from one side, rise in the middle of the pattern, and flow out to the other side of the print. Loops are formed by ridge lines that flow in from one side of the print, sweep up in the center like an arch, and then curve back around and flow out or tend to flow out on the side from where they entered. The loop is the most common of all the patterns. Whorls have one or more of the ridge lines curves around the core to form a circle or spiral or other rounded, constantly curving form³.

Palatal rugae, also called plicae palatinae transversae and rugae palatina, refer to the ridges on the anterior part of the palatal mucosa, each side of the median palatal raphe and behind the incisive papilla. Rugae patterns have been studied for various purposes, published reports being mainly in the fields of anthropology, comparative anatomy, genetics, forensic odontology, prosthodontics and orthodontics. It has been shown that total number of rugae do not change throughout early childhood and adolescence and changes occur in rugae relates to their length only¹³. In the light of this fact, palatal rugae patterns can be used to differentiate between individuals.

In our study, the parameter blood group is determined by the alleles that we inherit. There are three common Blood type alleles: A, B, and O. We all have two alleles, one inherited from each parent. The possible combinations of the three alleles are: OO; AO; BO; AB; AA; BB.

The results of our study shows that there was an association between distribution of palatal rugae, fingerprint patterns and blood group. The general distribution pattern of the primary fingerprint was of the same order in individuals with A, B, AB and O blood groups i.e high frequency of loops, moderate of whorls and low of arches. This is in accordance with the results obtained by Rastogi et al, Bharadwaja et al and Sharma et al¹⁴.

The association between blood groups and dermatoglyphic pattern according to the study by Rastogi et al shows blood group A had a higher frequency of loops and arches, whorls were more common in blood group O³. Bharadwaja et al published their study in 2004 which revealed that individuals with blood group A were seen to have more of loops, while that of blood group AB had more of arches. The results obtained in our study is in lieu with the above wherein blood group A showed a greater number of loops and blood group O whorls while AB, arches. Sharma et al studied the dermatoglyphic variations in five ethno-geographic cohorts of the Indian population and the results showed variation between the different cohorts not similar to the results above, however arches were the most rare in all cohorts¹⁴.

For the distribution pattern in individual fingers, Bharadwaja et al in their study noted that the thumb and little fingers of A, B and O blood group showed high frequency of loops and whorls were more in ring fingers while the index and middle fingers presented a higher incidence of arches. Individuals of AB blood

group also presented more whorls in their thumbs, index and ring fingers whereas their middle and little fingers had more loops¹⁰.

Tanuj et al found that loops were most often found on the little finger, followed by middle finger and index finger. Frequency of whorls was maximum on the ring finger followed by thumb and index finger⁵. These results are similar to that obtained in our study.

What we know of forensic odontology as applied to the Indian pediatric population is barely the tip of the iceberg with the rest of it waiting to be discovered. These uncharted territories should be mapped, and our vault of information should be filled enough to be compared with the west.

Our preliminary study includes few variables and a small sample size. There is immense scope for this particular study by conducting it on a larger population group and by including more number of variables. According to the results obtained in our study, by obtaining information about any one of the parameters we can predict the occurrence of the other two parameters with high degree of accuracy. This takes us a stride further in identification of individuals.

CONCLUSIONS

The following notable correlations can be drawn from the study;

- Wavy palatal rugae occurred most commonly.
- Maximum number of wavy rugae pattern was seen in blood group B.
- A significant correlation exists between blood group and dermatoglyphic pattern.
- Loops are the predominant fingerprint pattern in all four groups of the ABO blood group system.
- Blood groups A and B predominantly exhibit loops; blood group AB, arches; and, blood group O, whorls.
- Loops occurred most frequently in the little finger in all the four blood groups. Middle finger in blood groups A, B, O. Ring finger of blood groups A and B.
- Whorls were seen consistently on the right ring and left index finger of blood groups A, B and O.
- Arches were seen predominantly in the index and middle fingers of blood group AB.

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Teeth and their Secrets – Forensic Dentistry

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ABSTRACT

The teeth may also be used as weapon and under certain circumstances, may leave information as to the identity of the biter. The individuality of the human dentition frequently allows the Forensic Odontologist to reach a strong opinion of association in cases of identification and bite mark analysis. Such analysis can often be useful during the investigation of violent crimes, especially those involving sexual assault. The high number of murder, rape, and child abuse cases has led to increased numbers of forensics cases being heard in courts. Analysis of the bite mark is the second major responsibility of the forensic dentist.

Key words: Forensic Dentistry, Age estimation, Bite Mark Analysis.

INTRODUCTION

A dog that intends to bite does not bear its teeth”
(Turkish proverb)”

The term “forensic” is from the Latin, meaning forum or a place where legal matters are discussed¹. The science of dentistry as related to the law is known as Forensic dentistry or Forensic odontology².

The theory behind forensic dentistry is that “no two mouths are alike and teeth tool leaves recognizable mark on skin”³.

Forensic dentistry or forensic odontology involves dentists’ participation in assisting legal and criminal issues. It refers to the proper handling, examination and evaluation of dental evidence, which will be then presented in the interest of justice⁴.

Forensic identification by its nature is a multidisciplinary team effort relying on positive identification methodologies as well as presumption or exclusionary methodologies. Typically, this effort involves the cooperation & coordination of law enforcement officials, forensic pathologists, forensic

odontologists, forensic anthropologists, serologists, criminalists, & other specialist as deemed necessary⁵.

Forensic dentistry has become an integral part of forensic medicine over the past 100 years. This has been due to the dedication of people like Amoedo, Gustafson, Sognaes, Keiser-Nielsen and Suzuki, Whittaker, Clement, to name but a few. They established the essential role which forensic dentistry plays mainly in the identification of human remains⁶.

THE SCOPE OF FORENSIC DENTISTRY

As the state of art of forensic dentistry has advanced over years, it is now clearly established that dental evidence can be invaluable in personal identification & criminalistics⁷.

The scope of forensic dentistry is broad & ever-challenging. Each case is different & even the seemingly routine case may test the dentist’s ingenuity in applying his dental knowledge⁸.

HISTORICAL BACKGROUND

Forensic odontology has been with us since the beginning when, according to the Old Testament, Adam was convinced by Eve to put a ‘bite mark’ in apple⁹.

The earliest dental identification began with the

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Agrippina and the Lollia Paulina case shortly after her marriage in the year 49 A.D to Claudius, Emperor of Rome, Agrippina, began plotting to secure her position. Because she feared that the rich divorcee Lollia Paulina might still be a rival for her husband attention, Agrippina soon decided that it would be safer if Lollia Paulina was dead. To be safer Agrippina sent her own soldiers to kill Lollia Paulina, the soldiers were further instructed to bring back her head. Cutting off the head after inflicting death was not uncommon in those days, the only positive proof of death being visual. Agrippina stared at the severed head, unable to recognize the distorted face; she parted the lips with her fingers looking for Lollia Paulinas teeth which were known to have certain distinctive characteristics. Only then was she satisfied that it was Lollia Paulina. It marks the first use of dental identification of which there is record⁷.

It was used in the identification of Adolf Hitler and his wife Eva Braun at the end of World War II.

In 1453 the first formally reported case of dental identification was that of the 80 years old warrior John Talbot, Earl of Shrewsbury, who fell in the battle of Castillon¹⁰.

Early in 1775 Revere constructed a silver wire fixed bridge for his close friend Dr. Joseph Warren a medical practice. At the outset of the war, Warren refused the appointment of surgeon-in-chief to the continental army. Instead, he requested the rank of a line officer; Unfortunately, Warren was killed by a bullet that pierced his skull in the Battle of Bunker Hill.

Buried by the British, Ten months later, when the British had evacuated Boston, Warren's brothers, Paul Revere, and friends sought to recover his body from its unmarked grave. Revere was able to identify the remains by the bridge work he had constructed.

Warren was reburied on April 8, 1776 in King's Chapel. Joseph Warren was the first person to be identified by a dentist.

The identification of John Wilkes Booth's body, recovered by Union soldiers, was a controversial issue. The matter was resolved by the family doctor who was able to make a definite identification of dentition⁷.

In 1897 a paper entitled, "The role of the Dentists in the identification of the victims of the catastrophe of the Bazar de la Charite, Paris and 4th May, 1897", was presented by Dr. Oscar Amoedo (Professor of the dental school in Paris) at the international Medical

Congress of Moscow. The bazaar, at which the wealthy women of Paris annually raised money for projects for the poor, was destroyed within 10 minutes and 126 persons lost their lives.

The bodies of those killed in the fire were brought to the industrial place for identification. Visual identification was difficult because many were mutilated and extensively burned. Recognition was made by means of pieces of clothing and personal effects. When 30 remaining corpses could not be identified, the Paraguayan Consul suggested that the dentists of the missing persons be called to chart dentition and to identify the bodies by their dentistry. The first treatise on forensic odontology was written by Dr. Oscar Amoedo in 1898 and was entitled *L'Art Dentaire en Medicine Legale*. Dr. Oscar is also known as father of Forensic Odontology¹¹.

In 1870, Ansil L. Robinson was charged with the murder of his mistress; Mary Lunsford. Evidence against Robinson included an attempt to match his teeth to bite marks on the victim's arm¹².

In 1937 in Chantilly, a murder was convicted on the evidence of the bite marks that the victim inflicted during her struggle for life¹⁰.

Wayne Clifford Boden was a Canadian serial killer and rapist active from 1969-1971. He earned the nickname "the Vampire Rapist" because he had the penchant of biting the breasts of his victims, a method of operation that led to his conviction due to forensic odontological evidence¹³.

The "Scandinavian Star" ferry disaster 1990 - a challenge to forensic odontology with 158 victims, the fire on board the "Scandinavian Star" was one of the world's worst ferry disasters. Dental identity could be established in 107 cases (68%)¹⁴.

Sager case involved the murder of a 14 year old girl. The state's evidence included comparison by forensic odontologists, of bite marks on the victim's body to the defendant's dentition. After a painstaking review of voluminous legal and dental authorities, the Missouri court determined that "the science of positive bite mark identification has reached the level of scientific reliability and credibility to permit its admission as evidence in criminal proceedings¹⁵.

Forensic odontologists successfully identify tsunami victims in South-East Asia in December 2004; more than 92% of the non-Thai victims have been identified. About 80% of the non-Thai victims were identified by dental information. This high success rate

of dental identification in Thailand was a matter of surprise for many forensic experts¹⁶.

Forensic sciences organizations

There are three major forensic dental organizations on the North American Continent.

The American Society of Forensic odontology was organized at the Armed Forces Institute of Pathology (AFIP) in Washington, D.C in November, 1970, by Colonel Robert Boyers, then chief of Dental & oral pathology division of AFIP.

The Canadian Society of Forensic Science (CSFS) is a non-profit professional organization incorporated to maintain professional standards, and to promote the study and enhance the stature of forensic science. Membership in the society is open internationally to professionals with an active interest in the forensic sciences. It is organized into sections representing diverse areas of forensic examination: Anthropology, Medical, Odontology, Biology, Chemistry, Documents, Engineering, Firearms and Toxicology.

The American Academy of Forensic Sciences is a multi-disciplinary professional organization that provides leadership to advance science and its application to the legal system. The objectives of the Academy are to promote education, foster research, improve practice, and encourage collaboration in the forensic sciences⁷.

THE JOB OF FORENSIC ODONTOLOGISTS

As we enter a new millennium, our society is faced with fresh challenges in every conceivable area. Despite leaps in modern technology, medical breakthroughs and the geographical changes that the last century has brought, crime still persists in all aspects of our lives. Violent and heinous activities that shatter the lives of victims, their friends and families occur everyday. Often, little can be done to repair such damage. The apprehension and subsequent prosecution of the perpetrator(s) is essential to maintain law and order. Through the specialty of forensic odontology, dentistry plays a small but significant role in this process. By identifying the victims of crime and disaster through dental records, dentists assist those involved in crime investigation⁵.

Identification of the living or the deceased.

Dental identification of humans occurs for a number of different reasons and in a number of

different situations¹⁷. Dental identifications have always played a key role in natural and manmade disaster situations and in particular the mass casualties normally associated with aviation disasters¹⁸.

Bite mark identification, analysis and comparisons

The term 'bite mark' is used in this field knowing that the marks are the result of the tooth impression in different materials¹⁹. Bite marks can be found in flesh, foodstuffs and less frequently in a variety of other materials. The procedure for comparison of bite marks on the skin of victims to the dentition of possible assailants is well established and has been reported in historical cases, and in many cases to the present day. Since 1966 there have been more than 100 papers written on the subject, the majority of which are case reports or descriptions of technique. Bite mark evidence has recently become increasingly important in the investigation of non-accidental injuries to children²⁰.

DNA analysis from saliva obtain from bite marks

DNA analysis has been used successfully in a number of large accidents to associate body parts and for purposes of identification, by comparing victims' DNA profiles with those of relatives^{4,6}. However, DNA typing is still not generally regarded as an essential part of disaster victim identification²¹.

Dental age estimation.

The determination of D- and L-aspartic acid (Asp) content from teeth has been applied in age estimation for forensic purposes over the past decades. It was first introduced to assess age from tooth enamel and later from dentin and cementum. Recently, dentin seems to be most reliable, as the racemization reaction progresses more rapidly in the root than in the crown²².

Lip print identification analysis & comparison.

Cheiloscopy, (from the Greek words cheilos, lips, e skopein, see) is the name given to the lip print studies. The importance of cheiloscopy is linked to the fact that lip prints are unique to one person, except in monozygotic twins²³.

Lip prints can be instrumental in identifying a person positively and can be used to verify the presence or absence of a person at the scene of crime. The wrinkles and grooves on labial mucosa, called as sulci labiorum forms a characteristic pattern called as lip prints and the study of which is referred to as cheiloscopy²⁴.

Rugae print identification analysis & comparison.

Dental evidence can be used as the sole method of identifying a deceased person. In circumstances where identification of an individual by fingerprint or dental record comparison is difficult, palatal rugae may be considered as an alternative source. Palatal rugae have been shown to be highly individual and consistency in shape throughout life. The present study evaluated the use of palatal rugae patterns for forensic identification using manual method²⁵.

Denture identification

Labeled dentures can be of great assistance in the identification of individuals²⁶. Unlabelled dentures have been recovered from patients and then fitted to casts retained by the treating dentist or laboratory, and this has been an accepted method of identification²⁷.

Sex determination by DNA and teeth's.

Sex is the first step of personal identification in forensic medicine. Recently, with advances in gene analysis techniques, methods for sex determination using X and Y chromosome DNA analysis have been developed²⁸.

CONCLUSION

Forensic dentistry play major role in identification of those individuals who cannot be identified. Recent tragedies and past and present situations have increased awareness concerning the importance of forensic dentistry in identification of victims.

To maximize dental application in forensic cases, it is necessary to train dentists in the practical aspects of forensic odontology. And there is necessity in exposing dentists to the basic principles and techniques of the subject.

Hence dependence on latest technologies alone does not always help in solving cases and reversion to the conventional method may be required. Thus a combination of reliable conventional methods and potentialities of advanced sciences can make wonders in the Science of Forensic Dentistry.

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Critical Appraisal of Unsafe Abortions in Western Orissa: A Hospital Based Study

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ABSTRACT

Background: Unsafe abortion continues to contribute to the maternal mortality trends in rural India. Literature regarding the characteristics of cases from Orissa is scant impeding formulation of a preventive strategy.

Materials and methods: Sixty consecutive cases of complicated unsafe abortion referred to a maternity hospital in rural Orissa, India. Hospital records of these patients are analyzed with respect to epidemiological characteristics.

Study design: Retrospective study of hospital records.

Result: Unsafe abortion is common among married and multiparous women, of low socioeconomic status in the age group of 21-30 years. Timely intervention provided good cure rate.

Conclusion: Adequate information and counseling regarding Medical Termination of Pregnancy Act at the hospital level and other multipronged measures may help reducing the rate of septic abortions.

Key words: *Unsafe Abortion, Criminal Abortion, Medical Termination of Pregnancy, Maternal Mortality Rate.*

INTRODUCTION

Unsafe abortion is a persistent, preventable pandemic. WHO defines unsafe abortion as a procedure for terminating an unintended pregnancy either by individuals without necessary skills or in an environment that does not conform to minimum medical standard or both.¹ Reducing unsafe abortions and the complications resulting from them is not only closely linked to improved maternal mortality but also related to other aspects of development such as gender equality, women empowerment and poverty reduction.

Despite the realized importance of abortion as a global health problem, reliable data are difficult to

obtain, especially in countries where access to abortion is legally restricted. Whether legal or illegal, induced abortion is stigmatized and frequently censured by political, religious or other leaders. Hence underreporting is routine even in countries where abortion is legally available. The use of varying terms such as induced miscarriage, menstrual regulation, mini-abortion, and regularization of a delayed or suspended menstruation further compounds the problem of producing reliable and comparable estimates of the prevalence of unsafe abortion.

An estimate reflects that globally approximately 42 million pregnancies are voluntarily terminated annually- 22 million within the respective national legal system and 20 million outside it.² In the later case, these are often performed by unskilled providers or in unhygienic conditions, or both. Almost 98% of unsafe abortions occur in developing countries. Approximately 25% of the unsafe abortions are likely to face severe complications which can cause death, and will seek hospital care, putting heavy demands on already scarce resources.

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Unsafe abortions vary substantially by age across regions: adolescents (15-19 years) accounts for 25% of all unsafe abortions in Africa whereas the percentage in Asia is considerably lower. By contrast, 42% of all unsafe abortions in Asia are in women aged 30-44 years, compared to 23% in Africa.³⁻⁷ Therefore it can be inferred from various studies that abortion is common in unmarried women in Africa, and married women in Asia.⁸ Another observation from Asian countries that needs speculation is the parity of the women: most of the abortion seekers are multipara compared to the African nations.^{4-7,9,10}

Unsafe abortion is closely linked to illiteracy and poverty as seen across most of the studies.^{7,11} While the rate of abortion is constant across all socioeconomic barriers, the rate of unsafe abortion methods is confined to poor, illiterate people. Therefore, the rate of unsafe abortion is higher in underdeveloped and developing countries compared to the developed nations.

Abortion has a strong religious association: the countries where the religion does not sanction abortion, the legislation also prevents the termination of pregnancy, thereby increasing the rate of self-induced and unsafe abortion.^{2,6,7} However, in India there is a conglomeration of many religions, statistics shows that the abortion rate is highest among Hindus, as compared to Muslims and other religions.⁷

Statistics from countries, where abortion laws are restricted or liberalized shows that, most of the abortions are performed by local unqualified quacks.^{2,9-13} The circumstances under which women obtain unsafe abortion vary and depend on the traditional methods known and the type of provider present.^{3,9} Therefore it is not surprising that, any statistics pertaining to the method of unsafe abortion from India and the neighboring countries will show shocking results.^{6,10,12}

Most of the abortions are carried out in the early stage of pregnancy.^{12,14} The MTP Act in India prescribes the upper limit of legalized abortion as 20th week of pregnancy. In case of any abortion after 20th week, the abortion is considered illegal, and has to be carried out by clandestine method. Therefore the statistics from this part of the world show a significant proportion of unsafe abortion in the second trimester of pregnancy.

Reducing maternal mortality and morbidity in India has been a priority for the Government in recent years. Recently the Government has started 'Janani

Suraksha Yojna, targeting the high risk population.¹⁵ Unsafe abortion and its complications have been acknowledged as an important public health problem, but reliable data to monitor and evaluate its effect are virtually non-existent and also difficult to obtain, especially from Orissa- a poor state harboring a population of more than 40 millions.

We looked into the internet search engines to obtain some data helpful for our study. However, the most recent statistics are decades old and are not reliable. Therefore, we undertook a survey to study the vulnerable population at high risk group and to explore the preventable situations.

PATIENTS AND METHODS

Sixty consecutive emergency gynaecologic admissions to a maternity hospital in rural Orissa over a period of one year (2010) were reviewed to evaluate the demographic and clinical profile of patients admitted as a result of unsafe admission. Using the WHO definition, we classified induced abortion as unsafe, if it was performed by an unskilled provider (the woman herself, a traditional birth attendant, an auxiliary worker, nurse, or provider other than doctor), and/ or if it was performed in an unsanitary facility (the woman's home, the traditional birth attendant's home, or other), and/or if it was performed using a hazardous technique (caused by ingestion of harmful substance, voluntary trauma or injury by fall). The hospital records of the patients were analyzed with regard to the age group distribution, parity, marital status, socio-economic background, the qualification of the abortion provider, complications, fatality rate and the resulting outcome. History of contraceptive use during sexual intercourse was also studied.

Study design: retrospective analysis of hospital records.

Inclusion criteria: all cases admitted with history of unsafe abortions.

Exclusion criteria: patient refused hospitalization or who left the hospital against medical advice.

RESULT

The demographic variables and the gynecological variables are presented in Table 1 and 2 respectively. The mean age of unsafe abortion in our study population is 29.7 years. Maximum patients belonged to 21-30 years followed by the age group of 31-40 years. Eighty percent of the patients were married living with

Table 1. The demographic variables of the study population

Age	No	%
14-20	11	18.3
21-30	27	45
31-40	22	36.6
Marital status		
Married	50	80
Unmarried	10	20
Parity		
Nullipara	12	20
Multipara	48	80
Socioeconomic status		
Lower	43	71.7
Middle	15	25
Upper	2	3.3
Religion		
Hindu	52	86.7
Muslim	8	13.3
Contraceptive use		
Married (n=48)	12	25
Unmarried (n=12)	0	0
Interference by		
Untrained local quacks	41	68.3
Midwifery/ nurses	13	21.7
Self	6	10

Table 2. The gynaecologic variables associated with unsafe abortion

Duration of pregnancy	No	%
First trimester	12	20
Second trimester	40	66.7
Third trimester	8	13.3
Methods used		
Insertion of foreign body (local trauma)	35	58.3
Ingestion of abortifacient	15	25
Insertion of poisonous substance	6	10
Others	4	6.7
Complications		
Generalized peritonitis	30	50
Shock	28	46.6
Renal failure	12	20
Septicaemia	5	8.3
Faecal fistula	3	5
Outcome		
Completely cured	50	83.3
Death	6	10
Referred to other specialties	4	6.6

their family. Among the married couple, most were with more than one living children. All the unmarried girls and 75% of the married women did not use any type of contraceptive before sexual intercourse. The preferred time of inducing abortion was during 2nd trimester followed by 1st trimester. In most of the cases 41 (69%), untrained local quacks performed the procedure. Midwifery, and nurses were involved in 13 (21%) of cases, while the patient herself tried in 6 cases. Among the victims, 72% belonged to lower economic strata and 87% were Hindus.

The commonest method resorted was local trauma, i.e. insertion of foreign body into the uterine cavity, followed by ingestion of poisonous substance (abortifacient). During admission, the most common complication was generalized peritonitis (50%) resulting from perforation of uterus, followed by shock (47%) and renal failure (20%). In spite of these dreaded complication, 83% of the victims fully recovered, however, the life 10% the patients could not be saved.

DISCUSSION

In the current study we observed that the most vulnerable group for an unsafe abortion in Orissa are the poor married women belonging to 21-30 age group, who did not use any type of contraceptives and who have already more than one children. These findings are archetypal to any other studies conducted in other parts of India as well as its neighboring countries.^{5-11,16} Our study population comprised of the women from rural Orissa, a state burdened with illiteracy and poverty. The doctor-population ratio is also one of the lowest among the Indian states. In all the aspects of health care, Orissa lags behind the other states. Also the age for marriage among girls is considerably low. So after begetting one or two children, due to poverty, the married couples usually do not prefer having more children.^{5,7,9,10,13} We observed that only 20% of the study population used contraceptive to prevent unwanted pregnancy. As the awareness of modern day contraceptive is very low due to illiteracy, the women resort inducing abortion to get rid of the unwanted pregnancy.^{4,5,7,8,11,13,16} The access to modern health care facility is also significantly low due to government apathy. Since the doctor-population ratio is very low, most of the doctors' post in government hospitals lays vacant perennially. This is also another major reason to account for the significant number of late termination of pregnancy by the local unqualified quacks having minimal knowledge of female genital anatomy.^{6,9,11,12,14}

One of the most significant findings in our study is the peculiarity of the method used for inducing abortion.^{3,16} Like few other studies from developing nations, local trauma inflicted by inserting a foreign body is the commonest method employed.^{6,12} This may perhaps be the well accepted method used commonly for the unreported abortions. This method carries an inherent hazard in that, if not employed properly, may result in perforation of the gravid uterus resulting in peritonitis.^{6,7,9,10} This is the main reason to explain for nearly half of the women presenting with the features of generalized peritonitis. The other notable dreaded complications included shock and renal failure.

CONCLUSION

Like other studies conducted in India and its neighboring countries, the victims of unsafe abortions are the married and multiparous women belonging to underprivileged society. As they did not use adequate measures to prevent unwanted pregnancies; the dissemination of information for birth control measures seems to be inadequate and ineffective. Proper counseling at the community levels during earlier visit to hospital may have prevented many unwanted pregnancy and thereby unsafe abortions. Unsafe abortion endangers health in India and merits the same dispassionate, scientific approach to solutions like any other threats to public health. The beneficiaries of the access to safe, legal abortion on request include not only women but also their children, families, and society- for present and future generations.

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Investigating Relationship between Fluoride Ion Concentration in Mother and Cord Blood Serum

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ABSTRACT

Introduction: In a country like India, where fluorosis is endemic, the role in the movement of fluoride from mother to the fetus is still unclear, as whether fluoride intake of maternal blood affects the concentration of fluoride found in the fetus.

Aim: An attempt to prove the transfer of fluoride from mother to the foetus by estimating the fluoride ion concentration in mother and cord blood serum at the time of parturition.

Materials & Method: 45 pregnant women were randomly selected visiting a private Maternity Hospital of Meerut City. Mother and cord blood samples were collected at the time of delivery, and fluoride ion concentration was analyzed using ion selective electrode method in the serum samples.

Results: The results show a significant relationship between the fluoride ion concentrations in mother and cord blood serum. The concentration of fluoride is high in mother blood serum as compare to the cord blood serum. The present study shows that there exists a transplacental passage of fluoride irrespective of the amount of fluoride consumed during the time of pregnancy; placenta does not act as a barrier for the transfer of fluoride to the foetus.

Key words: Blood Serum, Fluoride, Transplacental Passage, Umbilical Cord.

INTRODUCTION

The relationship of a mother and child carries deep emotions and feelings within it and it is always nurtured by love, affection and care. Mother is the one who gives birth to child, bought him up; support him when he needs someone the most. The nutritional conditions of the mother while a baby is developing in the womb affect the development and future health of the infant. Many aspects of a newborn's health and wellbeing seem to be affected by the mother's nutritional status before and during pregnancy. In studies of endemic fluorosis, it is obviously necessary to know the concentration of fluoride in blood serum

and in other organ fluids.¹There is a paucity of knowledge concerning the basis of maternal-fetal fluoride metabolism and the uptake of fluoride in developing enamel under various conditions of maternal fluoride ingestion.² Caldera et al³ said that administration of fluoride to pregnant women could be a preventive measure for prevention of dental caries in developing child. The role of placenta in the movement of fluoride from the mother to the foetus is unclear because of conflicting evidences such as- According to Shen et al⁴ fluoride intake or maternal blood fluoride effects the concentration of fluoride transfer to the foetus. Armstrong et al (1970)⁵ suggests that the human placenta is unable to maintain a difference in the fluoride concentration between maternal and fetal blood fluids where else Gardner et al⁶ stated that placenta can accumulate fluoride and possibly play a regulatory role that helps to protect the foetus when maternal fluoride intake is high. Results of studies comparing fluoride levels in maternal and umbilical cord venous blood plasma as

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well as in intra uterine studies, prove that fluoride passes through the placenta and to what extent the placenta act as a filter to limit the transmission of fluoride to the fetal circulation is doubtful^{4,7-13}.

METHODOLOGY

The present study was conducted in Meerut City situated in the North Western plains of Uttar Pradesh, India. About 27.9% of the North Western Plains have water fluoride concentration of 1.01-1.5ppm.

Subject selection: The study was carried out in Meerut city during the month of Dec'09-Jan'10 on expectant women visiting a private maternity hospital of the city, with mean age of 29.5yrs and gestation period of not less than 35 weeks. Convenience sample of 16 women who fulfilled the inclusion and exclusion criteria were selected for the study.

Ethical clearance: Ethical clearance was obtained from the Institutional Ethical Committee of Kothiwal Dental College and Research Centre Moradabad, Uttar Pradesh, to conduct the study.

Approval for the study: The consent was obtained from the patients/their guardians, consulting Gynecologist and Hospital authorities.

Sample collection procedure: Maternal and cord blood samples were collected at the time of delivery. All women were hospitalized during the time of delivery and were under the supervision of the consulting Gynecologist during their course of gestation period. Out of total deliveries, few were caesarian under spinal anesthesia and few were vaginally by spontaneous labor. From mother, 5ml of blood was withdrawn with the help of a disposable syringe from Brachial vein and at the same time 5ml blood was collected from the cord by squeezing it with a gentle pressure and transferring it to the sterilized blood collecting vial with clot activator. Then the blood vials were kept aside without disturbing them for 20-30 minutes. After that obtained blood samples were centrifuged to obtain the required serum. The serum which was so obtained was stored at -20°C until the fluoride concentration was determined. The serum samples were stored in the concerning hospital pathology laboratory. From there samples were transported to Fluorosis Research and Rural Development Foundation in Delhi for fluoride estimation. Pearson's Correlation is used to find the association between mother's age, mother blood serum and cord blood serum. p value equal to or less than 0.05 was considered statistically significant. All the

data analysis was done using SPSS 11.0 version software.

RESULTS

Table 1. Mother's age in relation to cord fluoride concentration

S.No.	Mother's age in years	Cord blood (mg/l)
1	25	0.05
2	25	0.05
3	26	0.05
4	26	0.05
5	26	0.05
6	26	0.06
7	27	0.06
8	27	0.06
9	27	0.06
10	27	0.06
11	28	0.06
12	28	0.07
13	30	0.07
14	32	0.08
15	34	0.31
16	35	0.16

Table 1, illustrates a positive correlation between mother's age and fluoride concentration of cord blood serum. As the age of the mother is increasing the fluoride ion concentration in cord blood serum is also increasing. The highest blood serum fluoride concentration was found to be 0.31mg/l at age of 34years and lowest of 0.05mg/l at age of 25years.

Table 2. Mother and cord blood fluoride concentration

S.No.	Mother's blood(mg/l)	Cord blood (mg/l)
1	0.077	0.062
2	0.128	0.051
3	0.059	0.052
4	0.063	0.057
5	0.068	0.065
6	0.101	0.064
7	0.628	0.162
8	0.316	0.31
9	0.068	0.064
10	0.059	0.057
11	0.059	0.051
12	0.06	0.058
13	0.058	0.054
14	0.055	0.047
15	0.061	0.059
16	0.059	0.053

Table 2, shows that Maximum fluoride concentration reported in mother blood serum was 0.628mg/l and for the cord blood serum was 0.31mg/l. Minimum fluoride concentration reported in mother

serum was found to be 0.055mg/l and in cord it was 0.051mg/l.

Table 3. Pearson’s correlation between mother’s age, mother and cord blood serum fluoride concentration

		Mother’s blood (fluoride concentration)	Cord blood (fluoride concentration)	Mother’s age
Mother’s blood (fluoride concentration)	Pearson Correlation	1	.684(**)	.836(**)
	Sig. (2-tailed)	.	.003	.000
	N	16	16	16
Cord blood (fluoride concentration)	Pearson Correlation	.684(**)	1	.729(**)
	Sig. (2-tailed)	.003	.	.001
	N	16	16	16
Mother’s age	Pearson Correlation	.836(**)	.729(**)	1
	Sig. (2-tailed)	.000	.000	.001
	N	16	16	16

Table 3, presents the Pearson’s correlation between mother’s age, mother and cord blood serum fluoride concentration. Correlation between mother’s blood serum fluoride and cord blood serum fluoride is observed to be as 0.684 with P = 0.003 and mother’s age and cord blood serum fluoride is observed to be 0.729 with P = 0.001. Therefore, it is concluded that, there are positive significant correlations between mother’s blood and cord blood serum, and mother’s age and cord blood serum fluoride concentration.

DISCUSSION

The role of fluoride is ubiquitous in human diet. The present study was planned to determine the fluoride ion concentration in mother and cord blood serum at the time of parturition. As proposed by various authors like- Dariusz et al¹⁴ found a strong positive correlation between fluoride and calcium concentrations in maternal plasma and marginal and central part of placenta respectively, Szymaczek et al¹⁵ found cord fluoride concentrations on average 87% of those in maternal blood, Gedalia et al¹⁶ stated that placenta represents a partial barrier to the passage of fluoride, Shimonovitz et al¹² stated that placenta may serve as a partial barrier to fluoride passage. The present study reveals that placenta is not a barrier for the passage of fluoride which is in accordance with some of the studies (like — Sunil Gupta et al,⁹ Gedalia et al¹⁶). Gedalia et al¹⁷ recommended that higher fluoride intake above 1ppm from drinking water significantly increases the concentration of maternal blood fluoride level where else the cord blood fluoride concentration shows an inverse relation with the drinking water fluoride concentration. A positive correlation was found in the present study between

mother’s age and fluoride concentration of cord blood serum. As the age of the mother increases the fluoride concentration of cord blood serum also increases. The maternal blood serum fluoride concentration is 1.52 times that of cord blood serum fluoride concentration. According to Harry Husdan¹⁸ the reason behind this phenomenon may be due to renal function decreases with age and decrease in kidney function may be responsible for increase in maternal serum fluoride. Another reason proposed by Murray¹⁹ is due to absorption of more fluoride by bones and less amount of excretion by the kidney with the advancing age.

CONCLUSION

The present study confirms that fluoride is being getting transferred from the mother to the foetus. The fluoride concentration in mother and cord blood serum were in direct association, as the age of mother increases the fluoride ion concentration in mother blood and cord blood also increases. The high fluoride level in the foetus resulted from the high maternal fluoride level.

Conflict of Interest: None Declared

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Digital Forensics, Hacking and its Role in Crime Investigations

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ABSTRACT

The growing role of computers in various fields has not left legal medicine untouched. Where it has served to be a boon for the professionals, it has also led to the increasing fears regarding the manipulation and alteration of evidences from the cyber world. This paper deals with the importance of digital forensics in administration of justice and the problems that may be faced due to hacking.

Key words: Digital Forensics, Hacking

INTRODUCTION

The word 'hacking' rings an alarm in the cyber world. Whether it is a government agency or a private institution, from education to business, computers have set in their roots throughout the world and subsequently hacking has followed.

Hacking has really grown from a favoured pastime and passion to a profession which earns the bread and butter for the hacker. The term 'hacking' was coined by the students of the MIT (Massachusetts Institute Technology) way back in the 1960's. This group consisted of people who had minds that could make a programme perform actions for which it was not contemplated. For a couple of decades hackers only hacked for enjoyment and recreational purposes. However, the trend has changed as they have now made it a source of income. The question arises how do the hackers earn then? They eventually do so by hacking into and giving access to the systems to corrupt and unscrupulous people who utilize this information within the systems for fulfilling their ulterior motives. Important documents, programmes and files may be stolen from the authorized individuals and used for criminal purposes. These hackers are now termed as crackers¹.

Is it that the hacker (a person who breaks into computers and computer networks, either for profit or motivated by the challenge) can only be stamped as a menace to the society? According to computer

slangs used all over the world the hackers are mainly divided into the white hats, grey hats and the black hat hackers. The white hats are the good hackers and the black hats are the bad hackers. The grey hackers are placed somewhere in between who may break in to a system or security but refrain themselves from doing any harm or damage¹. So now, as we have acquainted ourselves that the good people do exist in the hacking industry, we still need to answer who they are? And what good do they cause to the society?

The hackers perhaps may have a good intention, but in the process inadvertently cause harm to the organisation into which they hack. Not only does a successful attempt at hacking a system results in a loss to that particular company or organisation but even a failed attempt may result in great loss, financial or otherwise.

Various agencies, be it defence, information technology or for that matter agriculture or pharmacy, dole out large sums of money for research and development and if they remain imprudent, valuable data can be effortlessly lost to a hacker. Only one lapse in their security can in fact ruin the millions spent along with the loss of vital information. It is these agencies who employ the hackers to make an attempt in retrieving the vital information in order to test the flaws in their security systems. Since, it is all done legally; they are branded as the good hackers or the white hats, sneakers, red teams or tiger teams². To summate, the white hat hackers are computer security experts, who

specialize themselves in penetration testing, and other testing methodologies, to ensure that a company's information systems are secure.

WHAT IS DIGITAL FORENSICS

Now that hacking can be better comprehended, the question arises what exactly is digital forensics and how does it nail the unethical hackers? Forensics concerns the application of a methodical investigation technique in order to reconstruct a sequence of events. Digital forensics can be defined as the practice of scientifically derived and proven technical methods and tools toward the preservation, collection, validation, identification, analysis, interpretation, documentation and presentation of after-the-fact digital information derived from digital sources for the purpose of facilitating or furthering the reconstruction of events as forensic evidence³. It is the art of recreating what has happened in a digital device, be it a computer, mobile, digital camera or even GPS devices. Although, it is a less well known branch of forensics much of it still remaining unmasked, today it is being used to investigate a wide variety of crime, including child pornography, fraud, cyber stalking, murder and rape.

Digital forensics is playing an eminent role in law enforcement, network security, and information assurance. This field of study encompasses not just digital evidence, but also the areas of cyber law, sociology and security to name a few. The increasing importance is being reflected in its growing role within crime investigations, civil cases and homeland security.

ROLE OF DIGITAL FORENSICS

The digital forensic evidence has been admitted in the courts and has played a pivotal role in the judgements of many cases. On 3rd September 2010 in Abu Dhabi, UAE, a case concerning the alleged rape of a 14 yr old Brazilian girl was brought to the courts. As the details of the case unfolded, the charges changed from rape to consensual sex. Digital forensics helped in uncovering evidence in the form of intimate text messages and photographs sent by the girl to the man from her mobile phone. The girl was eventually sentenced to six months in jail followed by deportation and the 25 year old Pakistani bus driver was sentenced to one year of jail followed by deportation⁴. Other illustrations regarding the importance of deleted data can be such as a daughter who accused her father of rape when in fact she didn't want to admit to having sexual relations with a boyfriend her parents knew

nothing about⁵. Or the case of a man's body that was found where a family stated he had never visited them, only to find a deleted photo of the man in their living room.

The following case particularly demonstrates the sheer scope of digital forensic investigation where in a recent conviction of a man for the murder of his wife, important evidence was gathered from the cyber world. Once merely a tool, associated largely with computer-based crimes such as hacking or possession of indecent images, digital forensics is now coming to the fore as a potentially invaluable weapon for both prosecution and defence wherever an accused person's whereabouts, motives or actions are in question. In 2006, a 31-year-old teacher, had appeared to have taken her own life - a suicide note and bottle of sleeping pills found close to her body. A civil wrongful death lawsuit was instigated by the deceased's parents against the husband of the deceased. It emerged during trial that the husband had slipped his wife sleeping pills and waited for her to fall asleep before smothering her with a pillow. The evidence, which eventually secured the husband's conviction, included data recovered from a laptop's hard drive released by his church, and the main computer server at a youth centre where he also served. Computer forensic analysis was able to reveal he had entered the term "overdose on sleeping pills" into a search engine and viewed several pharmaceutical websites prior to his wife's death. Also it was testified that he had looked at pornographic websites and sites aimed at married adults who want to have affairs⁶.

DISCUSSION

Although it is well affirmed that computer data can considerably help in the conviction of the guilty, the problem lies in the fact that the respective information can easily be tampered with and altered. So, the forensic expert has to be vigilant that he does not play in the hands of those guilty and ensure that the data is validated and checked up thoroughly for any misleading information that may be planted.

With the introduction of computerized reports, evidence through telecommunication and virtopsy, to name some, the forensic pathologists have now been linked to the cyber world. Precariously, the reports and systems can easily be hacked again if the line of transmission and the reports are not secured properly.

The advent of smart phones will see an increasingly large proportion of potential evidence migrating to the digital sphere. Modern smart phones allow users to

send email, browse the internet, create and edit documents, manage calendars, as well as a host of other functions. As technology of this type becomes an integral part of people’s lives, it could mean that digital forensic analysis will move from being an optional tool, to a standard and essential element of any criminal investigation.

In India digital forensics is gaining paramount importance day by day. However, being a very new concept there are very limited number of expert firms and organisations that are unequivocally providing expert services in this regard.

Studies conducted by a company Aliean have revealed the cost per minute if the services of different organisations are disrupted⁷.

Business Applications Outage Cost per Minute⁷

Financial / Trading	\$33,000
Supply Chain Management	\$11,000
Electronic Commerce	\$10,000
Customer Service Center / CRM	\$4,000
ATM / POS / EFT	\$3,500
Messaging	\$1,000
Infrastructure	\$600

According to the Symantec quarterly intelligence report⁸

The Symantec Global Internet Security Threat Report released in April 2010 showed that the US still remained the number 1 country for the malicious attacks. India also lifted in ranks from 11 in 2008 to 5 in 2009⁸. These data show the increasing cyber crimes in India and abroad and the financial constraints that hacking causes to various organisations.

CONCLUSION

Thus hacking can be both ethical as well as unethical and it is solely the decision of the individual who is hacking, to determine what side of the table he

chooses to be. The role of forensics only arises for those who stray and take up the law in their own hands. The role of ethical hackers cannot be overemphasized. They not only help in protecting the site from intruders but also help in nailing the potential hackers, thus helping in the conviction of the culprit. The hackers can themselves be traced back to their source by the use of various technical tools and computer software.

The real complication arises when both technical as well as legal issues are involved simultaneously. The technical mind may not have legal acumen and the legal eagle may not have technical expertise. Digital evidence in India is still at the infancy stage. The need of the hour is to establish good and effective digital forensics research and training institutions in India.

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Non-fluoride Treatment Modalities of Tooth Hypersensitivity

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ABSTRACT

It is true that the teeth of man have been hurting for many thousands of years. The causes of the pain and effective methods to relieve or prevent the pain tend to follow traditional routes like random treatment, starting with materials of natural origin and then work by the aggressively curious, the intelligent and the innovative to better understand the physiologic basis of the cause of the pain. The purpose of this paper is to provide an insight to the various non-fluoride treatment modalities of tooth hypersensitivity and the advantages and disadvantages of specific materials.

Key words: Hypersensitivity, Non-fluoride, Pain, Dentin.

INTRODUCTION

Man had been suffering with tooth-associated pain since times immemorial. One of the leading causes of this pain is tooth hypersensitivity. The terms dentin sensitivity and dentin hypersensitivity are often used interchangeably, although the prefix hyper denotes excessive sensitivity. Whereas dentin sensitivity is a normal response to stimulation of freshly exposed dentin, hypersensitivity may have a more pathologic basis. Hypersensitivity is most likely to occur between the time of initial exposure of dentin and spontaneous remission of pain resulting from age-related changes occurring in the dentin and pulp. These changes include dentinal sclerosis and formation of reparative dentin. Specific treatment modalities are available to treat dentin sensitivity.

DISCUSSION

Prior to treating sensitive root surfaces, hard or soft deposits should be removed from the teeth. Root planning with curesttes or otherwise manipulating sensitive dentin may cause considerable discomfort,

in which case teeth should be anesthetized before treatment. The teeth should be isolated and dried with warm air. When using desensitizing agents that have a caustic effect on soft tissue, care must be exercised to prevent them from contacting the alveolar mucosa. Dentin often becomes insensitive when open tubules are covered with a thin film of varnish. This may be an effective method of providing temporary relief.

CORTICOSTEROIDS

Mosteller¹ reported that when a liner consisting of 1 per cent of prednisolone in combination with 25 per cent m-cresyl acetate, and 50 per cent gum camphor was applied to the walls of the cavities, it was completely effective in preventing postoperative sensitivity. Fry and colleagues² and Bowers and Elliot³ determined that a similar preparation provided prompt relief from hypersensitivity. Mjor and Furseth⁴ have reported that application of a corticosteroid preparation to dentin caused complete obliteration of tubules, thus decreasing dentin permeability. However, because the steroid was left in contact with dentin from 41 to 95 days, the relevance of this study to the clinical management of hypersensitivity is questionable. In a double-blind study, Lawson and Huff⁵ found that paramethasone had a significant desensitizing action. It has also been reported that burnishing an ophthalmic corticosteroid solution into sensitive root areas achieved some success⁶.

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Studies involving the use of corticosteroids have provided little evidence that desensitization was due to the hormone, particularly when it was claimed that sensitivity was promptly relieved. Corticosteroids are not fast-acting drugs. Because the use of corticosteroids is based on the assumption that hypersensitivity is linked to pulpal inflammation, more information is needed regarding the relationship between these two conditions.

EFFECTS OF BURNISHING DENTIN

Burnishing of dentin with a toothpick or a orangewood stick results in the formation of a smear layer that partially occludes the dentinal tubules. Pashley and coworkers⁷ employed an *in vitro* method to study the effects of burnishing NaF, Kaolin, and glycerin, alone or in various combinations, on dentin permeability. They observed that burnishing created a partial smear layer that reduced fluid movement across dentin by 50 to 80 per cent. Burnishing dentin with a dry orangewood stick was more effective in reducing dentin permeability than burnishing with glycerin alone or glycerin in combination with NaF. When both NaF and glycerin were burnished into dentin with an orangewood stick, the reduction in permeability was not significantly greater than burnishing with glycerin alone. Thus in studies in which an agent is burnished into the dentin, the effect of burnishing alone must be considered when evaluating the results.

Formation of Insoluble Precipitants to Block Tubules

Certain soluble salts react with ions in tooth structure to form crystals on the surface of the dentin. In order to be effective, crystallization should occur within 1 to 2 minutes, and the crystals should be small enough to enter the tubules⁸. The crystals must also be large enough to partially obturate the tubules. Although relatively large crystals such as calcium oxalate dihydrate are very effective in reducing Permeability, smaller crystals such as CaF_2 are less apt to be effective. Although it is used infrequently today, AgNO_3 is a time-honored desensitizing agent. Numerous studies have attributed the effectiveness of AgNO_3 to its ability to precipitate protein constituents of odontoblast processes, thereby blocking the tubules. However there are reasons to doubt this explanation. Greenhill and Pashley⁹ studied the extent to which ammonical AgNO_3 and AgNO_3 followed by 10 per cent formalin decreased the hydraulic conductance of dentin that is, the extent to which the fluid can be filtered across dentin *in vitro*. As compared with

controls, AgNO_3 followed by 10 per cent formalin reduced hydraulic conductance by 59.2 per cent whereas AgNO_3 alone reduced it by 47.4 per cent. This study involved the use of sections of dentin in which the tubules were devoid of protein. Other protein precipitants such as zinc chloride and phenol had a similar effect on hydraulic conductance. The result of this *in vitro* study were very similar to data obtained from dog's teeth *in vivo*¹⁰. This indicates that the protein in tubules was not a determining factor in the reduction of dentin permeability. Gottlieb¹¹ developed the zinc chloride - potassium ferrocyanide impregnation method for desensitizing root surfaces and cavities. Scanning electron micrographs of this procedure have revealed a highly crystalline deposit covering the dentine surface.

Grossman¹² proposed formalin as the desensitizing agent of choice in treating anterior teeth because, unlike AgNO_3 , it does not produce an unsightly stain. Formalin has been used in the dental office in the concentration of 40 per cent for topical application by means of cotton pellets or orangewood sticks. Greenhill and Pashley¹³ found 10 per cent formalin to be relatively ineffective in reducing the hydraulic conductance of dentin *in vitro*.

Mjor¹⁴ employed microradiography to compare calcium hydroxide covered dentin with normal dentin and demonstrated increased radiodensity in the Ca(OH)_2 covered dentin.

Hiatt and Johansen¹⁵ studied the effectiveness of burnishing CaHPO_4 into sensitive areas of roots with a round toothpick and found that 93 per cent of patients reported significant relief of discomfort, as compared with 25 per cent of control group, which received slight burnishing only.

Kun¹⁶ found that topical application of concentrated strontium chloride on an abraded dentin surface produced a deposit of strontium that penetrated dentin to a depth approximately 20 microns and extended into the dentinal tubules.

Pashley and coworkers¹⁷ found that topical application of 3 per cent W/V half-neutralized KHO_x (oxalate) is a highly effective means of reducing dentin permeability.

Dentin resins, bonding agents and adhesive agents have been used widely to seal the dentinal tubules to

prevent pain-producing stimuli from reaching the pulp. Wycoff¹⁸ advocates the use of glass-ionomer

cement because it is hydrophilic, acid-containing is not required, the material adheres well, and is esthetically pleasing.

CONCLUSION

Apart from various treatments available, dietary counseling and proper tooth brushing technique should be emphasized. Addy and associates¹⁹ found that red and white wine, citrus fruit juices, apple juice, and yogurt were capable of dissolving the smear layer in vitro. Periodontists generally feel that patients who maintain effective plaque complain less about hypersensitivity. Conversely, patients whose root surfaces are covered with plaque seem to have more problems with hypersensitivity. Recurrence of root sensitivity has been noted in specific areas that were missed in home care²⁰. Regardless of the type of treatment employed, 20 to 40 per cent of hypersensitive teeth usually improve over a period of 4 to 8 weeks.

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Study of Pattern of Injuries in Corrosive Poisoning

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ABSTRACT

India is a developing nation and its economy is based on agriculture. The tremendous advances in the fields of science and biotechnology and with indiscriminate use of insecticides, the deaths due to insecticides are on rise. The incidence of poisoning is high because of its low cost, easy availability, irregular distribution and lack of stringent laws and hence this has led to consumption of poisons accidentally /intentionally. The use of poison for homicidal purpose is not uncommon.

In Deaths due to poisoning constitute a larger percentage among the autopsies conducted across India. Ingestion of corrosives is a serious cause of concern because of the extreme morbidity and mortality associated with it. In this article we are discussing three cases of corrosive poisoning.

Key words: Corrosive Poison, Suicide, Accident, Head Injury, Autopsy

INTRODUCTION

The word poison has been evolved from Latin word potion i.e. to drink for health. Poison is defined as any substance which when administered, inhaled or ingested is capable of acting deleteriously on human body.

Paracelsus over 400 years ago stated that "All substances are poisons, there is none which is not a poison, the right dose differentiates a poison and a remedy."

The knowledge of poison and causing death by poisoning was prevalent in India right from ancient time. In present era it is estimated that some or the other form of poison is directly or indirectly responsible for more than 1 million illness world wide.

Poisoning is and likely to remain one of the commonest cause of unnatural death in developing countries. As per WHO estimates nearly 1 million people committed suicide during first year of this millennium amounting to an average of one death per 40 seconds. Suicides can be attributed to social and cultural transformation societies across the world. Consumption of poisons as manner of suicide is

common option and one of the leading causes of death. The safety of a chemical is defined as therapeutic index or ratio, which is LD50/ED50.

Poisoning being medical in nature and the postmortem examination is done to establish the exact cause and some times the manner of death.

THE CASE SERIES

Case Report 1

History furnished by relatives and police on 12 June 2009 at around 2 :20 pm deceased a male aged about 44years said to have consumed toilet cleansing liquid at his residence and was brought dead to MS Ramaiah Hospital, Bangalore.

External examination

Dead body was that of a male aged 44 years measuring 5feet and 4 inches in length, moderately built and well nourished dark brown in complexion. Eyes closed, pupils dilated and cornea was hazy. Post mortem staining was present over back of chest and abdomen. Rigor mortis well appreciated all over the body.

External injuries: Nil

Autopsy Findings

Internal examination

- i. Mouth and tongue shows reddish brown discoloration.

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- ii. Esophagus shows reddish brown corroded mucosa.
- iii. Trachea and bronchial tree shows black colored particles with shreds of mucosa .
- iv. Peritoneal cavity contains 400ml of altered blood.
- v. Stomach Contained 200ml of altered blood with shreds of leathery mucosa with peculiar smell.
- vi. 2nd part Duodenum shows perforation measuring 2x2cm over its posterior aspect.

Viscera sent for forensic science laboratory

- 1. Stomach and its contents with portion of small intestine and its contents
- 2. Portion of liver and one kidney
- 3. Blood with preservative (sodium chloride)
- 4. Preservative

Opinion of forensic science laboratory

Presence of hydrochloric acid was detected in stomach and other viscera.

Cause of death —Death is due to shock and hemorrhage as a result of corrosive poisoning.

Case Report 2

History furnished by relatives and police, on 2nd July 2009 the deceased at around 1.30 am said to have consumed liquid stored in a bottle , later she is said to have complained of burning pain in chest and was shifted to wockhardt hospital Bangalore. She was declared dead on 4th July of 2009 at 4.30pm.

Autopsy Findings

External examination

Dead body is that of an elderly female aged 63 years measuring 5feet and 6 inches in length, moderately built and well nourished light brown in complexion

Eyes closed, pupils dilated and cornea was hazy. Post mortem staining was present faintly over back of chest and abdomen. Rigor mortis appreciated all over the body.

External injuries: Nil

Internal Injuries

- i. Mouth and tongue shows reddish brown corroded areas.
- ii. Esophagus mucosa shows reddish brown.
- iii. Peritoneal cavity contained 600ml of dark colored altered blood.

- iv. Stomach soft and edematous with loss of rugosity, shows perforation measuring 5x4 cms, present along the lower part of greater curvature.
- v. Left lobe of liver shows reddish brown corroded area over its anterior superior surface.
- vi. Left dome of diaphragm shows perforation measuring 6x5 cms with inferior surface left lung involvement.
- vii. Spleen discoloured and hardened
- viii. Small intestines with its mesenteric attachment shows blackish discolouration
- ix. Other organs were congested

Viscera sent for forensic science laboratory

- 1. Stomach and its contents with portion of small intestine and its contents
- 2. Portion of liver and one kidney
- 3. Blood with preservative (sodium chloride)
- 4. Preservative

Opinion of forensic laboratory

Presence of hydrochloric acid was detected in stomach, sand no other poison was detected in the other specimens sent

Cause of death: Death is due to shock and hemorrhage as a result of corrosive poisoning

Case report 3

History furnished by relatives and police on 14 Feb 2010 ,the deceased a 23 years male said to sustained head injury while crossing the road , he was to shifted to corporate hospital .

Investigations were

CT SCAN report - Right Sylvain subarachnoid hemorrhage, bilateral base frontal and mid brain showed punctuate hemorrhage and Base occipital shows linear fracture.

In the hospital, said to have had retrograde amnesia and behaved violently with suicidal attempts for which psychiatric opinion was sought and later he was discharged against medical advice on 6 march 2010. on 9th march 2010 he said to have consumed unknown acid stored in a container at his work place.

External examination

Moderately built and nourished with poor hygiene, lips shows blackish corrosion and teeth are chalky

white in color, Mouth and tongue mucosa showed reddish brown corrosion.

Internal Injuries

- i. Teeth chalky white in color.
- ii. Esophagus shows corroded areas.
- iii. Peritoneal cavity contained 200ml of dark colored fluid.
- iv. Stomach soft and edematous with loss of rugosity.
- v. Left lobe of liver shows reddish brown corrosion over its anterior superior surface.
- vi. Spleen hardened ,and shows signs of corrosion.
- vii. Small intestines with its mesenteric attachment shows blackish discoloration.
- viii. Other organs were congested.
- viii. Brain organized SAH over right temporal lobe.
- ix. Skull linear fracture 6cms over basi occiput.

Opinion of forensic laboratory

Presence of hydrochloric acid was detected in stomach

Cause of death

Death is due to corrosive poisoning consequent upon head injury sustained.

DISCUSSION

Human beings are surrounded by more than 9 million natural and synthetic chemicals and these numbers are growing, there is estimate that about 1 to 2 thousand new chemicals viz pesticides, cosmetics



Fig. 2. Photograph of perforated stomach.

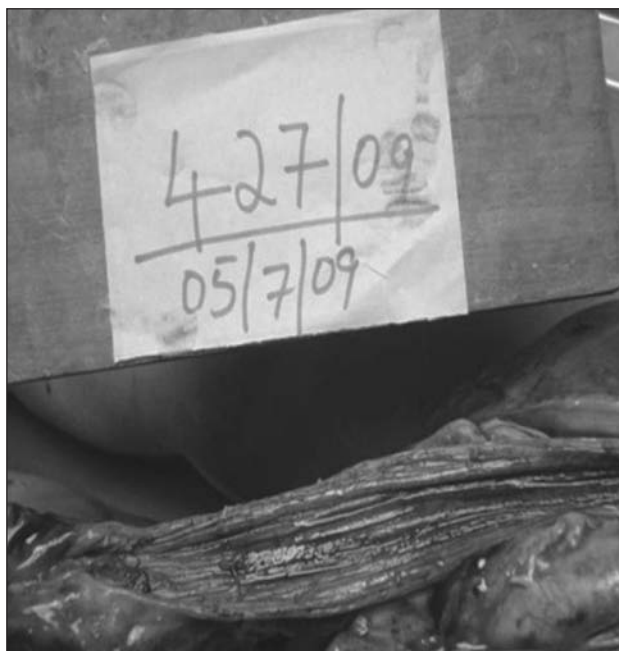


Fig. 3. Photograph of corroded esophagus.



Fig. 1. Photograph of corroded liver.



Fig. 4. Photograph of trachea with corroded areas.

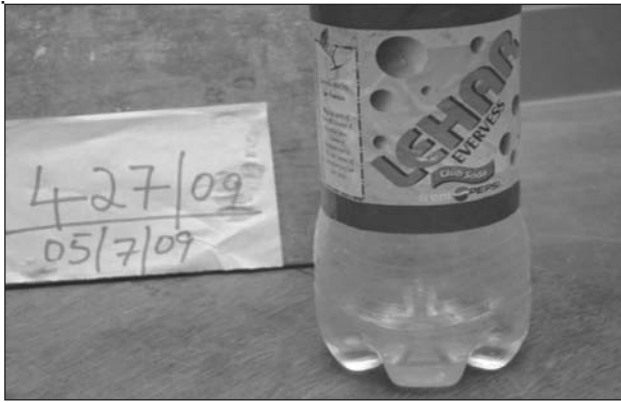


Fig. 5. Photograph of alleged container.

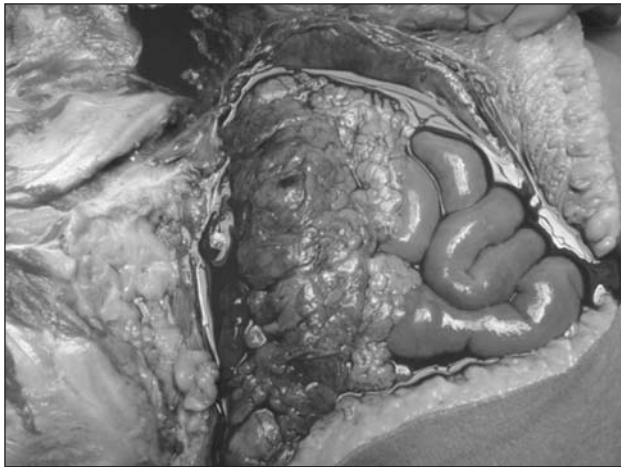


Fig. 6. Photograph of peritoneum with dark fluid.

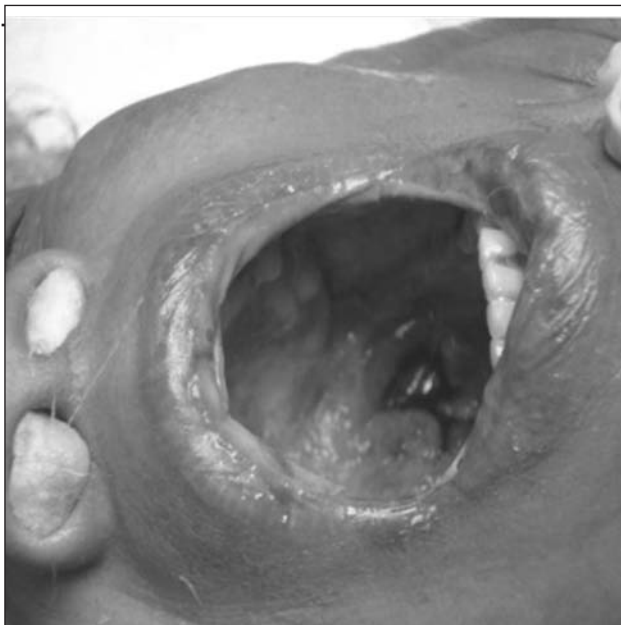


Fig. 7. Photograph of corroded oral mucosa.

or food preservatives pose grave risks to the health. Suicidal acid ingestion in the form of toilet cleaning agents has been the commonest form of corrosive poisoning.



Fig. 8. Photograph of corroded spleen.



Fig. 9. Photograph of corroded kidneys.

A corrosive is a substance which causes destruction of tissues at the site of application, in dilute solution many corrosives have an irritant effect but irritants may corrode certain sites.¹

Corrosive injuries of the stomach and esophagus are not infrequent causes of hospitalization in countries like India. Ingestion of a corrosive substance can produce severe injury to the gastrointestinal tract and can even result in death. The degree and extent of

damage depends on several factors like the type of substance, the morphologic form of the agent, the quantity, and the intent.²

Both accidental ingestion, particularly in children, due to careless storing of chemicals and ingestion with suicidal intent due to free availability of the caustic agents contribute to their occurrence. In most reported series, the chemicals that are most commonly responsible are alkalis Viz, potassium and sodium hydroxide. In contrast, the majority of the corrosive injuries in India are due to acids. The most common acids implicated are bathroom cleaning acid (concentrated hydrochloric acid) and aqua regia.³

Alkaline substances produce more severe tissue injury by causing liquefactive necrosis which allows deeper penetration of the corrosive agent and further injury. Acids produce coagulative necrosis resulting in formation of an eschar, which protects against further damage¹. In animals pathological changes due to caustic injury are divided into three phases⁴. In the acute phase, the superficial epithelium is destroyed and necrosis extends to a variable depth. Vascular thrombosis may further accentuate the injury and lead to sloughing off of superficial layers. This is followed by the second or reparative phase with appearance of granulation tissue. Collagen deposition starts early and peaks during the second week but continues for weeks to months. In the third phase collagen contracts both circumferentially and longitudinally result in stricture formation.

Ingestion of corrosives is a cause of concern because of the extreme morbidity associated with it. Two subgroups are especially vulnerable, the pediatric population suffering from accidental ingestions, and adolescent to adult age group in whom almost all these ingestions are related to suicidal attempts. The suicidal cases were associated with reactive depression are also relatively less. High degree of stress in academic, financial and social sectors as well as inability to achieve the targets on professional, educational and socioeconomic fronts leading to limited alternatives were the contributory factors in taking suicidal actions.⁴

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Epidemiology

Over 5 million people are treated in USA every year on exposure to drugs. Only about 5% require hospitalization. Over all mortality rate is low, only 0.03% of all exposures, but 1-3% in suicidal cases. Acute poisoning accounts for 2-3% of all admissions to hospital. In India, high incidence in the community reflects cases of availability of insecticides and pesticides and also stress of modern lifestyle. Insecticides, vegetable poisons, aluminum phosphide, alcohol, hypnotics and sedatives are the major poisons encountered in India. In rural areas, Insecticides, pesticides and vegetable poison, predominate whereas in cities and towns it is sedatives or other drug over dosage. The figures are much higher in India and are increasing day by day⁶

Factors modifying the action of poisons

1. Dose-As a general rule small dose usually produce no toxic effects, whereas large doses produce toxic effects on the body. Some individuals also exhibit phenomena like idiosyncrasy, allergy and synergism; the presentations are different with single or chronic exposure and with frequency of exposure.
2. Form of poison
 - (a) Physical state- Gases and vapors act more quickly than fluid poisons because they are absorbed immediately. Fluid poisons act faster than solid ones.
 - (b) Chemical combination-Some substances in certain combination become inert like AgNO₃ and Hydrochloric acid, and certain other combinations becomes poisonous like lead carbonate and copper sulphide.
 - (c) Mechanical combination - The action of a poison is considerably altered when combined mechanically with inert substances.
3. Method of administration-A poison acts most rapidly when inhaled in gaseous or vapors form or when injected I.V. followed by I.M./S.C. and least rapidly when swallowed
4. Condition of the body
 - (a) Age- Children is more susceptible than adults to toxins. In old age poisons have greater effects.
 - (b) Sleep and intoxication-The bodily functions are lowest during sleep, so the poisons are absorbed slowly during sleep.

Fate of poisons in the body

Greater part of a poison is lost by vomiting and diarrhea. After absorption the poison is dealt with in one of the several ways. Most frequently the poison undergoes biotransformation in the liver. The main route of excretion of the poison or its end products is the urinary tract. Other routes are bile ducts, sweat glands, saliva, mucus and lungs. Epidermis, hair and nails retain inorganic poisons like Arsenic. Bony skeleton holds substances like lead and radioactive metals.

Any patient showing the clinical features shown in should be considered for toxic ingestion.

CONCLUSION

To collect and make available information on the constituents of household, agriculture and industrial chemicals as well as drugs. Poisoning is more common in young males. The overall mortality is substantially high, mainly contributed by self-poisoning with insecticides and corrosives. Timely transport and intervention of all critically ill poisoning cases is required to prevent the high mortality among victims. Early endoscopic evaluation of the esophagus and stomach remains the standard for diagnosis; however, complete assessment may require laparotomy or thoracotomy. Early resection of necrotic tissue in the

esophagus or stomach can lead to increased survival.⁷ Educational and legislative interventions may be required to make the changes.

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Reliability of Various Parameters Used for Sexing of Sacrum in Chennai Region

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ABSTRACT

Identification of person is the first step to solve crime. In identification determination of sex is primary characteristic along with age and stature. The determination of deceased sex is first step in skeletal analysis since estimation of age at death, race, stature depends on sex of deceased. In this study various measurements of sacra of Chennai region, available in the Department of Anatomy, Madhav medical college Chennai are taken. The demarking points of various parameters are calculated and the percentage of bones identified by D.P. was also recorded. The results were compared with the available literature. It is found that the demarking point of length of sacrum is most reliable in sexing of sacra. Though, the Demarking Point (D.P) of a single parameter may not identify sex in all the bones but the accuracy is almost 100% in the bones, which are identified.

Key words: Parameters of Sacrum, Demarking Point, Sex.

INTRODUCTION

Determination of sex from the skeletal remains is of tremendous medico legal importance for establishing the identity of an individual. Sacrum has always attracted the attention of medico legal experts for establishing sex, possibly because of its contribution to pelvic girdle and associated functional sex differences. It has long been customary among forensic experts, anatomists and anthropologist to judge the sex of skeletal material by non-metric observations. Lately, Sexual divergence has been based upon actual measurement in different regions. The determination of deceased sex is first step in skeletal analysis since estimation of age at death, race, stature depends on sex of deceased.

Metrical study of sacrum has been done by various authors (Wilder¹, 1920, Fawcett², 1938, Davivongs³, 1963), Singh and Gangrade⁴ (1968) have reported that even within the same general population, mean value may be significantly different in bones from different

zones. Jit and Singh⁵ (1966) advocated the demarking point, which identify the sex with 100% accuracy. Singh and Singh⁶ (1972) have shown that D.P. should be calculated separately for different regions of population because the mean of a parameter differs in values in different regions.

The available literature shows that the Indian sacra have not been studied widely except Singh & Raju⁷ (1977) and Jana et al⁸ (1988). The materials studied by them are from Varanasi region and Burdwan regions respectively. Hence present study was undertaken with a view to study the sex differences in sacra of Chennai region of Tamilnadu.

MATERIAL AND METHODS

The materials for the present study consisted of 60 adult sacra (30 males and 30 females) of known sex available in the Department of Anatomy, Madhav Medical College, and Chennai. These sacra were selected after rejecting the bones, having any fractures, pathology or wear and tear. With the help of a stainless steel sliding caliper and flexible steel tape, the following measurements were taken (each linear measurement was recorded to the nearest millimeter)

1. Maximum length of sacrum (Wilder's mid-ventral Straight length) — measured along the mid-line of sacrum with the sliding caliper from middle of

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- antero-superior margin of the last sacral vertebra.
- Maximum breadth of sacrum — measured with the sliding caliper by taking points at the upper part of auricular surface anteriorly (or lateral most part of alae of sacrum), thus maximum breadth is measured on anterior aspect of sacrum.
 - Curved length of sacrum (Mid-ventral curved length) — measured along with mid line of the anterior surface of the sacrum (from middle of antero-superior margin of promontory to middle of antero-inferior margin of the last sacral vertebra) by the flexible steel tape.

The demarking points (DP) of all the above parameters were calculated on the line of the work of Jit and Singh (1966) and percentage of bones identified by each parameter were worked out.

RESULTS

The range, mean, calculated range (mean \pm 3 S.D.) demarking points (DP) of various parameters such as length of Sacrum, width of Sacrum and curved length of sacrum, and the percentage of bones in which sex could be identified by them, are given in Table 1.

DISCUSSION

Determining the sex is an important task of Forensic Experts and sacrum is the best bone to serve the purpose. Jit & Singh (1966) found that the max & minimum units of parameter values which is determined on the basis of mean + 3 S.D. and which they have named D.P. would be of great value of determining the sex of sacrum with almost 100% accuracy.

The mean length of male sacra of Chennai region (107.56mm) is higher than that of Varanasi region (104.96mm) studied by Raju et al. (1981) However, the female sacra of Chennai region are shorter than the Varanasi region. Comas & Charles⁹(1960) reported a wide variation between the male and female in the Chinese, Negroes and Bushmen. Devivongs (1963) in

his study of Australian aboriginal sacra has reported mean length of sacrum to the 96.52mm and 88.12 mm in the male and female respectively, which is much less than the Indian sacra studied so far. Thus there exists a regional and racial difference in the length of sacrum.

The mean width of the male sacra of Chennai region (107.03mm) is almost similar to observation made by Raju et al. (1981) in the Varanasi region (105.33mm). However, in the females the Varanasi region showed a lesser value than that of Chennai region. In the Australian aboriginal females, the maximum width of sacrum was 101.24 mm) of the same race (Davivongs, 1963).

The mean curved length of sacra of male and female in present study is 110.6 and 99.98 respectively, which is in good agreement with study done by Raju et. al. (mean curved length for male sacra is 112.7 and for female sacra is 104.8). The range of the curved length of female sacra falls within the male range in the present study. This is true in the case of Australian aboriginal studies by Davivongs (1963).

CONCLUSIONS

The present study shows that all the three parameters are significant with p value less than 0.001. Among the three parameters length of sacrum proves to be the best parameter in identifying the sex, i.e. with demarking point for length of the sacrum 70.3% of male sacra and 23.9% of female sacra are identified with almost 100% accuracy. Other two parameters i. e. width of the sacrum and curved length of the sacrum, though p value is significant, but percentage of sacra identified with demarking point is less (i.e. 2.1% of male sacra and 0% of female sacra are identified with demarking point for width of the sacrum and 13% of male sacra and 4% of female sacra are identified with demarking point for curved length of sacrum). However, not a single parameter could identify 100% of the bones. Hence, it can be concluded that for the determination of sex of sacrum, maximum number of parameters

Table 1. Showing various parameters of Sacrum and their statistical analysis.

Sl No.	Parameters (mm)	Sex	Range	Mean	S.D.	't' value	'p' value	Calculated range Mean \pm 3 S.D.	D.P.	% of boneid entified by D.P.
1.	Length of Sacrum	M	93-121	107.56	8.59	8.43	<0.001	81.78-133.34	>108.6	70.3
		F	82-100	90.86	5.91				<81.70	23.9
2.	Width of Sacrum	M	93-119	107.03	7.98	3.68	<0.001	83.07-124.00	<83.47	2.10
		F	84-117	96.80	10.40				>124	0
3.	Curved length of sacrum	M	96-134	110.6	11.39	4.19	<0.001	76.42-144.77	>120.68	13
		F	91-115	99.98	7.13				<76.42	4

should be taken to attain 100% accuracy. Continuance of such studies in a defined geographic area over a period of time will definitely help in establishing anthropometric standards. Such studies will also be useful to observe the changing trends if any, in the metric measurements which is influenced by environmental socioeconomic factors, physical stress and genetic factors.

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Burn Injury – Simple, Grievous or Dangerous ?

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ABSTRACT

70 year-old-male admitted with burns allegedly as a result of pouring of hot oil over his abdomen. Total percentage of burnt area was around 20% only. Declaration of nature of injury was the question for discussion as it was not coming exactly under the purview of any of the clause of section 320 IPC.

Key words: *Burns, Nature of Injury in the Absence of Death.*

The term 'burn' denotes a variety of conditions of which the local effects of dry heat are the classical examples. There are differences in the circumstances and the resulting destruction of tissues.

The conclusion as to the agent producing the burns may be of importance as envisaged in section 324 and 326 of the Indian Penal Code wherein it is laid that causing of 'hurt' or 'grievous hurt' by some specified means is punishable more severely than when such means have not been employed. Among the means are also included means like 'fire or any heated substance' or any 'corrosive substance' or 'explosive substance', etc., under these sections. Here, section 304B of the said Code also deserves a passing reference. This section while prescribing certain requirements for establishing the factum of 'dowry death', specifically mentions 'burn death' in its opening sentence, viz: "where the death of a woman is caused by *any burns* or bodily injury or occurs otherwise than under normal circumstances.....". Calculative inclusion of 'burn death' in the said section, probably, rests upon the fact that most 'dowry deaths' are the result of 'bride burning' as this mode of death is most notorious in preventing easy differentiation amongst 'suicide / accident / homicide' and at times; presenting difficulty in identification too. Needless to say that all cases of burn injury and / or death (whether by dry or moist heat, chemicals, or by hot solids, etc.) need reporting to the police. The determining factors for production of burn injury are primarily intensity of heat and the duration of contact. Simplifying the concept by taking an example of hot water at 65° C: exposure for 45s will produce a full - thickness burn, for 15s a deep partial - thickness burn, and for 7s a superficial partial-thickness burn². Assessment of burn size needs be carried out in controlled environment

allowing the area to be exposed vividly and any soot or debris washed off. In the event of smaller burns or patches of burn, the best measurement is to cut a piece of clean paper of the size of victim's whole hand (digits and palm), which represents 1% TBSA. Drawing the burn area on Lund and Browder Chart maps out the percentage TBSA of sections of our anatomy. It also takes into account different proportional body surface area in children according to age. The rule of nines (each upper limb 9% TBSA, each lower limb 18%, the torso 18% each side, and the head plus neck 9%) can be used as a rough guide to TBSA outside the hospital environment.

In the present case, the victim aged about 70 years male, reported to the hospital on 18.07.09 at about 11.45 AM with burn injuries allegedly produced by hot oil thrown upon him by his daughter-in-law. The victim narrated that he had lost his wife sometimes back and his daughter-in-law had been rebuking him on one pretext or the other, with the intention of compelling him to transfer the house in her name. And, the extreme was witnessed yesterday i.e. on 17.07.09 when she threw hot oil upon him producing burn injuries upon lower abdomen, inguinal, scrotal and penile regions (see photograph taken on 29-9-2009 on the day of discharge) On clinical assessment, burns were described as 'deep partial-thickness burns' involving 18-20% area of the body. There was fixed capillary staining, the color did not blanch with pressure. The victim was administered intravenous fluids with antibiotic coverage. On 22.07.09, he was referred to plastic surgeon for skin grafting. However, he never consulted any surgeon and got readmitted on 11.08.09 with history of difficulty in passing urine. Catheterization was done and again given intravenous fluid with antibiotics. On 29.09.09, catheter was

removed and he was discharged in a satisfactory condition.

DISCUSSION

Scalds are usually accidental due to bursting of hot water bottles, boilers and splashing of fluid from cooking utensils. Suicide by scalding is very rare. Homicidal burns, though not common, are known. Cases are on the record when lighted fire-sticks, hot metals, boiling liquid or corrosives have been used with criminal intent. Exposed areas of skin tend to be burned less deeply than clothed areas, as the clothing retains the heat and keeps the hot liquid in contact with the skin for a longer period of time. Furthermore, the latent heat (heat retention capacity) of the sticky viscid liquids is high and therefore, the penetration capacity of heat of such liquids is also more. In the instant case, the resulting severity of injury probably was credited to such factors.

The quality of burn care is no longer measured only by survival, but also by long-term function and appearance. Although small burns are not usually life-threatening, they need the same attention as larger burns to achieve optimal outcomes. Scarring, a virtual

certainty with deep burns, can be minimized by appropriate early surgical intervention depending upon burn characteristics and host factors. In the present case, the victim had duly been advised to consult plastic surgeon for skin grafting but he remained careless and developed scarring.

Declaration of 'nature of injury' in this case remained a point of discussion amongst doctors for quite sometime as the extent and severity of burn injuries were cunningly placed at borderlines. The single most important factor in predicting burn-related mortality is considered as the overall size of the burn as a proportion of the victim's TBSA. It has been documented that children with burns over 10% TBSA and adults with burns over 15% TBSA, warrant intravenous fluid resuscitation. Further, if the resuscitation is inadequate, burns of 30% TBSA frequently lead to acute renal failure. Various text books of Forensic Medicine document that involvement of more than one third of the body surface poses danger to life. And, burns affecting the face, neck, lower part of anterior abdominal wall, or genitalia are more dangerous than burns in other parts of the body. Infants and elderly individuals are more susceptible to complications of burns. Considering such qualifying factors, injuries in the case under reference were designated as 'Grievous'.

Finally, the aspect of development of scarring invites attention. Scald burns from hot oil are usually deep partial-thickness burns as stated already. It has been advocated that alongwith burn size and victim's age, depth of the burn is also an important determinant of the victim's long-term appearance and functional outcome. An understanding of burn depth requires understanding of skin thickness. The thickness of the skin varies with the age and sex of the individual and the area of the body. The thickness of the living epidermis is relatively constant, but keratinized (dead and cornified) epidermal cells may reach a thickness of 0.5cm on the palms and soles. The thickness of the dermis varies from less than 1mm on the eyelids and genitalia to more than 5mm on the posterior trunk. In victims over 50 years of the age, dermal atrophy usually sets in and therefore, all areas of skin become thin in such individuals and the skin appendages (which contribute to healing) are far less active. Owing to such riders, a scald in an elderly individual will be deeper than an identical scald in a young adult. Moreover, standard textbooks of surgery describe that deep partial- thickness burns take 3 or more weeks to heal without surgery and usually lead to hypertrophic scarring. Hence, development of scarring in the instant



Fig. 1. Burn Injuries (Healed) upon lower abdomen, Inguinal, Scrotal and Penile Region.

case was not unexpected, carelessness and financial restraints (as told by the victim) added fuel to the fire. However, viewing through the angle of criminality, the law unambiguously sanctions weightage to the original status of the injury and its consequences in the ordinary course of affairs. And, victim's refusal or helplessness contributing towards ultimate outcome of his condition can be dealt under other concerned provisions of law; in the event of such an issue creeping at some stage.

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A Pilot Study on Usefulness of Estimating Alkaline Phosphatase and Acetyl Cholinesterase Levels in Organophosphorus Poisoning

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ABSTRACT

Organophosphorus pesticide poisoning is a major problem in the developing world for which health care is often not available. Many patients in these regions die before they reach health care centres^{1,2} and in absence of accurate identification of the poisonous substance treatment becomes further difficult. A pilot study was conducted on patients admitted with organophosphorus (O.P.) poisoning to our trauma and emergency care unit from January 2010 to March 2010. Total number of 50 cases were admitted during the study period, in that, some of them were diazepam / benzodiazepam positive. The various aspects of treatment, complications, drug options and uncommon problems were evaluated.

Key words: Organophosphorus Poisoning, Acetyl Choline Esterase, Alkaline Phosphatase.

INTRODUCTION

Poisoning is one of the most important causes of death. According to WHO, three million cases of acute poisoning occur annually, of which about 2,20,000 die. Of these, 99% of the fatal poisonings occur in developing countries, particularly among farm workers.³ Organophosphates and carbamates as pesticides are most commonly used worldwide and more commonly in developing countries. With green revolution and industrialization, they have become household items of the agriculturists⁴. Unfortunately, because of their easy availability and low economic status, they have also been commonly abused for committing suicide and are agents of accidental poisoning in the developing countries. Although exact estimates are not available, hospital based statistics suggest that significant number of the admissions to emergency with acute poisoning can be attributed to organophosphate compounds. Sahin et al reported organophosphate poisoning in approximately 15%

cases⁵. Despite an increased incidence of organophosphorus insecticide (OPI) poisoning, the exact micro molecular changes that take place remain elusive. Till date, atropine and oximes continue to occupy the prime position in the specific management of OPI poisoning.⁶

Organophosphorus insecticide poisoning is a common, rapidly progressive and potentially fatal clinical entity⁷. Diagnosis of organophosphorus poisoning in patients can be made by estimation of acetyl choline esterase status supported by their clinical signs and symptoms. Estimation of acetyl choline esterase status in serum is possible only in well established and high tech biochemical laboratories, which are usually not present in rural areas where the poisoning cases are commonly seen. In such circumstances, laboratory evidence based diagnosis can be made at the tertiary care hospitals, where the facilities are available. But bringing patient to tertiary care hospitals usually consumes more time which is precious in all such emergency cases.

Some researchers are of the opinion that Alkaline Phosphatase, a diagnostic marker of liver function test is altered in poisoning cases. Alkaline Phosphatase estimation can be done in any small biochemical laboratories and is very economical compared to Acetyl choline esterase estimation. If it is established as a prognostic marker of organophosphorus poisoning we might be able to save many lives and

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can reduce the mortality rate to a significant amount due to Organophosphorus Poisoning. Hence this study is undertaken.

MATERIAL AND METHODS

This pilot study was carried out in the Department of Biochemistry in Jawaharlal Nehru Medical College Belgaum, Karnataka, from January 2010 to March 2010. Data were collected from all the poisoning cases admitted during this period to Trauma and Emergency Care Unit in KLES Dr. Prabhakar Kore Hospital and MRC, Belgaum, Karnataka which is the hospital attached to medical college.

This study include total 50 healthy volunteer subjects as controls and total 50 organophosphorus poisoned subjects as cases. Organophosphorus poisoning was suspected on basis of information collected from the patient / attendants along with clinical features like miosis, increased salivation, increased respiratory secretions, muscle cramps and abdominal discomfort. The cases were confirmed on the findings of results of Thin Layer Chromatography (TLC) and Spectrophotometry. Cases of Animal bite, Plant poisoning, Drug and food poisoning were excluded in this study.

Blood samples were collected from confirmed cases of organophosphorous poisoning and Acetyl choline esterase as well as Alkaline Phosphatase levels were estimated by Siemens Kit method and Kind & King’s method respectively.

RESULTS

During this study period total 65 poisoning cases were brought in the trauma and emergency care unit of KLES Dr. Prabhakar Kore Hospital and MRC, Belgaum, Karnataka. In which 50 cases, positive for organophosphorus poisoning were included in this study. Apparently healthy subjects as Control group were collected from the community.

Table 1. Serum enzyme levels in controls and poisoning cases

Markers (Enzymes)	Controls			Cases			‘t’ value	‘p’ value
	Mean	SD	Range	Mean	SD	Range		
Alkaline Phosphatase (U/ml)	140.1	17.55	79-150	105.4	23.60	67-177	1.277	0.207
Acetyl choline esterase (U/ml)	12412	4606.4	1734-19870	3676.4	2344.73	352-9505	11.854	0.00

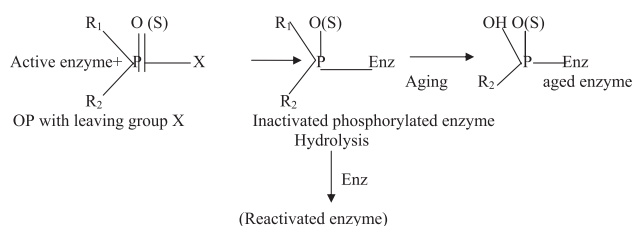
Degree of Freedom (DF) = 97

Result of this study shows that, in organophosphorus poisoning cases, levels of acetyl choline esterase are decreased comparatively to the controls whereas in Alkaline Phosphatase status no significant difference was observed.

DISCUSSION

In present circumstances of globalization, urbanization and industrialization, the stress is increasing on individuals in particular, as well as on the community in common. Sometimes, this trend make the people engulf in some unethical behavior such as poisoning. In the Zone of North Karnataka, Organophosphorus poisoning is the most commonly found in cases of poisoning.

Clinical manifestations of OPI poisoning are caused by excessive synaptic accumulation of acetylcholine esterase (AChE) ⁸.



Key reaction occurring between organophosphorus and Acetyl choline esterase⁹.

The pathophysiological basis for the clinical manifestations of OP poisoning is irreversible inactivation of the enzyme, Acetylcholinesterase at the peripheral nicotinic and muscarinic and central nervous system (CNS) nerve terminals and junctions. Nicotinic manifestations occur in severe cases and late in the course; these comprise of fasciculations and neuromuscular paralysis. There is a good correlation between the electrophysiological abnormalities and the severity of the clinical manifestations. Neurophysiological abnormalities characteristic of nicotinic junctions (mainly neuromuscular junction) dysfunction include: (1) single, supramaximal electrical-stimulus-induced repetitive response/s, (2) decrement-increment response to high frequency (30 Hz) repetitive nerve stimulation (RNS), and (3) decremental response to high frequency (30 Hz).¹⁰ The resulting build up of acetylcholine esterase causes overstimulation of cholinergic synapses in the autonomic nervous system, central nervous system

and neuromuscular junction, producing the acute cholinergic crisis. Patients die from respiratory failure during this crisis, or from a delayed respiratory failure called the intermediate syndrome.

Some researchers are of the opinion that Alkaline Phosphatase, a diagnostic marker of liver function test, altered in poisoning cases. It may be because most organophosphates are highly lipid-soluble agents and are well absorbed from the skin, oral mucous membranes, conjunctiva and gastrointestinal and respiratory route⁹. Lipid is transported in the form of Lipoproteins for further metabolism. The pathway of lipoprotein metabolism is complex and includes two cycles exogenous and endogenous, both centered on the liver and these cycles are interconnected¹¹. Overall the lipid gets metabolized via liver.

In humans, Alkaline Phosphatase is present in all tissues throughout the entire body, but is particularly concentrated in liver, bile duct, kidney, bone, and the placenta. Due to its presence in liver, it is considered as one of the important diagnostic marker. In absence of pregnancy and bone disease, an elevated ALP level generally reflects hepatobiliary disease¹². But this study did not reveal any such types of findings in organophosphorus poisoning. But there is a probability of alteration of Alkaline Phosphatase status in other types of poisoning.

CONCLUSION

This study reveals the decrease in Acetyl choline esterase level in organophosphorus poisoning subjects which is statistical significance but there was no significant alteration in Alkaline Phosphatase level in organophosphorus poisoning as compared to apparently healthy controls. This study reveals one more fact that the incidence of poisoning is burning problem in North Karnataka zone. Hence every suspected organophosphorus poisoning case should be screened by estimating the acetyl choline esterase status for confirmation and also for determining the effectiveness of treatment. It shall make the diagnosis of poisoning cases more easy and response to the treatment can be monitored in very objective manner, thus enabling the physicians to regulate the doses of specific antidote resulting in fast improvement in the health status of patients.

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Photodynamic Therapy in Dentistry - A Review

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ABSTRACT

Photodynamic therapy (PDT) also known as photoradiation therapy, phototherapy, or photochemotherapy, involves the use of a photoactive dye (photosensitizer) that is activated by exposure to light of a specific wavelength in the presence of oxygen. PDT is a very promising and non invasive treatment modality. At present, PDT is alternative method of treatment of premalignant lesions and head & neck cancer. It is well known that PDT may also be used in the eradication of refractory fungal infections in oral cavity where antibiotics have failed. Due to its ability of viral inactivation, PDT is being used in the treatment of Herpes Simplex Virus (HSV-1) recurrent infections. PDT is being also tested in the case of eradication of microbial which colonized root canals and dental plaque. Almost every dental practice is equipped with polymerizing lamp which is very convenient source of monochromatic blue light in most cases. The application of a photosensitizer with absorption spectrum near to emission spectrum of the polymerizing lamp might be a new, potent tool in dentistry.

Key words: Photodynamic Therapy, Photosensitizer, Wavelength, Radiation

INTRODUCTION

Photodynamic therapy (PDT) is a current treatment modality in dentistry. PDT consists of light irradiation (red light or ultra violet light for diagnostic purposes) and special chemical compound which is called photosensitizer. It is very important that the applied doses of light and photosensitizer are too small to achieve therapeutic effects when given separately. The combined use of light and photosensitizer in special configurations may ensure therapeutic effects. Photosensitizer is a chemical compound which under an influence of light energy shifts to an excited state. Upon subsequent photochemical reactions singlet oxygen and highly reactive radicals are generated in cells. Apart from PDT one can distinguish two other light involving therapies: 1) Phototherapy in which ultraviolet A (UV-A) and B (UV-B) light are being used with out any photosensitizer and 2) Photochemotherapy consisting of ultraviolet A (UV-A) light and psoralens (natural photosensitive compounds).¹

HISTORICAL BACKGROUND

Since centuries the mankind realized that light exerts an important influence on humans. The ancient Egyptian worshipped Ra God. According to their faith Ra was responsible for abundant harvest, reproduction of animals and fertility of women. Similarly, in Greek mythology, Apollo was identified with sun. Principles of heliotherapy were created from these faiths and Herodotus is considered the father of heliotherapy.²

The bases of modern phototherapy were invented at the beginning of XIXth century. In 1899 Oscar Raab proved in his theses that certain chemical compounds like acridin or eosin under the influence of light may elicit cytotoxic effect. Niels Finsen studies focused on the application of arc lamp in phototherapy. In 1903 he was awarded a Nobel Prize for that research. In 1942 Auler and Banzer from the University of Berlin discovered characteristic red fluorescence of porphyrins in rodent tumors. That discovery was a beginning of photodynamic diagnosis (PDD).²

Light alone or in combination with chemical compounds has been used for a long time to induce a therapeutic effect. Psoralens and light were used in ancient India, China and Egypt for treatment of vitiligo and psoriasis.³

In 1976 Kelly and Snell performed the first experiments in PDT on humans. They investigated

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effects of hematoporphyrin derivatives (HpD) photodynamic therapy in case of bladder carcinoma in five patients.²

In 1993, in Canada, the purified HpD was officially accepted as commercially available product termed Photofrin II.²

PRINCIPLE

The principle of PDT is a non thermal photochemical reaction, which requires the simultaneous presence of a photosensitizing drug, oxygen, and visible light. After a period to allow the photosensitizer to collect in the target tissue, the photosensitizer is activated by exposure to low power visible light of a drug - specific wavelength. Mainly the light source consists of a portable diode laser and the light is transmitted via laser fibres to or into the tumour. Illumination of the tumor by the light at the activating wavelength results in the destruction of cells by a non free radical oxidative process.⁴

The excited singlet state then may undergo intersystem crossing to the slightly lower energy, but longer lived, triplet state, which may then react further by one of the two pathways known as Type I and Type II photoprocesses, both of which require oxygen.⁴ Type I pathway involves electron-transfer from the PS triplet state with the participation of a substrate to produce radical ions that can then react with oxygen to produce cytotoxic species (superoxide, lipid-derived radicals). Type II pathway involves energy transfer from the PS triplet state to ground-state molecular oxygen (triplet) to produce excited-state singlet oxygen, which can oxidize many biological molecules such as proteins, nucleic acid and lipids, and can lead to cytotoxicity.⁵

These reactive oxygen species may damage crucial cell components such as structural proteins, enzymes, DNA, and phospholipids. PDT is a cold photochemical reaction, and the photosensitising agents are of inherently low systemic toxicity. PDT damage heals mainly by regeneration rather than scarring. Due to the organ preserving principle of PDT, important structures are maintained with good functional and cosmetic outcome.⁴

PHOTOSENSITIZERS

Several photosensitizers have been developed during the past. Haematoporphyrin and haematoporphyrin derivatives were the first photosensitizers.⁴ Depending on the type of agent, photosensitizers may be injected intravenously, ingested orally, or applied topically. Although a

number of different photosensitizing compounds such as methylene blue, rose bengal, and acridine are known to be efficient singlet oxygen generators (and therefore potential photodynamic therapy agents), a large number of photosensitizers are cyclic tetrapyrroles or structural derivatives of this chromophore; in particular porphyrin, chlorin, bacteriochlorin, expanded porphyrin, and phthalocyanine (PC's) derivatives.⁶

Photosensitizers can be categorized by their chemical structures and origins. In general, they can be divided into three broad families:

1. *Porphyrin-based photosensitizer* (e.g., Photofrin, ALA/PpIX, BPD-MA),
2. *Chlorophyll-based photosensitizer* (e.g., chlorins, purpurins, bacteriochlorins), and
3. *Dye* (e.g., phthalocyanine, naphthalocyanine)⁶

GENERATIONS OF PHOTOSENSITIZERS

Most of the currently approved clinical photosensitizers belong to the porphyrin family. Traditionally, the porphyrins and those photosensitizers developed in the 1970s and early 1980s are called first generation photosensitizers (e.g., Photofrin). Photofrin® (di-hematoporphyrin ether), available for 30 years in its commercial form, and hematoporphyrin derivatives (HPDs) are referred to as first-generation sensitizers. Photofrin® is the most extensively studied and clinically used photosensitizer.⁶

Porphyrin derivatives or synthetics made since the late 1980s are called second generation photosensitizer (e.g., ALA). Second-generation photosensitizers include 5-aminolevulinic acid (ALA), benzoporphyrin derivative (BPD), lutetium texaphyrin, temoporfin (mTHPC), tinethyletiopurpurin (SnET2), and talaporfin sodium (LS11). Foscan® (mTHPC), the most potent second-generation photosensitizer, has been reported to be 100 times more active than Photofrin® in animal studies. These photosensitizers have a greater capability to generate singlet oxygen; however, they can cause significant pain during therapy and, because of their high activity, even dim light (60 Watt bulb) can lead to severe skin photosensitivity.^{4,7}

The third agent, ALA, is an intrinsic photosensitizer that is converted in situ to a photosensitizer, protoporphyrin IX. Topical ALA and its esters have been used to treat pre-cancer conditions, and basal and squamous cell carcinoma of the skin.⁶

Third-generation photosensitizers include currently available drugs that are modified by targeting with monoclonal antibodies. Currently, only four photosensitizers are commercially available: Photofrin, ALA, Visudyne (BPD; Verteporfin), and Foscan.⁴ The first three have been approved by the FDA, while all four are in use in Europe.⁶

ILLUMINATION DEVICES & THEIR DESIGNS

The design of an optical device to illuminate

uniformly the target lesion without having to shield the whole oral cavity is extremely appealing. Different designs include: (Table 1)⁸

- I. *Tailored reflector*: The average irradiance obtained on the 25 mm² target is 115 mW/cm².
- II. *Lightpipe*: The average irradiance on the target is 77 mW/cm² with an average deviation of 4%.
- III. *Cylinder*: The average irradiance on the target is 104 mW/cm² with an average deviation of 5%.⁸

Table 1. Comparison of the designs⁸

Design	Configuration	Dimensions of device (mm ³)	Average irradiance (mW/cm ²) on 25 mm ² target, Goal 50 mW/cm ²	Average deviation (%), Goal < 10%
Tailored Reflector	Central window	5.5 × 7.2 × 10	130	< 3
	Lateral window	5.5 × 7.2 × 10	128	3
Lightpipe	-	6.8 × 6.8 × 50	77	4
Cylinder Reflector	Central window	5 × 10 × 11	104	5
	Lateral window	5 × 10 × 11	103	6

PHOTODYNAMIC THERAPY & ITS APPLICATIONS IN DENTISTRY

A. Premalignant Lesions & Conditions - PDT is alternative method of treatment of oral leukoplakia or lichen planus. In the case of multifocal leukoplakia it is very often impossible to remove all pathological foci within the margin of intact tissue. PDT may then be successfully used. PDT does not cause scarring. Microfoci, which are invisible upon macroscopical examination, are usually eradicated after PDT. Eradication of microfoci considerably decreases risk of recurrences.¹

In the cases of lesion located on the skin of face or labial mucosa the PDT assures cosmetic effects which are very important in that localization. Delta-aminolevulinic acid is very often used in the treatment of leukoplakia at concentration from 10 to 20%. 0.1% chlorophyllgel is being used too. The application of photodynamic therapy in oral leukoplakia significantly reduces the time of treatment in comparison with pharmacological methods involving vitamin A or active metabolites of vitamin A.⁹

PDT is very effective in the treatment of lichen planus. Methylene blue (MB) was found to be very promising photosensitizer in that case.⁹ Unlike other photosensitizers; MB can be administered

topically and orally and it may be a preferred choice for superficial lesions in skin and oral cavity. The fact that MB has a strong absorption at wavelengths longer than 620 nm, where light penetration into tissue is optimal, has led to the using of MB as a promising candidate for PDT in Lichen Planus.¹⁰

B. Oral Oncology - PDT has been used with relative success in the field of oncology, notably in head and neck tumors. The exact mechanism of action of PDT is unclear. It would appear to act on hyperproliferating cells, such as are pre-sent in malignancies, with selective uptake of photosensitizers into these cells. It has been suggested that PDT may have immunomodulatory effects and may induce apoptosis in the hyperproliferating inflammatory cells which are present in malignancies.¹⁰

C. Herpes Simplex Infections - Treatment with low-level laser therapy can be considered as an option in the treatment of recurrent HSV-1 infections and herpes labialis, and decreases the frequency of vesicle recurrence and provide comfort for patients. No significant acute side effects are noted and the lesions heal rapidly. High-power lasers (HPL) have been used for the treatment of herpes labialis in the vesicular stage, while low-power laser (LPL) are used to accelerate the healing process and minimize the frequency of vesicle

formation. The mechanism of virus inactivation involves binding of the dye to nucleic acid, absorption of light, generation of reactive oxygen species, and guanine oxidation in the viral genome.¹¹

D. Fungal Infections – PDT may also be used in the eradication of refractory fungal infections in oral cavity where antibiotics have failed.¹¹

E. Periodontitis - PDT may also be used in the case of inflammation of periodontium. One of the main factors which induces periodontitis are microbia that exists in dental plaques both supra and subgingival. The use of PDT in fighting periodontitis is still in experimental stage. There is high effectiveness of PDT in inactivation of *Actinomyces naeslundii* in vitro using a chlorine e6 or poly-L-lysine as photosensitizer. Chlorin e6 as photosensitizer ensures relatively high rate of inactivation of anaerobic microbia like *Porphyromonas gingivalis*, *Fusobacterium nucleatum*, *Capnocytophaga sp*¹. PDT also helps in reduction of bleeding on probing in the sessions following periodontal debridement. It can also be employed in patients with aggressive periodontitis, or during maintenance therapy, in the treatment of periimplantitis, and so on.¹²

F. Endodontics - Resistant bacteria persist after endodontic treatment in deciduous and permanent teeth. Therefore, chemical- mechanical endodontic treatment using irrigation solutions does not completely eradicate bacterial strains. The elimination of bacteria and their sub-products is a critical factor for effective endodontic treatment. In the deciduous teeth, radicular canal anatomy, presence of accessory foramina in the furcation area, ecotopic root reabsorption and lower tolerance towards long treatment make it difficult for chemical –mechanical instrumentation to be used. Currently photodynamic therapy is regarded as an additional resource to achieve microbial reduction.¹³ Studies are carried on the application of special thin and elastic fibrosopes as light sources in root canals. Chlorin e6 –PDT reduces bacterial flora with eradication effects upto 95% and the combination of PDT with routine methods results in 98% effectiveness.¹

G. Dental Caries - Microbia when colonizing the surface of teeth form dental plaques which lead to tooth decay. Erythrosine as a photosensitizer is

found to be effective in inactivation of *Streptococcus mutans*. Toluidine blue is also very promising photosensitiser in eradication of microbia responsible for dental plaque formation. The effectiveness of Toluidine blue in inactivation of *S.mutans* and *S.Sobrinus* is 95 and 99% in the case of *S.sanguinis*. The use of PDT may significantly decrease a number and size of teeth decay.¹⁴

ADVANTAGES OF PDT THERAPY

Some advantages of PDT over traditional techniques include preservation of functionality, excellent cosmetic results, good acceptance by patients, possibility to repeat the treatment and low invasiveness.⁸ Photodynamic therapy (PDT) is a promising approach to cancer treatment because of the absence of systemic toxicity of the drug in the absence of light irradiation, the possibility to irradiate the tumor selectively, the opportunity of treating multiple lesions simultaneously, and the ability to retreat a tumor to improve the response.¹⁵

PDT provides two opportunities of controlling the selectivity of treatment: (i) by preferential accumulation of photosensitizer molecules in a tumor and (ii) by spatiality limited application of light.¹⁵

LIMITATIONS OF PDT THERAPY

If healthy tissue is irradiated during the PDT treatment, inflammation, pain, swelling, burns and scarring may occur; in some cases, the teeth may also become loose. For these reasons, shielding of the oral cavity is essential; reproducibility and uniformity of light dosimetry are also desired to improve the outcome of the treatment.⁸ Even successfully treated patients often suffer from long-term skin sensitivity caused by retention of photosensitizer in the skin and subsequent exposure to ambient light. Possible contraindications of PDT therapy is patients suffering from acute intermittent porphyria or people who are allergic to porphyrins.¹⁵

Successful photodynamic treatment is, however, limited by the lack of accurate dosimetry and suitable illumination devices, as well as by insufficiently defined treatment parameters. New photosensitizers and more efficient light delivery systems, along with animal studies, are required to establish the optimum treatment parameters before the technique can proceed to clinical trials.¹⁶

CONCLUSION

Photodynamic therapy is a new promising tool as an adjunct in the management of several dental disorders. Almost every dental practice is equipped with polymerizing lamp which is very convenient source of monochromatic blue light in most cases. The application of a photosensitizer with absorption spectrum near to emission spectrum of the polymerizing lamp might be a new, potent tool in dental disorders. Further advances in PDT include targeted macromolecular conjugates that employ cell type specific binding by ligand-receptor or antibody-antigen recognition which will provide higher selectivity.

Conflict of Interest – None Declared

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Study to Analyse Pattern of Consumer Protection Act Cases Referred to PGIMER for Expert Opinion

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ABSTRACT

Introduction: The Consumer Protection Act 1986 (CPA) was a milestone in the history of consumer movement in India, drafted to prevent exploitation of consumers. The Hon'ble Supreme Court delivered a land mark judgment to bring the medical services under this Act which created flutter amongst medical fraternity. In relation to health care, doctors were to be held responsible whenever there was a breach of duty. The Apex Court subsequently in another judgment provided some relief by ordering that matter must be first referred to a board of doctors to establish prima facie. This resulted in a large number of cases from the region being referred to PGIMER, Chandigarh for expert opinion.

Objective: The study was conducted at PGIMER, Chandigarh to analyze the CPA cases referred for expert opinion.

Material and Method: It was a retrospective study where the files of CPA cases referred to PGI for expert opinion between November 2009 to December 2010 were retrieved and extensively analyzed.

Results: Total numbers of 51 cases were referred to the PGIMER to seek expert opinion. Maximum cases were referred from the state of Punjab (90%) and belonged to the age group of 15 to 40 (40%), and had been referred from the district consumer forum (about 80%). In almost 60% cases, the alleged negligence was related to some surgical procedure. Eighty percent (80%) were against private hospitals. Amongst the speciality involved Orthopedics ranked highest (approx. 30%) and Gynae. & Obstt. and General Surgery being the other two (20% each). Repeat surgery (35%) was the most common result of negligence. Regarding opinion of the expert committee, 70% were given in the favour of treating doctors / hospitals, in 30% cases no decision could be given due to incomplete documentation. None of the decisions was against any doctor or hospital.

Conclusion: The era of information technology, increased awareness, fading trust and respect, intolerance and tendency of taking law in hand is gradually turning India into a law driven society. It is better to treat safe rather than to play safe. To avoid CPA cases we need meticulous documentation, proper maintenance of medical records, well informed consent, practicing evidence based medicine, effective communication, ensuring patient safety, accountability, transparency, and prompt grievances redressal mechanism. Surgeons, particularly in private set up need to be more alert since it emerged that most common negligence was related to some surgical procedure carried out in private hospital.

Key words: CPA, Supreme Court, Expert Opinion, Negligence, Surgical Procedures.

INTRODUCTION

Consumer Protection Act, 1986 was introduced in the Lok Sabha on December 5th, 1986 with a motive to ensure better protection of the interest of consumers.

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The principle aim of CPA 1986 was to save the consumers from exploitation and to make provisions for the establishment of Consumers Councils and other authorities for the settlement of consumer's dispute and for matters connected therewith. In a landmark judgement given by Hon'ble Supreme Court of India dated 13.11.1995, the services provided to a patient by a doctor by way of consultation, diagnosis and treatment, both medical and surgical were included in the ambit of service as defined in this act. This

invited a lot of criticism from the medical fraternity which believed that this was a humiliation done to medical profession as the doctor and patient relationship is very auspicious and should not be covered under this act. Subsequently giving some relief to the medical professionals another landmark judgement was delivered by the apex court of the country on 17.2.2009 in which it was stated that on receiving a complaint against doctor or hospital, the consumer forum should refer the case to a competent doctor or committee of doctors and in case a prima facie is established only then the notices should be issued to the alleged doctor. Following this judgement a number of cases were referred to the Postgraduate Institute of Medical Education & Research, Chandigarh, a premier Institute of northern India located in the capital city of Punjab and Haryana wherein expert opinion was sought in respect of complaints lodged with the respective district consumer forums. The study has made an attempt to analyze the pattern of such cases.

HISTORY

There has been mention of consumer protection during the Mughal times and especially during the time of Khiljis¹. During the British regime (1765-1947), ('Colonial Era'), Government's economic policies in India were concerned more with protecting and promoting the British interests than with advancing the welfare of the native population. Among the various acts implemented during this era, prominent were: the Indian Penal code, 1860, the sale of Goods act, 1930, the dangerous drugs act, 1930 and the drugs and cosmetics act, 1940². The post independence period saw enactment of a number of laws to safeguard the interests of the consumers from various angles such as Banking Companies Act, 1949 (later called The Banking Regulation Act) to amend and consolidate the Law related to banking matters, Industries (Development and Regulation) Act, 1951 to implement the Industrial Policy Resolution of 1948. These were among earlier steps taken by National Government in India in the direction of consumer protection³. Thought consumer was a stakeholder but almost always was ignored or undermined. In order to strengthen the hands of consumer and do justice to their rights, the Consumer Protection Bill, 1986 was introduced in the Lok Sabha on December 5th 1986.

MAIN FEATURES OF THE CPA AS APPLICABLE TO MEDICAL PROFESSION

Under this act a doctor, when consulted by a patient owes him duty of care, duty of administration of most

appropriate treatment and a breach of any of these duties gives the right of action for medical negligence to the patient. The main relief provided under the Consumer Protection Act is compensation for the damage caused due to deficiency in service, which in the case of medical services is negligence.

Some of the Landmark Judgements of the Supreme Court in Relation to Medical Field

IMA VS V.P. Shantha & Others (13-11-1995)[4]

- The Honorable court directed that services provided to a patient by a doctor by way of consultation, diagnosis and treatment, both medicinal and surgical, would fall within the ambit of 'service' as defined in Section 2(1) (o) of the Act.

Jacob Mathew VS State of Punjab (5-8-2005)[5]

Guidelines Issued by Supreme Court

- The investigating officer before proceeding against the doctor accused of negligence needs to obtain an independent and competent medical opinion preferably from a doctor in government service qualified in that branch of medical discipline.
- A doctor accused of negligence, may not be arrested in a routine manner.
- A doctor may be liable in a civil case for negligence.

Martin F. D'Souza VS Mohd. Ishfaq (17-2-2009)[6]

Guidelines Issued by Supreme Court

- Whenever a complaint is received against a doctor or hospital by the Consumer Forum or by the Criminal Court then before issuing notice to the doctor or hospital the matter must be referred to a competent doctor or committee of doctors, and if prima facie a case of medical negligence is established, only then the notice be issued.

Following the judgment district/state consumer forum started referring all the cases filed there to government hospitals for expert opinion. Postgraduate Institute of Medical Education & Research (PGIMER) being a premier institute of northern India and being located in Union Territory of Chandigarh, the capital of Punjab and Haryana received a large number of cases from both of these states.

OBJECTIVE

The objective of the study conducted at PGIMER was to analyze the Consumer Protection Act Cases related to medical negligence in which PGIMER

was not a party but had been requested by District / State Consumer Forum to furnish expert medical opinion to establish prima facie or established negligence. Objective was to understand and analyze the pattern of cases and expert opinion given thereof.

MATERIAL AND METHODS

It was a retrospective study. The files of CPA cases referred to PGI for expert opinion during the period of November 2009 to December 2010 were retrieved and thoroughly analyzed. A total number of fifty one (n=51) cases had been referred. Extensive scrutiny of these case files was carried out in order to understand the pattern of cases. Various parameters such as referring state, consumer forum involved, age group of the deceased, nature of negligence, type of the hospital/organization involved and amount of compensation sought, the specialty involved, and finally opinion of the expert committee of PGIMER were recorded and analyzed. Inputs from the medical specialists concerned and the Law Officer, PGIMER were also obtained.

RESULT

A total numbers of 51 cases were studied. Maximum cases had been referred from the state of Punjab (90%) and 6% from state of Haryana (Table 1). Maximum cases belonged to the age group of 15 to 45 (40%) (Table 2). Eighty percent (80%) cases had been referred from the District Consumer Forum and twenty percent (20%) from the District Consumer Forum. No case had been referred from National consumer forum. In almost sixty percent (60%) cases, the alleged negligence was related to some surgical procedures followed by wrong diagnosis in twenty two percent (22%) cases (Table 3). Eighty percent (80%) were against private hospitals and only twelve percent (12%) cases were against Govt. hospitals. Amongst the speciality involved Orthopedics ranked highest (approx. 30%) and Gynae. & Obstt. and General Surgery being the other two (20% each) (Table 4). Repeat surgery (35%) was the most common result of negligence. Regarding opinion of the expert committee, seventy percent (70%) had been given in the favour of treating doctors / hospitals whereas in thirty percent (30%) cases no decision could be given by the expert committee due to incomplete documentation (Table 5). None of the decision was given against treating doctors. There was no follow up of the cases which had been referred back (30%) due to incomplete documentation.

Table 1. State Wise Distribution

Sr.No.	State	Number of cases
1.	Punjab	45
2.	Haryana	03
3.	Chandigarh	02
4.	UP	01
	Total	51

Table 2. Age Wise Distribution

Sr.No.	Age Group	No. of Male	No. of Female	Total
1.	>14	03	01	04
2.	15-30	06	06	12
3.	30-45	03	05	08
4.	45-60	05	03	08
5.	>60	06	02	08
6.	Not known	02	09	11
	Total	25	26	51

Table 3. Type of Negligence

Sr.No.	Type of Negligence	No. of Cases
1.	Surgical Procedures	22
2.	Wrong Diagnosis	11
3.	Delay/Lack in Care	04
4.	Dental Procedure	02
5.	Operation Failure	05
6.	Miscellaneous	05
	Total	51

Table 4. Speciality Involved

Sr.No.	State	Number of cases
1.	General surgery	08
2.	Gynae. & Obstt.	10
3.	Neurosurgery	02
4.	Medicine	05
5.	Orthopedics	12
6.	Cardiology/CTVS	03
7.	Dental Surgery	02
8.	Ophthalmology	03
9.	Miscellaneous	06
	Total	51

Table 5. Decision of Expert Committee

Sr. No.	Decision of the Expert Committee	Number of cases	Remarks
1.	In favour of doctors	30	-
2.	Against doctors	-	-
3.	Undecided	21	Due to incomplete documents
	Total	51	

DISCUSSION

India is a democratic country and laws are drafted for the betterment of the society and its effectiveness has to be judged by the extent of its utility to the person for whom it is made. India is a welfare state and thus

has to fulfill the constitutional goals of looking after health and safety of its citizens. The consumer protection act (CPA) was introduced in the Lok Sabha in the year 1986 and came into force on the 15th August 1987 and it is considered as a dynamic and radical piece of legislation enacted by the Parliament. It has four chapters and thirty one sections. Number of cases related to medical field gradually piled up in consumer dispute redressal agencies and decisions given thereof were not acceptable to one or the other party involved. Finally all these cases led to an appeal in the Hon'ble Supreme Court of India and a landmark judgment was delivered by the Hon'ble Supreme Court in 1995 in the case of IMA V/s VP Shanta and others (Civil appeal no.688 of 1993) wherein the Hon'ble Court gave the decision that services rendered to a patient by medical practitioner (except where the doctors gives services free of charge to every patient) by way of consultation, diagnosis or treatment (both medical and surgical) will fall within the ambit of service. The fact that medical practitioners belong to a profession and are regulated by Medical Council of India, does not exclude them from this act.⁴

In another landmark judgment of Martin F.Douseza V/s Mohammed Ishfaq (date of judgment 17.2.2009), the Hon'ble Supreme Court directed that before issuing notice to the doctor or hospital accused of negligence, the matter must be referred to a competent doctor or committee of doctors to establish the prima facie or medical negligence, only then the notice be issued.⁶ Following this judgment, there was a steep rise in the cases filed with various consumer forum being referred to the government hospitals seeking expert opinion of medical boards. PGIMER being a premier institute of the northern India received total number of 51 such referrals during November 2009 to December 2010. These were mainly from the state of Punjab and against the private hospitals. In majority of the cases the alleged negligence were related to some surgical procedures and orthopedic ranked highest followed by Gynae. & Obstt. and General surgery. The probable reason is that Punjab is a rich state having good income from agriculture and industry. The purchase power of a common man has increased and the numbers of vehicles too have increased manifolds. Increased purchasing power and change of lifestyles has resulted in the large number of road side accidents leading to orthopedic injuries which possibly was the reason for orthopedic cases being ranked the highest specialitywise negligence. The most common negligence reported was repeat surgery. This was due to the lack of communication or the procedure not

being explained fully to the patient in situation of emergency. The doctors in the region are not still very open to the patients and spend little time in explaining the procedure, recording the proceedings meticulously and explaining the possible outcomes and complications which led to misunderstanding and communication gap. The most common excuse / defense put forward by the treating doctor was that the alleged negligence is a rare complication of the procedure. In all the cases, an attempt had been made to justify the same by attaching photocopies of some text book/journal. Though the same had not been documented in the consent obtained prior to the surgical procedure/treatment. In as many as 70% of the cases, the expert committee at PGIMER was convinced that alleged negligence in one way or the other is a rare complication of the procedure as claimed by the treating doctor and thus gave the decision in favour of the accused medical professional. The thirty percent (30%) of the cases which were sent back due to incomplete documentation without giving any decision and were never referred back to the expert committee for review. The follow up of those cases could not be done. It emerged from the study that the private hospitals of the region conducting surgical procedures specially related to orthopedics, gynae. & obstt. are more vulnerable to invite trouble and face the charges of negligence in the consumer courts so they need to be more alert, careful, vigilant and adhere to the practices of patient's safety. Communication with patients and his relatives is of paramount importance and should essentially be considered part of treatment. Rare and uncommon complications should be explained to the relatives and be recorded in the consent obtained prior to the surgical procedure. The probable outcome of the procedure likely improvement, expected results, possibility of re-surgery and rare complications should all be explained and recorded and signatures of the patients/his relatives in the presence of witnesses be obtained.

CONCLUSION

We are living in an era of information technology leading to increased awareness. A vast ocean of knowledge and information is available to a common man just at a click of mouse. Our society has been empowered with Right to Information (RTI) Act 2005. Mutual faith, trust and respect is fast evaporating and the social fabric is weakening rapidly. Young India (Youngistan) is very demanding and highly intolerant. Public interest litigations are being filed left and right.

The media is very active. We are thus turning rapidly into a LAW DRIVEN SOCIETY. Doctors are soft target. The medical fraternity therefore needs to be more careful, alert and vigilant specially surgeons in the private setup. Obtaining an insurance cover is another possible remedy. The need of the hour is to follow the golden rule of prevention is better than cure and remember that it is always better to stay out of the problem than to get out of the problem. It is always better to TREAT SAFE NOW than to PLAY SAFE LATER.

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Postmortem Study of Injury Patterns in Fatal Road Traffic Accidents in Yavatmal, Maharashtra

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ABSTRACT

Road traffic accidents are the major causes of death worldwide and also contribute substantially to the disease burden in India. The present study was undertaken on 187 victims of road traffic accidents and an attempt is made to measure incidence of road traffic accidents in relation to age, sex, type of collision, type of offending vehicle, time and place of accident and other various epidemiological, medico-legal aspects of vehicular accidents to establish various causative factors, types and distribution of injuries in road traffic accidents by detailed examination of death victims. All the data thus collected was analyzed and presented in this paper.

Key words: Road Traffic Accidents, Injuries.

INTRODUCTION

International Classification of Diseases defined traffic accident as "any vehicle accident occurring on the public highway, either originating on or terminating on or involving a vehicle partially on the highway"¹. WHO defined the accident as "an unexpected, unplanned occurrence that may involve injury"². According to World Health Organization's Global Burden of Disease Project for 2004, road traffic injuries will raise to become the fifth leading cause of death by 2030, resulting in an estimated 2.4 million fatalities per year. Road traffic injuries are one of the top three causes of death for people aged between 5 and 44 years. The report also revealed that more people die in road accidents in India than anywhere else in the world³. In India, at least 13 people die every hour in road accidents⁴. Risk taking behaviour of road users, vehicle characteristic, unsafe traffic environment, poor road infrastructure are the main causes for vehicular accidents. The present study aims at studying the pattern and distribution of injuries sustained by victims of road traffic accidents.

MATERIAL AND METHODS

This study was carried out on 187 cases of fatal road

traffic accidents brought to the mortuary for autopsy in the Department of Forensic Medicine, S. V. N. Government Medical College, Yavatmal during the period from 1st October 2007 to 30th August 2009. The information regarding age, sex, residence, marital status, date and time of time of accident and death was gathered from relatives, police inquest report, dead body challan and clinical details from hospital records. During autopsy, detailed examination was carried out and data regarding both external and internal injuries was carefully recorded and analyzed.

OBSERVATIONS

1. Age and Sex group

The highest incidence was seen in age group of 21-30 years comprising 28.34% cases. Age groups least affected was 0-10 years (2.13%). Males comprised a majority and constituted 83.42% with male to female ratio as 5.03:1.

Table 1. Age and sex distribution

Age in yrs	Males (%)	Females (%)	Total (%)	sex ratio
0-10	3	1	4 (2.13)	3:1
11-20	12	4	16 (8.55)	3:1
21-30	48	5	53 (28.34)	9.6:1
31-40	38	9	47 (25.13)	4.22:1
41-50	33	5	38 (20.32)	6.6:1
51-60	15	2	17 (9.09)	7.5:1
61-70	5	2	7 (3.74)	2.5:1
> 70	2	3	5 (2.67)	0.67:1
TOTAL	156(83.42)	31(16.58)	187(100)	5.03:1

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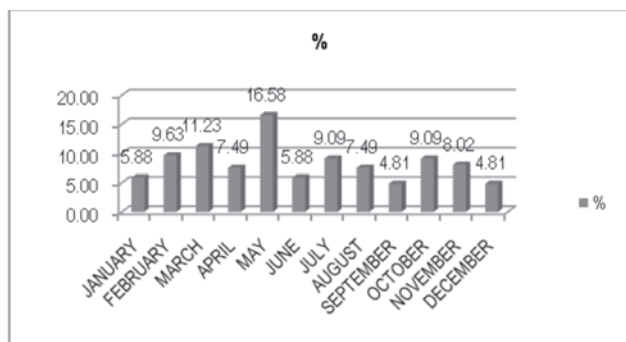
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2. Month of the accident

The maximum number of cases occurred in the month of May (16.58%), followed by March (11.23%) and the least in December (4.81%). Combining the above data, maximum cases occurred in summer season (February- May) comprising 44.92% cases and the least in rainy season (21.93%).

Graph 1. Month-wise distribution



3. Time of the accident

In the present study, most of the incidents occurred between 1200 to 1800 hours, comprising 37.43% of total cases, followed by time interval 6000 to 1200 hours (26.20%). The least number of cases (10.70%) occurred between 0000 to 6000 hours in the morning.

Table 2. Time of accident

Time of Accident in Hours	Number of Cases	Percentage
00-06	20	10.70
06-12	49	26.20
12-18	70	37.43
18-24	48	25.67
TOTAL	187	100

4. Survival period and place of death

The maximum number of victims (39.57%) died while on the way to hospital, followed by victims died in the hospital (34.76%). The number of victims who died on the spot was 25.67%.

Table 3. Place of death

Place of Death	Number of Cases	Percentage
Spot Death	48	25.67
On The Way To Hospital	74	39.57
In The Hospital	65	34.76
Total	187	100

5. Profile of the victim

The motor-cyclists were the commonest group of victims, comprising 69(36.90%) cases, out of which 59 were drivers, followed by Light Motor Vehicle users

comprising 46 (24.60%) cases of which 43 were occupants. Pedestrians constituted 32 (17.11%) of the cases. Overall, occupants of the vehicles (81) outnumbered the drivers (74).

Table 4. Profile of victim

Type of Victim	Drivers	Occupant	Total	Percentage
Pedestrians	Na	Na	32	17.11
Motor-Cyclists	59	10	69	36.90
Cyclists	6	3	9	4.81
Lmv	3	43	46	24.60
Hmv	5	12	17	9.09
Three Wheeler	1	13	14	7.49
Total	74	81	187	100

*LMV: Light Motor Vehicle, *Hmv- Heavy Motor Vehicle, NA- Not Applicable.

6. Offending vehicle

In present study, truck was the commonest offending vehicle being involved in 64 (59.81%) cases, followed by Light Motor Vehicle (15.89%) and buses (9.35%).

7. Cause of death

The head injury was the commonest cause of death comprising 39.57% cases. In drivers, head injury was the commonest cause of death observed in 42 cases. In occupants of the vehicles, injury to vital organs was the commonest cause of death seen in 33 cases. In pedestrians, shock and hemorrhage was predominant cause of death seen in 12 cases.

8. Site of injury

Extremities suffered maximum injuries (32.64%), followed by Head, neck and face region (30.93%). Least numbers of injuries were observed on spine (1.33%). Pedestrians, two wheeler and three wheeler users sustained maximum injuries on extremities, followed by on head, neck and face. Four wheeler users had maximum injuries on head, neck and face region, followed by on extremities.

Table 5. Site of injury

Site of Injury	Percentage
Extremities	32.64
Head, Neck, Face	30.93
Thorax	17.08
Abdomen	12.33
Pelvis	5.69
Spine	1.33
Total	100

9. Head injury

The scalp injury in the form of contusions,

lacerations, under-scalp haematoma, etc. was the commonest type of injury seen in 129 of the total cases, followed by intracranial haemorrhages comprising 113 of the total cases and skull fractures (95). Injury to brain was observed in 51 of the total cases. Linear fracture of skull was the commonest type seen in 41.05% of the total cases. Least common was the depressed fracture, observed in 14.74% of the total 95 cases. Skull vault fracture was seen in 80 cases. Temporo-parietal region was involved most commonly in 16 (20%) cases, followed by fronto-parieto-temporal region (17.50%). Parietal bone was the most commonly fractured bone of vault of skull, comprising of 13.75% of total skull vault fractures. The base of skull had maximum fractures at anterior and middle cranial fossae (31.25%), followed by middle cranial fossa (29.17%) and least number at posterior cranial fossa (4.17%).

A combination of subdural haemorrhage with subarachnoid haemorrhage was most commonly observed in 70 (61.95%) of the total cases of intracranial haemorrhages, followed by combination of extradural, subdural and subarachnoid haemorrhage (20.35%). Subdural haemorrhage was the commonest single haemorrhage observed in 6.19% of the total intracranial haemorrhages.

10. Chest injuries

Rib fracture with lung injury was seen in 66.04% cases of intrathoracic injuries, followed by injuries to lungs without fracture of ribs (12.26%). Injury to heart was associated with fracture of corresponding ribs in 8.49% cases and in 1.89% cases there was injury to heart without corresponding rib fracture. Injury to heart was commonly seen in drivers (5/11), while rib fracture with lung injury was common in occupants (42/70).

11. Abdominal injuries

Liver was the most commonly injured abdominal organ seen in 28.17% cases and kidney was least commonly involved (4.23%). Maximum number of abdominal injuries was seen in occupants (40/71) and least was in pedestrians (10/71).

DISCUSSION

In this study, Males clearly outnumbered females with male to female ratio as 5.03:1. This is in accordance with the studies by Arvind Kumar et al (2008)⁵ and Y N Singh et al (2005)⁶.

In the age group analysis of the victims, maximum incidence was in age group of 21-30 years and least in

group 0-10 years. Similar findings were observed by B H Tirpude et al (1998)⁷, Harnam Singh et al (2004)⁸, B R Sharma et al (2007)⁹ and Arvind Kumar et al (2008)⁵.

Maximum cases occurred in the summer which is consistent with study by Gautam Biswas et al (2003)¹⁰ and report by National Crime Bureau (2007)⁴.

The maximum numbers of accidents were reported between 1200 to 1800 hours, comprising 37.43% cases, followed by time interval 6000 to 1200 hours (26.20%). The similar trends are seen by Anand Menon et al (2006)¹¹ and Sangeet Dhillon et al (2007)¹².

The maximum number of victims (39.57%) died while on the way to hospital, followed by victims died in the hospital (34.76%) and victims died on spot (25.67%). The present study is consistent with the studies by Akhilesh Pathak et al (2006)¹³ and B. R. Sharma et al (2007)⁹.

The motor-cyclists were the commonest group of victims, comprising 36.90% cases, followed by Light Motor Vehicle users comprising 24.60% cases. Pedestrians constituted 17.11% of the cases. Similar trends were seen by Akhilesh Pathak et al (2008)¹³.

Trucks were the commonest offending vehicle being involved in 59.81% cases, followed by Light Motor Vehicle (15.89%) and buses (9.35%). Similar trends were seen by J Chandra et al (1979)¹⁴, Gautam Biswas et al (2003)¹⁰, B H Tirpude et al (1998)⁷, B R Sharma et al (2007)⁹, Harnam Singh et al (2004)⁸ and Rakhi Dhandona et al (2004)¹⁵.

In present study, the head injury was the commonest cause of death comprising 74 (39.57%) cases, followed by injury to vital organs observed in 55 (29.41%) cases. J. Chandra et al (1979)¹⁴, and Arvind Kumar et al (2008)⁵ in their study found similar trends.

Extremities suffered maximum injuries (32.64%), followed by head, neck and face region (30.93%) and thorax (17.08%). Least numbers of injuries were observed on spine (1.33%). Sangeet Dhillon et al (2007)¹² and Harnam Singh et al (2004)⁸ revealed the similar findings.

Scalp injury was the commonest type of injury seen in 129 of the total 138 cases of head injuries, followed by intracranial haemorrhages (113) and skull fractures (95). Injury to brain was observed in 51 cases. The findings correlate with studies by Akhilesh Pathak et al (2008)¹³ and Sangeet Dhillon et al (2007)¹².

In present study, linear fracture of skull was the commonest. Parietal bone was the most commonly

fractured bone of vault of skull. The base of skull had maximum fractures at anterior and middle cranial fossae and least number at posterior cranial fossa (4.17%). Anand Menon et al (2005)¹¹, Akhilesh Pathak et al (2008)¹³ and Abhishek Yadav et al (2008)¹⁶ found the similar findings.

Subdural haemorrhage was the commonest single haemorrhage observed in 6.19% of the total intracranial haemorrhages. The similar trends was seen by Dr. Harnam Singh et al (2004)⁸ and Anand Menon et al (2006)¹¹.

In chest trauma injury to heart was commonly seen in drivers, while rib fracture with lung injury was common in occupants. J. Chandra et al (1979)¹⁴ revealed similar findings.

In abdominal injuries, liver was the most commonly injured abdominal organ seen in 28.17% cases and kidney was least commonly involved (4.23%). Maximum number of abdominal injuries was seen in occupants (40/71) and least in pedestrians (10/71). Similar trends were seen by J. Chandra et al (1979)¹⁴, Dr. A. L. Ghangle and Dr. L. K. Bade (2001)¹⁷ and Chaudhari B L et al (2005)¹⁸.

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A Finger Dermatoglyphic Study among Adolescents in Amritsar District of Punjab in India

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ABSTRACT

The Amritsarians are one of the most popular people in the North-western state of Punjab in India. The present investigation was undertaken to ascertain variation and sexual dimorphism with respect to finger dermatoglyphic characteristics in 106 adolescents (54 males and 52 females). Frequency distribution of finger pattern types in both hands (left and right sides combined) showed that loops are the most prevalent patterns among both males (50.00%) and females (56.73%), followed by whorls (43.70% in males and 63.53% in females). Significant sex difference was observed with respect to the frequencies of finger dermatoglyphic pattern types ($\chi^2 = 38.86$, $P < 0.01$). Further, females had significantly higher ulnar loops ($t = 4.18$, $P < 0.01$) than their male counterparts whereas males significantly outnumbered ($t = 2.83$, $P < 0.01$) females in having radial loops however, in cases of the pattern Intensity Index (PII) in fingers, Dankmeijer's Index and Total Finger Ridge Count (TFRC), no significant differences were observed.

Key words: *Finger Dermatoglyphic, Whorls, Radial Loops, Ulnar Loops, Arches*

INTRODUCTION

Amritsar, popularly known as the holy city is one of the frontier cities of Punjab in North-western India. The present paper respects, for the first time, finger Dermatoglyphics of adolescents (16-17 yrs) of Amritsar Dermatoglyphic characters, despite polygenic, are putatively non-adaptive and exhibit a wide range of variation in different populations.

The fingertip discipline has had data collected and tested for more than 100 years, making it one of the most precise activities within the forensic sciences (Chapman, 1992). Many individuals in the past and present have contributed to this discipline, such as Sir Francis Galton who demonstrated that friction ridge arrangements are both unique to an individual and unchanging through time (Chapman, 1992)¹.

TYPES OF FINGERPRINT PATTERNS

There are three basic fingerprint patterns; arch, loop, and whorl. These patterns can be further classified into tented arches, plain arches, radial loops, ulnar loops, plain whorls, central pocket loop whorl, double loop whorls and an accidental whorl. Any

fingerprint pattern which contains 2 or more delta's will be a whorl pattern. In the scheme of classification, one can make the assumption that if a pattern contains no delta's then it is an arch, if it contains one (and only one) delta it will be a loop and if it contains 2 or more it will always be a whorl. If a pattern does contain more than 2 delta's it will always be an accidental whorl.

Data and information on finger dermatoglyphic variations of adolescents of North Indians are lacking. Further no study has so far been undertaken for ascertaining the finger type patterns of Punjab's people. This made us interested in carrying out investigation in this area. The principal aim of this study was to investigate finger dermatoglyphic variations in both sexes of adolescents of Amritsar district. Further, objective of this investigation was to understand the sexual dimorphism in case of finger dermatoglyphic pattern types, intensities and sizes.

MATERIAL AND METHODS

This study was carried out on the students of age-group 16 to 17 years (adolescents period), studying in various schools and colleges of Amritsar. 106

adolescents were randomly selected for the study and their finger prints were studied. For taking Dermatoglyphics, ink method suggested by Cummins, 1926 (2) was used. Kores camel duplicating ink was spread with the help of a roller over an inking slab. A 15" x 6" sized plain glass was used as inking slab. The smeared palm and fingers of both hands were printed on a durable plain paper and laid down on a pressure pad. Primary patterns (loops, whorls and arches) were observed along with pattern indices and total finger ridge count. Statistical comparisons between male and female samples were carried out through percentages and t-test (equal variance not assumed). Sexual dimorphism with respect to the frequencies of finger dermatoglyphic patterns (whorls, radial loops, ulnar loops and arches) were examined by chi-square test.

The present account dealt chiefly with the following dermatoglyphic traits on fingers: pattern types, pattern indices and total finger ridge counts.

Digital Pattern Type – All composite patterns including twin loops, lateral pocket loops, central pocket loops and accidentals were combined in the whorl category (with two triradii). Radial loops and ulnar loops were counted separately and jointly as loops. The arches included simple as well as tented arches.

PATTERN INDICES

- a) Pattern Intensity Index (PII) = 2 x whorls + loops where n = total number of fingers on both sides combined
- b) Dankmeijer’s Index = $\frac{\text{Arches} \times 100}{\text{Whorls}}$

Total Finger ridge count - The total finger ridge count (TFRC) is the sum of the single largest counts on all ten fingers of an individual.

RESULTS

The frequency distribution of finger pattern types in both hands of students is shown in Table 1.

Table 1. Frequency distribution of finger pattern types among adolescents.

	Pattern types	Male (54)		Female (52)	
		No.	%	No.	%
1.	Whorls	236	43.70	190	36.53
2.	Radial Loops	142	26.29	85	16.34
3.	Ulnar Loops	128	23.70	210	40.38
4.	Arches	34	6.29	35	6.73

÷2 for sex diff. = 38.86 **

** Statistically significant at 1 % probability level.

It is clear from table 1 that students show a preponderance of loops followed by whorls and arches. The most common pattern type in males was recorded as loops (50.00%) and whorls (43.70%) while arches (6.29%) were infrequent. Similarly, females had high frequency of loop patterns (56.73%) followed by whorl pattern (36.53%) and arches (6.73%) were found infrequent. Radial loops and ulnar-loops were counted separately and jointly in loops. All composite patterns including twin loops lateral pocket loops, central pocket loops and simple whorls were combined in the whorl category. It is further evident from Table – 1 that males showed higher frequency of whorls (43.70%) than the females (36.53%). A difference of 6.73% is evident between male and female series in respect of loop patterns with females exhibiting higher frequency of loops as compared to their male counterparts. The sex dimorphism, an established phenomenon for pattern types (Mukherjee, 1967)³, is also recorded in the present population. A similar observation was made on the Bagatha (Heena & Narahari, 1990)⁴ and khonds (Narahari et al., 2005)⁵.

Chi- square test based on finger dermatoglyphic pattern type frequencies (whorls, radial loops, ulnar loops and arches of both left and right sides combined) between males and females, as a direct indicator of sexual dimorphism was done. The result revealed that the chi-square value (÷2 = 38.86) was highly significant at 1% level (Probability = P < 0.01). Therefore, a significant difference between two sexes with respect to frequencies of finger dermatoglyphic pattern was observed. Inter-gender variations of finger patterns (whorls, radial loops, ulnar loops and arches) were also determined by using t-test as depicted in Table 2.

Table 2. Variation of finger patterns among adolescents (male = 54, female = 52)

Patterns	Sex	N	Mean	S.D	t-value	Sig.
Whorls	Mal	54	4.37	2.804	1.294	NS
	Female	52	3.65	2.896		
Radial Loops	Male	54	2.63	1.640	2.838	0.01
	Female	52	1.63	1.961		
Ulnar Loops	Male	54	2.37	1.336	4.181	0.01
	Female	52	4.04	2.597		
Arches	Male	54	0.63	1.202	0.187	NS
	Female	52	0.67	1.184		

It is clear that males (x= 2.63, SD = 1.64) have significantly (t=2.83, P < .01) higher frequency of radial loops as compared to their female counterparts (x = 1.63, S.D = 1.96). On the contrary, females (x = 4.04, S.D = 2.95). Significantly (E= 4.18, P < .01) outnumbered males (x = 2.37, S.D= 1.33) in having ulnar loops. However, no statistically significant difference was found in respect of frequencies of whorls and arches in both sexes.

Table 3. Pattern indices of Finger Dermatoglyphs among Adolescents (Male=54, Female=52)

Pattern Indices	Male	Female	t-value	Sig.
	X+ S.E	X ± S.E		
Pattern Intensity Index (PII)	13.67 ± 0.48	13.02 ± 0.47	0.961	NS
Dankmeijer's Index	27.77 ± 8.24	14.23 ± 4.44	1.431	NS

X ± SE – Mean and standard errors.

The mean (x) and standard error (ISE) of various indices of fingers of male and female subjects are presented in Table – 3. The mean pattern Intensity Index of fingers was 13.67 (± 0.48) in males and 13.02 (± 0.47) in females. The difference observed between these means was statistically insignificant (t = 0.96). The mean Dankmeijer's Index was 27.77 (± 8.24) in males and 14.23 (± 4.44) in females. The difference between these means was also insignificant (t = 1.43).

Table 4. Variation of Total Finger Ridge Counts (male =54, female =52)

Ridge Count	Male	Female	t-value	Sig.
	X±SE	X±SE		
TFRC	126.69 + 4.65	125.54+4.97	0.168	NS

X ± SE – Mean and standard errors

The mean (ISE) ridge count of dermatoglyphics on fingers in males and females are shown in table 4. The mean total finger Rigde Count (TFRC) was 126.69 (+ 4.65) in males and 125.54 (+ 4.97) in females. Between the sexes, no significant difference (t = 0.16) in these means were observed.

DISCUSSION

The present study reveals variation and sexual dimorphism of finger Dermatoglyphics in adolescent population of Amritsar. Pattern frequencies, indices and ridge counts were recorded as the most frequent dermatoglyphic pattern on fingers of both male (50.00%) and female (56.73%) adolescents. This finding coincides with Bhardwaja et al. (2004)⁶ study on digital dermatoglyphic of medical students of Ajmer. A significant sex difference was observed in relation to the pattern type frequencies of the finger dermatoglyphic when examined with chi-square test. No Significant variation of pattern indices or total finger ridge count (TFRC) was found in both sexes. Further, males were found to have significantly higher radial loops whereas females had significantly higher ulnar loops on finger-tips. Males had higher whorls and lower loops as compared to the females. Higher whorls and lower loop frequencies in males have consistently been observed in some previous studies (M.R Chakravarti, 1963)⁷ and (Sengupta, 1998)⁸ which is also true for the present investigation.

The mean PII and TFRC did not show sexual dimorphism in sampled subjects. This finding relates to the results reported in a recent study conducted by Banik et. al, (2009)⁹ on finger dermatoglyphic variations in Rengma Nagas of India. However, these results do not agree with those reported by Narahari & Padmaja's (2006)¹⁰ study on Bondos of Orissa, whereby significant sex dimorphism was noticed in the values of PII with higher values for the males.

This finger dermatoglyphic record is important as a record of information with respect to the adolescent population of north-western India. These results however, need further verification with new data from different population from Amritsar.

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Multiple Epidermoid Cyst of Scalp: A Case Report

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ABSTRACT

Epidermoid cysts represent the most common cutaneous cysts. While they may occur anywhere on the body, they occur most frequently on the face, scalp, neck, and trunk. Dermoid and epidermoid cysts are developmental pathologies that occur in the head and neck with an incidence of 6.9-7%.^{1,2} Historically, epidermoid cysts have been referred to by various terms, including follicular infundibular cysts, epidermal cysts, and epidermal inclusion cysts. Because most lesions originate from the follicular infundibulum, the more general term epidermoid cyst is favored. The main reason why some people want them removed is for cosmetic reasons as they can look unsightly. We are presenting a rare case of non hereditary multiple epidermoid cysts present only on the scalp, of a 48 year old female.

INTRODUCTION

Epidermoid and dermoid cysts can be present anywhere in the body lined by squamous epithelium. About 7% occur in head and neck region. The cysts can be defined as epidermoid when the lining presents only epithelium, dermoid cysts when skin adnexa are found, and teratoid cysts when other tissue such as muscle, cartilage, and bone are present. The semi-fluid content of the cyst looks a soft cheesy material. This substance is keratin.

CASE REPORT



Fig. 1. A single cyst prepared for excision.

A 48 year old female patient reported to the Outpatient Department at The Coorg Institute of Dental Sciences, Virajpet, India, complaining of multiple swellings in the scalp.

Clinical history revealed, slow growing multiple small peanut sized swellings which were spontaneously developed over a period of 15 years to reach the present size. No history of fever, pain or secondary changes were noted in the swelling and no associated swelling were present elsewhere in the body. Past medical history was non contributory to the present clinical condition. Physical and haematological examination revealed that the patient was apparently normal.

On examination 6 swellings were noted on parietal and occipital regions, the swellings were spherical in shape, biggest of which was measuring 3x3cms (Fig. 1). Edges of the swelling were clearly defined, skin upon the swelling was normal. On palpation inspeactory findings were confirmed, swellings were not fixed to the underlying structures and they were non pulsatile. The swellings were non tender and no discharge was present.

Complete hemogram revealed no abnormalities. At this point the clinical panel decided to perform excisional biopsy of the swelling under local anaesthesia.

At first analysing only the clinical aspects, provisional diagnosis of sebaceous cyst was made. We decided to do an excisional biopsy of the large lesion on the parietal region under local anesthesia as patient wished to get it removed first. The patient was prepared and draped. Local anesthesia was infiltrated around the lesion. A linear incision was made along the length of the lesion cutting the skin and the subcutaneous tissue. As the subcutaneous tissues was divided cystic lining was apparent.



Fig. 2. Intra operative picture showing enucleation.



Fig. 4. Wound closure with surgical silk.



Fig. 3. Surgical site after excision of the lesion.



Fig. 5. Excised specimen.

At this plane using tissue dissecting scissor cyst was gently separated from the aponeurotic tissue. The cyst was well encapsulated and did not show any fixity to the underlying tissue (Fig. 2). The wound was irrigated with saline and the excessive tissue was cut and removed (Fig. 3). The wound closure was done with surgical silk (Fig. 4). Excised specimen was sent for histopathological examination (Fig. 5). The sutures were removed on 7th day post operatively and the wound healed uneventfully.

MICROSCOPIC FEATURES

Hematoxylin and eosin stained section revealed large keratin filled cystic cavity lined by stratified squamous epithelium without any presence of skin appendages. Inflammatory infiltrate was minimal. The impression was EPIDERMOID CYST.

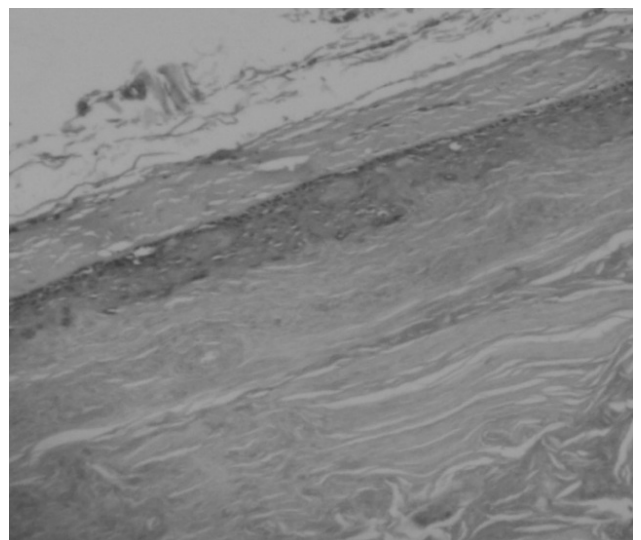


Fig. 6. Microscopic impression.

DISCUSSION

Epidermoid and dermoid cysts are nonodontogenic cyst lesions. They are rare lesions derived from germinal epithelium.¹⁹

The etiology of epidermoid cysts is unknown, but is associated with the presence of remnants of embryonic tissue (ectoderm) during the fusion during the third and fourth intrauterine weeks.¹⁸

Paget (1870a) refers to a case observed by Mr. James Reid. The patient was a woman aged 80 years, who had numerous sebaceous cysts on the scalp. Three of her daughters showed similar cysts. Non-familial cases of multiple sebaceous cysts are also reported.⁴ Rayer (1835) described cases in which multiple follicular tumours occurred. These tumours, he said, may be called wens, steatomata, or atheromata. Rayer admitted that the aetiology was obscure.

The common view is that the cysts are retention cysts, but the retention theory is not accepted by all, and there is much evidence to suggest that they are cysts of new formation.

It is probable, however, that there are many types of sebaceous cyst.

1. Retention cysts,
2. Cysts of new formation.

1. Retention cysts

- (i) Follicular cysts, by obstruction of the infundibulum of the hair follicle.
- (ii) Sebaceous duct cysts, by obstruction of the duct of the gland before it opens into the hair follicle.

1. Retention Theory

- (a) Hyperkeratinization

Bossellini showed by serial microscopical sections that hyperkeratinization was present in the hair follicle above the orifice of the sebaceous gland duct, and as a consequence he believed that sebum was retained in the hair follicle, forming a cyst. Gunther and Klausner confirmed these observations, but Prakken believed that cysts were formed sometimes by dilatation of the hair follicle and sometimes by dilatation of the sebaceous gland duct.^{5,6}

- (b) Primary Hypertrophy of the Sebaceous Glands

Pringle regarded origin as hypertrophy of the sebaceous glands with retention of secretion. In support of this numerous hypertrophied sebaceous

glands were seen in the neighbourhood of the tumours, which he removed and sectioned. Most other observers, however, have found that the sebaceous glands, far from being hypertrophied, are actually atrophied.

2. Cysts of new formation

- (i) Congenital in origin, arising from (a) epithelial rests; (b) overdevelopment of sebaceous gland structures.
- (ii) Traumatic implantation cysts.

Paget (1870) believed that most cysts of the scalp were cysts of new formation, although probably many cysts of the face and trunk and limbs result from distension of the hair follicles and their secretion.^{4,17} In support of this view he quotes Astley Cooper, South, Walther and Porta (Milan, 1856). However, he also refers to the work of Lebert and Bruns, who described a slender cord traceable from the cyst to the skin which was supposed to be formed by the obliterated duct of the enlarged and obstructed hair follicle, but he remarks that this retention type of cyst must be rare.¹¹

Many observers (literature by Benecke, 1931) have reverted to the view originally held by Paget that the majority of sebaceous cysts are cysts of new formation and that a true retention cyst of the hair follicle or sebaceous duct is rare. Benecke believed that the majority of the so-called sebaceous Cysts met with clinically are more properly termed "epidermoid cysts." These arise by the accumulation of secretion from isolated rests of epidermal cells lying within the corium.^{8,9} Other types of cysts of new formation have been described, arising as naevoid new growths or traumatic implantation cysts. As evidence against the retention theory attention is drawn to: (i) the rarity of cyst formation in cases of severe acne; (ii) the rarity of comedones in cases of sebocystomatosis; (iii) the difficulty of demonstrating by serial section an occluded or partially obliterated sebaceous duct ; (iv) the occurrence of cysts of identical histological structure on the palms of the hands and the volar surface of the fingers, sites devoid of sebaceous glands and hair follicles.^{11,17,18}

The three most common locations for the dermoid cysts are the gonads, the superior mediastinum and the head and neck in that order.¹⁹ Head and neck dermoid cysts account of nearly 7% of all dermoid cysts.^{12,13}

Although dermoid cysts can become quite large, symptoms are generally minimal patients usually

present with several month history of a painless, nontender, subcutaneous cystic masses. Physical examination reveals that the mass is attached not to the skin but to the underlying structure.^{14,15,16}

SUMMARY

A rare case of non hereditary multiple epidermoid cysts only on the scalp of a 48 yr old female is presented. The common view is that these cysts are retention cysts, but the retention theory is not accepted by all and many authors agree that they are the cysts of new formation.

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A Two-year Prospective Study of the Estimation of Foetal Age from Centres of Ossification by Radiography and Autopsy

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ABSTRACT

The estimation of foetal age plays an important role in the medicolegal investigation of such offences as criminal abortion and foeticide. The present study was conducted in the Department of Forensic Medicine and Toxicology, Indira Gandhi Government Medical College, Nagpur from November 2007 to October 2009 on a total number of 100 foetuses.

Complete body radiographs with the foetus lying in supine position and extremities extended were taken in all cases. The same foetus was dissected for inspection of ossification centres.

In the study, the mean gestational age of appearance of ossification centres for calcaneum was 24 weeks, talus - 26 weeks, cuboid - 38 weeks, lower end of Femur - 34 weeks, upper end of Tibia - 34 weeks.

Our study showed that the gestational age of a foetus can be estimated with a reasonable degree of accuracy from the appearance of various centres of ossification.

Key words: Foetus, Age Determination, Centres of Ossification, Radiological Examination, Autopsy.

INTRODUCTION

Motherhood is supposed to be the most satisfying moment in the life of a woman. In Indian mythology, child-bearing is equated with paying the debts owed to Nature.

As man evolved, he explored various techniques for the removal of inconvenient hurdles. As part of that purpose, he subsequently developed methods of abortion. As he became more civilised, laws were formulated to prevent abortions of pregnancies resulting from illicit or illegal sexual intercourse. The need to know the age of the abortus was indispensable in such cases.

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With the passage of time, the foetus needed to be studied not only for the prevention of crime but also to learn the influence of geographical, regional, maternal, nutritional, environmental and other factors on the development of tissues and the foetus as a whole.

From the time of Galen (130-200 A.D.) to the present, the gross developmental anatomy of the human prenatal osseous skeleton has been the object of much research. Literature on this subject has been primarily concerned with the time of appearance and the number of centres of ossification and the interpretation of osseous anomalies.¹ Radiography was once the mainstay of the estimation of foetal age until other methods such as ultrasonography were developed. A vast number of studies on radiological examination of foetuses have been done to date. The relation between time of appearance of numerous centres of ossification and gestational age is also known. Full body radiography has been suggested as a routine supplement to autopsy to estimate foetal age.²

Estimation of gestational age of fetus is of great medicolegal significance³. It plays important role in the scientific investigation of crimes against fetuses such as criminal abortion and foeticide. To support a charge of infanticide, certain facts have to be proved, viz., that the newborn was capable of a separate existence (i.e. more than 28 weeks of gestation under Indian law), that the baby was born alive and had a separate existence from the mother and that a wilful act of commission or omission caused its death.

The present study was carried out, therefore, to help to investigating officers and the judiciary to curb crimes against fetuses.

MATERIAL AND METHODS

The present study was carried out in the Department of Forensic Medicine and Toxicology, Indira Gandhi Govt. Medical College, Nagpur from November 2007 to November 2009. Sample of 100 fetuses were collected from labour room, womb of deceased pregnant women & fetuses on which medicolegal autopsy performed here. The embryos of less than 10 weeks were excluded from this study. Intrauterine Gestational age of foetus was obtained by last menstrual period, ultrasonography report and by utilising the formula from calculating foot length⁴.

In all cases, full body antero-posterior radiographs of foetus lying in supine position with extremities extended were taken with 'Allenger's apparatus' at the Department of Radiology in this medical college.

In the study, standard and accepted methods of dissection of foetus were used for gross examination of ossification centres of lower limbs⁵.

OBSERVATIONS

During the period of November 2007 to October

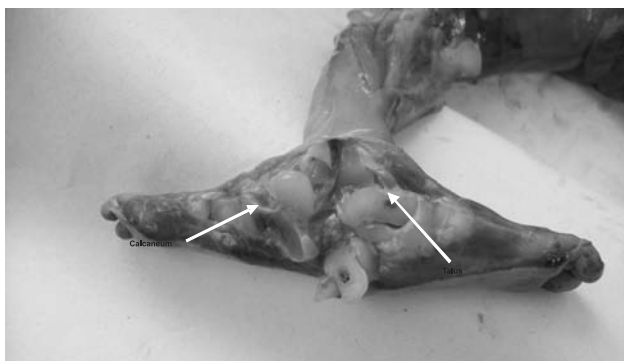


Fig. 1. Ossification centres of calcaneum and talus in foetus of 7 months gestational age.

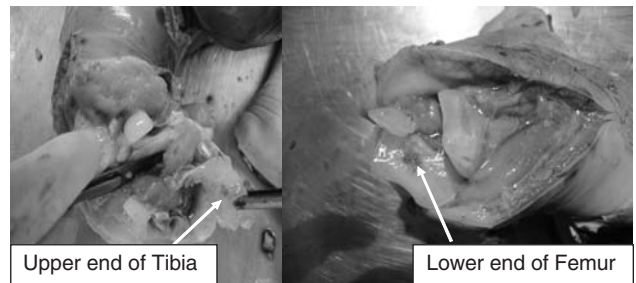


Fig. 2. Ossification centre of upper end of Tibia & lower end of Femur in foetus of 9 months gestational age.

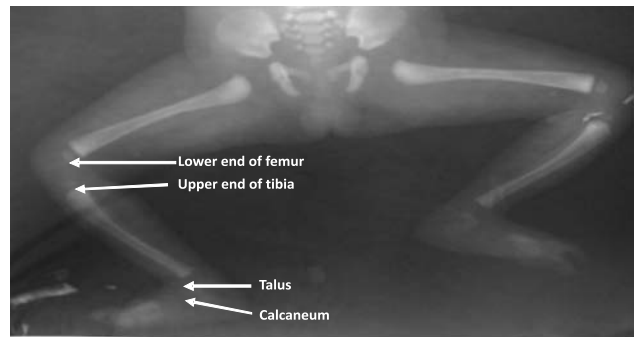


Fig. 3. Radiograph showing Ossification centres of Calcaneum, Talus, lower end of Femur and upper end of Tibia in foetus of 9 months gestational age.

2009, 100 fetuses were studied; of which 47 were male fetuses, 51 were female fetuses and 02 were non recognised foetus. All the data were scrutinised and observations were documented as follows.

Table 1. shows that on radiology, centre of ossification was first observed in calcaneum at 21 weeks and present in all cases from 27 weeks of gestational age. Ossification centre of Talus makes its presence by 23 weeks and then present in all cases from 28 weeks. Ossification centre for lower end of femur was first present at 32 weeks and then present in all cases from 34 weeks & upper end of tibia was first seen at 34 weeks in one case. Centre of ossification for cuboid was seen in one case at 38 weeks. The mean age of appearance of ossification centres in calcaneum, talus, lower end of femur, upper end of tibia and cuboid for male was 24, 27, 35, 35 and 38 and for female was 23.5, 25.5, 33 and 34 respectively. It was evident that appearance of ossification centres occurs earlier in female as compared to male.

Table 2. depicts the presence of ossification centres on autopsy at various gestational ages. The centre of ossification for calcaneum appeared at 20 weeks, while talus was first present at 26 weeks. Ossification centre for calcaneum was present in all cases from 23 weeks while talus from 30 weeks except in one case at

Table 1. Appearance of Ossification centres at particular gestational age on radiography.

G. A. (Wks)	Calcaneum			Talus			Cuboid			Lower end of Femur			Upper end of Tibia			TOTAL			
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	N	T
11- 20	0	0	00 %	0	0	00 %	0	0	00%	0	0	00%	0	0	00%	11	10	2	23
21	1	0	16.67 % (1)	0	0	00 %	0	0	00%	0	0	00%	0	0	00%	3	3	0	06
22	1	1	66.67 % (2)	0	0	00 %	0	0	00%	0	0	00%	0	0	00%	1	2	0	03
23	1	4	55.56 % (5)	0	1	11.11 % (1)	0	0	00%	0	0	00%	0	0	00%	5	4	0	09
24	1	1	66.67 % (2)	1	0	33.33 % (1)	0	0	00%	0	0	00%	0	0	00%	2	1	0	03
25	0	3	100 % (3)	0	2	66.67 % (2)	0	0	00%	0	0	00%	0	0	00%	0	3	0	03
26	3	2	71.43 % (5)	2	2	57.14 % (4)	0	0	00%	0	0	00%	0	0	00%	4	3	0	07
27	2	0	100 % (2)	1	0	50 % (1)	0	0	00%	0	0	00%	0	0	00%	2	0	0	02
28	2	5	100 % (7)	2	5	100 % (7)	0	0	00%	0	0	00%	0	0	00%	2	5	0	07
29	2	1	100 % (3)	2	1	100 % (3)	0	0	00%	0	0	00%	0	0	00%	2	1	0	03
30	3	5	100 % (8)	3	5	100 % (8)	0	0	00%	0	0	00%	0	0	00%	3	5	0	08
31	2	3	100 % (5)	2	3	100 % (5)	0	0	00%	0	0	00%	0	0	00%	2	3	0	05
32	2	3	100 % (5)	2	3	100 % (5)	0	0	00%	0	1	20 % (1)	0	0	00%	2	3	0	05
33	0	2	100 % (2)	0	2	100 % (2)	0	0	00%	0	1	50 % (1)	0	0	00%	0	2	0	02
34	0	2	100 % (2)	0	2	100 % (2)	0	0	00%	0	2	100 % (2)	0	1	50 % (1)	0	2	0	02
35	2	1	100 % (3)	2	1	100 % (3)	0	0	00%	2	1	100 % (3)	2	0	66.6 % (2)	2	1	0	03
36	4	1	100 % (5)	4	1	100 % (5)	0	0	00%	4	1	100 % (5)	3	0	60 % (3)	4	1	0	05
37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38	3	1	100 % (4)	3	1	100 % (4)	1	0	25 % (1)	3	1	100 % (4)	2	1	75 % (3)	3	1	0	04

Table 2. Presence of ossification centres and gestational age on autopsy. (n=44)

G. A. (Wks)	No. of cases in which ossification centres present on autopsy																		
	Calcaneum			Talus			Cuboid			Lower end of Femur			Upper end of Tibia			TOTAL			
M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	N	T	
11-19	0	0	00%	0	0	00%	0	0	00%	0	0	00%	0	0	00%	4	0	1	05
20	0	1	14.28 % (1)	0	0	00%	0	0	00%	0	0	00%	0	0	00%	4	3	0	07
21	0	1	20 % (1)	0	0	00%	0	0	00%	0	0	00%	0	0	00%	2	3	0	05
22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	4	2	100 % (6)	0	0	00%	0	0	00%	0	0	00%	0	0	00%	4	2	0	06
24-25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	4	3	100 % (7)	2	2	57.14 % (4)	0	0	00%	0	0	00%	0	0	00%	4	3	0	07
27	1	0	100 % (1)	0	0	00%	0	0	00%	0	0	00%	0	0	00%	1	0	0	01
28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29	1	2	100 % (3)	00	0	00%	0	0	00%	0	0	00%	0	0	00%	1	2	0	03
30	2	1	100 % (3)	2	1	100 % (3)	0	0	00%	0	0	00%	0	0	00%	2	1	0	03
31	1	1	100 % (2)	0	0	00%	0	0	00%	0	0	00%	0	0	00%	1	1	0	02
32	1	1	100 % (2)	1	1	100 % (2)	0	0	00%	0	0	00%	0	0	00%	1	1	0	02
33-37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38	2	1	100 % (3)	2	1	100 % (3)	1	1	66.67 % (2)	2	1	100 % (3)	2	1	100 % (3)	2	1	0	03
39-40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*G.A.-Gestational Age, Wks-Weeks, M-Male, F-Female, N- Non-recognized, T-Total

31 weeks. Centre for lower end of femur and upper end of tibia were present in all cases on 38 weeks. Ossification centre for cuboid was present in 66.67% at 38 weeks.

The range of appearance for calcaneum on autopsy was 20-21 weeks and its mean age was 20.5 weeks while on roentgenogram the range was 21-27 weeks and mean age was 24 weeks. On radiology and

autopsy, the range and mean age were same for Talus (29 weeks), Cuboid (>38 weeks) and both lower end of femur and upper end of tibia (38 weeks).

DISCUSSION

In this prospective radiological and autopsy study of the appearance of ossification centers in foetus, it was noted that the mean age for appearance of calcaneum lie down between 20.5 weeks to 24 weeks of gestational life; while for the talus it was 29 weeks & Cuboid at 38 weeks. Lower end of Femur appeared from 32 weeks and present in all cases after 34 weeks of gestational life. Upper end of Tibia appeared around the age of birth of foetus starting from the age of 34 weeks of gestational life.

These findings for appearance of ossification centers of calcaneum were consistent with the findings of Sheaff M.J et al⁶, Saphir O⁷ and Tchaperoff⁸. However the findings of present study were inconsistent with the findings of Goldstein I.⁹, Mukherjee J.B.¹⁰, Modi¹¹, Gordan I. et al.⁵, Drennan et al⁸. and Knight B¹².

Findings of current study for appearance of ossification centres of Talus were coincident with the findings of Stempfle¹³, Saphir O⁷ and Tchaperoff⁸, while they did not coincide with the findings of Goldstein I⁹, Sheaff M.J et al⁶, Mukherjee J.B.¹⁰, Modi¹¹, Gordan I. et al.⁵, Knight B¹² and Drennan et al⁸.

In case of Cuboid, results of present study were coincident with that of Chan W.F.¹⁴, Mukherjee J.B.¹⁰, Modi¹¹, Drennan et al⁸ and Adair et al⁸, on the other hand the findings are not similar to the findings of Gordan I. et al.⁵ and Knight B.¹²

Regarding the lower end of femur, the findings of current study matched well with the findings of Goldstein I.⁹, while they were inconsistent with the findings of Odita J.C.¹⁵, Christie A¹⁶, Chan W.F.¹⁴, Mahony B.S.¹⁷, Sheaff M.J et al⁶, Saphir O⁷, Tchaperoff⁸, Mukherjee J.B.¹⁰, Modi¹¹, Gordan I. et al.⁵, Drennan et al.⁸ and Adair et al.⁸

Findings of appearance of ossification centre for upper end of tibia were similar to results of other studies^{6, 7, 9-12, 14-16}.

Most of the findings of this study were consistent with the study of other authors, while some findings were deviating owing to the difference in amount of data and population, samples of study; genetic and environmental factors who affects foetal development

and interfere with the right age estimation related to the particular studied area.

CONCLUSION

In previous era, it was very difficult to assess the exact age of foetus but with the help of recent researches related with the time of appearance of various ossification centres, the age of foetus can be estimated with great accuracy. Therefore, when this applied to legal practice, it can be of a great importance to the investigating authorities to frame the charges and for the court to disburse the appropriate justice to the innocent dead foetus.

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Microcrystal Tests for the Detection of Alkaloids of *Datura Fastuosa* & Glycosides of *Nerium Odorum* and *Calotropis Gigantea*

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ABSTRACT

An attempt was done to detect the presence of different toxic principles (alkaloids and glycosides) from the toxic plant specimens i.e. *Datura fastuosa*, *Nerium odorum* and *Calotropis gigantea* using sensitive microcrystal tests. This study involved the extraction of toxic principles from the respective plant materials using Stass Otto method and further analysis & detection of the same using different reagents. In total 75 plant samples were collected. Microcrystal tests were performed on the slides. Crystallization products were examined microscopically. Rod shaped, Needle shaped, Globular shaped and Square shaped crystals were obtained with different reagents for the toxic principles of *Datura fastuosa*. & transparent rectangular crystals were obtained for *Nerium odorum* & Needle shaped, Octahedral shaped and Leaf shaped crystals were obtained for toxic principles of *Calotropis gigantea*. The results showed a significant difference between the average positive results of crystal formation of *Datura fastuosa* (13.33%), *Nerium odorum* (24.75%) *Calotropis gigantea* (15.23%) and the probability of detection between *Datura fastuosa* and *Nerium odorum* was $p < .01$, *Datura fastuosa* and *Calotropis gigantea* was $p > .01$. The results of this study give a scope for further research in the similar line to explore the potential detection methods like microcrystal test which is superior to the conventional color tests and economical to the other screening tests employed in forensic science laboratories.

Key words: Microcrystal Tests, *Calotropis Gigantea*, *Datura Fastuosa*, *Nerium Odorum*.

INTRODUCTION

Microcrystal tests are presumptive tests in which a substance is identified by the formation of characteristic crystals when a certain reagent is added. Usually, such tests are conducted using a microscope (microcrystal test). An example is the acetone-chlorhaemin test for blood. (A Dictionary of Chemistry. Sixth Edition, 2008.)

In the year 1891 Schuette did a study on the principal alkaloids contained in *Atropa Belladonna*, as atropine, hyoscyamine, hyoscine, and belladonnine, also atropamine, are substances which bear a close chemical relationship to one another, being partly

isomeric and capable of being transformed into one another, e. g., hyoscyamine into atropine. Atropine and hyoscyamine, both of the formula, $C_{17}H_{23}NO_3$, are capable of being resolved into the alkaloid tropine ($C_8H_{15}NO$) and tropic acid ($C_9H_{10}O_3$) by treatment with baryta-water, while hyoscine, under these conditions, is split into pseudotropine ($C_8H_{15}NO$), melting at $106^\circ C$. ($232.2^\circ F$.), and tropic acid. If in these processes concentrated hydrochloric acid is employed atropic acid ($C_9H_8O_2$) and its polymer, isotropic acid ($C_{18}H_{16}O_4$) are formed, besides tropic acid. These reactions were first established by Kraut, in 1863, and Lossen, in 1866, and the same subsequently studied in detail by Ladenburg and other investigators. Tropine was found to be a pyridine derivative, viz.:oxy-ethyl-methyl tetrahydropyridine ($C_5H_7N \cdot [C_2H_4OH] \cdot CH_3$). It is a strong, tertiary base, forming hygroscopic crystals, which melt at $62^\circ C$. ($143.6^\circ F$.) and boil at $229^\circ C$. ($445^\circ F$.)

In 1880 Ladenburg recognized tropic acid to be *A-phenyl-B-oxypropionic acid* ($CH_2OH \cdot CHC_6H_5 \cdot COOH$). It is soluble in alcohol and ether, to some

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extent in water, from which solvent it crystallizes in needles or plates, melting at from 117° to 118° C. (242.6° to 246.2° F.).

In the year 2003 Swiatko, J did the study on cocaine. The presence of cocaine in illicit drug samples is still being determined in some laboratories using spot tests and microcrystal tests. Seventeen chemical species were tested using three different spot tests (Wagner, Marquis, and cobalt thiocyanate followed by stannous chloride reactions) and two microcrystal tests (gold chloride and platinum chloride) to determine whether the results could be differentiated from the results of these tests on cocaine. The data obtained indicated that nine of the 17 compounds gave results similar to those from cocaine using the three spot tests, but that the results from microcrystal testing allowed for differentiation of all nine compounds from cocaine.

The most definite and certain identifications that can be readily made increases of this kind are with microcrystal tests. In the year 1961 Charles C. Fulton. did the study on identification of microcrystal test for certain drugs. The most definite and certain identifications that can be readily made in cases of this kind are with microcrystal tests. In the toxicologic work, a chromatographic band on paper is eluted with chloroform in the presence of a small volume of solution of borax and sodium sulfite. UV spectrophotometry and both color and microcrystal tests can then be used on the eluted residue. There is a wealth of crystal tests and a particularly good one can generally be found for nearly any drug, particularly a basic one. Unfortunately the simple methanol eluate of a sprayed TLC spot contains iodide from the spray, which interferes with most of the good color tests (the best are with concd. H₂SO₄ reagents), and with many of the crystal tests. Potassium ion from the spray and sodium ion from the plate itself may also interfere, but the iodide interference is the most serious. However, a considerable number of the best crystal-producing reagents already contain iodide, and these can be used with the simple methanol eluate. Some other crystal producing reagents, not reacting with the iodide, are also available. Quinine spots can be noted by fluorescence for elution without spraying. Volatility tests can be used for methamphetamine and numerous other volatile drugs. Tests are described here for the drugs mentioned in the title: these have been used successfully on eluted residues not merely with spots of "knows" but also with spots from urine sample. [Charles C. Fulton. 10 articles under "Chemical Microscopy" in The

Encyclopedia of Microscopy, edited by George L. Clark, Reinhold Publishing Corporation, 1961.]

OBJECTIVE

The objective of the present study was to detect the presence of different toxic principles like alkaloids and glycosides from the plant specimen i.e. *Datura fastuosa*, *Nerium odorum* and *Calatropis gigantea* using sensitive microcrystal tests. This study was focusing on the extraction of toxin principles from the respective plant materials and further analysis & detection of the same using different reagents. With this study an effort was made to standardize the detection methods of respective toxic principles from the plant specimen using the sensitive microcrystal tests and such generated data of method of detection could be used by the forensic scientists and toxicologists for the detection of the same toxic principles apart from using the conventional color tests and TLC and other instrumentation.

Sample Size

In total 75 samples of plant samples were collected i.e. Samples of seeds from 25 plants of *Datura fastuosa* species and samples of roots from 25 plants of *Nerium odorum* and samples of leaves from 25 plants of *calatropis gigantea* were collected.

Criteria for the collection of sample

- Only seeds of *Datura fastuosa* plant, only roots of *nerium odorum* and leaves of *calatropis gigantean* was considered.
- Samples from each species were collected from different plants.

MATERIAL

Reagents

Reagents used for microcrystal test

1. Frodhe's reagent: 500g ammonium molybdate in 100 ml of dist. water.
2. Gerard's reagent: 2gm of mercuric chloride in 100 ml of ethanol.
3. Picric acid 5g of picric acid in 100ml of dist. water.
4. Lead iodide 30gm of potassium acetate in 100 ml of dist. water and add lead iodide till saturation.
5. Potassium mercuric iodide: 1.5gm of mercuric oxide and 5g of potassium iodide in 100ml of dist. water.
6. Mercurous nitrite: Mercurous nitrite in 50ml of nitric acid till saturation.

Equipments & Apparatus

Binocular Microscope, Beakers, glass rod, funnel, separating funnel, slides,, wire guage, burner, micropipette, spatula, Petridish, cover slip, mortar and pistil etc.

METHODOLOGY

1. Extraction and purification of active constituent i.e., poison in matrices of interest.
2. Purification of active constituent thus separated.
3. Rapid Screening and Identification.

Extraction

Stas-Otto Method

Procedure

1. 50 gms of biological material was minced, mixed with plenty of rectified spirit (about 2-3 times the weight of material) in a flask and acidified with tartaric acid. The mixture was heated on the steam bath for 1-2 hours with thorough shakings at frequent intervals. The extraction was then allowed to proceed for about 24 hours with steam off. It was then filtered through a fluted filter paper. The filtrate is evaporated and the residue was again extracted with acidulated alcohol in the same way, filtered and washed several times with hot rectified spirit. The combined filtrates were evaporated in a porcelain basin on the steam bath to a syrupy consistency.
2. To the syrupy residue about 100 ml of rectified spirit was added very slowly with constant stirring so as to make the insoluble matter granular and not gummy. It was warmed with occasional stirring for about half an hour and filtered. This process was repeated once more and the combined alcoholic extracts were evaporated almost to dryness.
3. The residue was dissolved in about 50 ml of water acidulated with dilute sulphuric acid and filtered after about an hour. The poisons were thus dissolved out by the aqueous solution which was transferred to a separating funnel and extracted with a suitable solvent such as ether, chloroform

etc. in portions of about 25 ml. This step was done so that the solvent would take up from the acid solution, alkaloids & glycosides which has escaped initial treatments for purification.

4. The acid aqueous solution was then rendered alkaline with a solution of ammonia, for liberating the free base from its salt. The alkaline solution is now extracted with 25ml portions of chloroform in the same way as in the previous stage. This step was performed because the solvent would take up all the alkaloids and glycosides which were partially extracted from the acid solution. The extraction is repeated 2 or 3 times more.
5. The evaporated chloroform extract is purified by dissolving it in about 20 ml of water acidulated with Sulphuric acid and filtering through a small filter. The filtrate is extracted with chloroform, first in acid and then in alkaline medium as in the initial stages of extraction. These extracts are evaporated to dryness for analysis

Reagents used for the microcrystal tests

7. **Frodhe's reagent:** 500g ammonium molybdate in 100 ml of dist. water
8. **Gerard's reagent :** 2gm of mercuric chloride in 100 ml of ethanol
9. **Picric acid** 5g of picric acid in 100ml of dist .water.
10. **Lead iodide** 30gm of potassium acetate in 100 ml l of dist. water and add lead iodide till saturation .
11. **Potassium mercuric iodide** :1.5gm of mercuric oxide and 5g of potassium iodide in 100ml of dist. water
12. **Mercurous nitrite** :Mercurous nitrite in 50ml of nitric acid till saturation
13. **Vanillin reagent:** 50mg of vanillin in 2 or 3 drops of conc. Sulphuric acid.

Micro crystal test

Different slides were marked for different alkaloids and glycosides.

1. Two drops of respective alcoholic alkaloidal/ glycosidal residue were placed on the slide.
2. Respective reagents were added to the alkaloidal/ glycosidal sample.

Table 1. Percentage of crystal formation in experiments with different reagents for different extracts

S. No.	Name of the reagent	R1	%R1	R2	%R2	R3	%R3	R4	%R4	R5	%R5	R6	%R6	R7	%R7	Total No. of Positive Result	Average Percentage of Positive Results
1	Extract of Calatropis	10	40	0	0	16	64	0	0	10	40	17	68	0	0	53	30%
2	Extract of Datura	0	0	14	56	12	48	0	0	10	40	12	48	0	0	48	27.14%
3	Extract of Nerium	0	0	0	0	0	0	0	0	0	0	0	0	19	76	19	10%

3. Slides were kept for 15 min for crystallization to occur.
4. The crystallization product were examined under microscope.

Table 2. Difference between percentage of positive results

S.No.	Name of the reagent	Average percentage of positive results	Difference b/w %age	Difference b/w %age	Mean	Standard deviation
1	Extract of Calotropis	30	3.81(1-2)	26.66(1-3)	15.23	16.15
2	Extract of Datura	27.14	3.81(2-1)	22.85(2-3)	13.33	13.46
3	Extract of Nerium	10	26.66(3-1)	22.85(3-2)	24.75	2.64

Table 3. Mean, Standard deviation, t-value & p-value of difference between percentage of positive results

Plant extracts experimented	Mean	Standard deviation	t-value	p-value
1. (a) Extract of Calotropis gigantea/Datura fastuosa (b)Extract of Datura fastuosa/ Nerium odorum	15.23	16.15	0.46	>.01
2. (a) Extract of Datura fastuosa/Calotropis gigantea (b) Extract of Datura fastuosa/ Nerium odorum	13.33	13.46	4.14	<.01

Microcrystals formed after reaction of different alkaloids & glycosides with different reagents



Fig. 1. Octahedral shaped crystals (*Calotropis gigantea*)

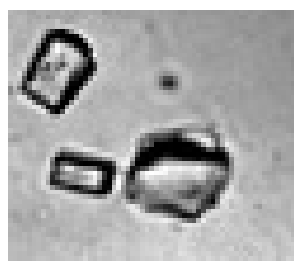


Fig. 2. Square shaped crystals. (*Datura fastuosa*).

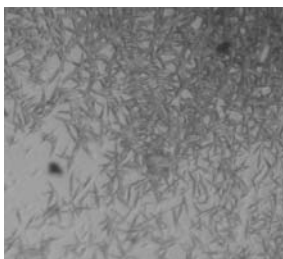


Fig. 3. Needle shaped crystals (*Calotropis gigantea*)

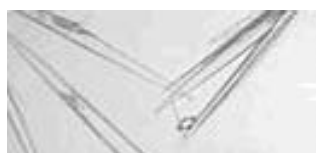


Fig. 4. Needle shaped crystals (*Datura fastuosa*).



Fig. 5. Rod shaped crystals (*Calotropis Gigantea*)

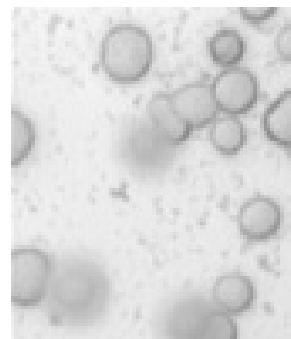


Fig. 6. Globular shaped crystals (*Datura fastuosa*).



Fig. 7. Hexagonal shaped crystals (*Calotropis gigantea*)

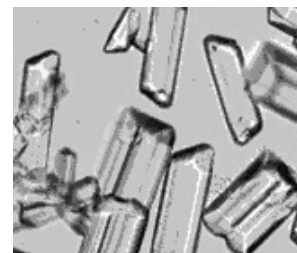


Fig. 8. Rectangular shaped crystals (*Nerium odorum*)

RESULTS

Extract of *Datura fastuosa* with Gerard’s reagent : Rod shaped crystals were appeared showing positive result in 14 out of 25 trials i.e. 56 %; with Picric acid :Needle shaped crystals were appeared. showing positive result in 12 Out of 25 trials i.e. 48%. with Lead iodide :It showed no positive result. :with Potassium mercuric iodide :Square shaped crystals were appeared showing positive result in 10.out of 25 trials i.e. 40%; with mercurous nitrite iodide :globular shaped crystals were appeared showing positive result in 12. out of 25 trials i.e. 28%.

Extract of *Calotropis gigantea* with Frodhe’s reagent:rod shaped crystals were appeared. showing positive result in 10 out of 25 trials i.e. 40%; with Picric acid:needle shaped crystals were appeared showing positive result. in 16 Out of 25 trials i.e. 64% results.;with Lead iodide :It showed no positive result.; with Potassium mercuric iodide :octahedral shaped crystals were appeared showing positive result in 10.out of 25 trials i.e. 40%; with mercurous nitrite iodide :leaf shaped crystals were appeared showing positive result in 17out of 25 trials i.e. 68%.

Extract of *Nerium odorum* showed no positive result with Picric acid, Lead iodide, Potassium mercuric iodide, mercurous nitrite iodide and with vanillin: Transparent rectangular shaped crystals were appeared showing positive results in 19 out of 25 i.e. 76% . The results showed a significant difference between the average positive results of crystal formation of *Datura fastuosa* (13.33%), *Nerium odorum* (24.75%) *Calotropis gigantea* (15.23%) and the probability of detection between *Datura fastuosa* and *Nerium odorum* was $p < .01$, *Datura fastuosa* and *Calotropis gigantea* was $p > .01$

CONCLUSION

Although most of the forensic laboratories are employing preliminary screening test like color test and TLC's and also confirmatory test using instrumentation, there is a need for the rapid and economical screening methods like microcrystal tests for toxic principles of forensic significance i.e. the alkaloids & glycosides of plant species like *Datura fastuosa*, *Calotropis gigantea*, *Nerium Odorum*. Presently, toxic principle identification is based on derivative formation of a special kind. of precipitates which are obtained and have reproducible and readily recognizable crystal habits; characteristic of the particular toxin. Experience has shown that the product resulting from the reaction of toxin and reagent is distinctive and readily formed . Usually, in fact, mere inspection under the ordinary microscope is quite satisfactory - when the crystals are truly characteristic - but the polarizing microscope is often useful, and data of optical crystallography can be used, not only on crystalline derivatives, but also on the original salt. The present study has given promising results using Microcrystal test for the detection of alkaloids and Glycosides *Datura fastuosa*, *Calotropis gigantea*, & *Nerium Odorum* using different reagents and the present study give a scope for further research in the similar line to explore the potential detection methods like microcrystal test which is superior to conventional color test employing forensic science laboratory for the detection & the same will be helpful for forensic toxicologist & forensic scientist under researchers to adopt such methods.

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Using Taser Gun on Patients: A Critical Review

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ABSTRACT

Taser is a variant of stun gun that is mainly used by the law authorities to control violent or escaping criminals. A Taser is an electroshock weapon which uses electrical current to disrupt voluntary control of muscles. Considering its utility, some psychiatric hospitals are planning to use them in their emergency departments for better handling of volatile situations in which the patient is dangerous to handle. In this paper we have attempted to review the advantages and disadvantages of introduction of Taser guns in hospitals. This paper will discuss the various medical, ethical, legal and social aspects of Taser use in medical care. In the end some guidelines and recommendations for its use in hospitals on the psychiatric patients and the management of tasered subjects is also suggested.

Key words: Taser, Electroshock Weapon, EMD (Electro Muscular Disruption), Neuromuscular Incapacitation, Sensory and Motor Nerves.

INTRODUCTION

Psychiatric patients can sometimes turn physically dangerous, thus posing a risk to the security of doctors and other medical staff dealing with such unruly patients. In such situations, a very fine balance is to be maintained between the safety of doctors and other medical staff dealing with such violent psychiatric patients and the ethical rights of the patient. The Taser gun which is recently introduced in India for law enforcement is now also being considered for controlling violent or unruly patients in hospitals.

Taser is a non lethal electroshock weapon which causes a brief neuromuscular incapacitation when used. They were initially introduced in India, to be used by the police for the purpose of law enforcement to control violent mobs or escaping criminals¹. Seeing its utility, the hospitals are planning to them in the psychiatric hospitals for controlling psychotic, violent, dangerous combative introduce patients

Taser was developed by Jack Cover a NASA scientist & is an acronym for a fictional weapon. A Taser is an electroshock weapon which uses electric current to disrupt voluntary control of muscles. The effect is

“neuromuscular incapacitation” and the device works on the mechanism of “Electro-Muscular Disruption (EMD) technology”². A person struck by a Taser experiences stimulation of his sensory and motor nerves, resulting in strong involuntary muscle contractions.

A single 5 s Taser shot releases two probes, which carry muscle-locking electric pulses into the target, creating neuromuscular incapacitation. The incapacitation is immediate and unavoidable. Once the electricity flow stops, the subject immediately regains control of his body. The maximum range is about 35 feet.

Effects of use of Taser Gun

Generalized effects- Usually a five second exposure is given with one shot. There is no loss of consciousness during or after shock. But secondary injuries may occur due to fall after the use of weapon. The sharp metal probes may cause puncture wounds in the skin. However, they may cause severe injury on striking the eyes, genitals, superficial blood vessels etc.^{3,4,5}

Cardiac Effects: The Taser produces a current of 0.36 - 1.76 joules per pulse. This is generally not expected to affect cardiac conduction. No dysrhythmias have been reported in small studies of healthy volunteers, though cardiac dysfunction could occur in cases of people on pacemakers, mentally ill, drug abusers, epilepsy patients etc.^{6,7,8}

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Physiological Effects: The Systolic blood pressure decreased while Diastolic blood pressures, heart rate, calcium, sodium, potassium, bicarbonate and lactate levels and blood pH changed slightly after a 5 second Taser exposure.⁶ The VE, RR, and TV were mildly elevated for a brief period; there was no metabolic acidosis induced hyperventilation⁷. The heart rhythm before, during & after Taser exposure showed no adverse cardiac effects or rhythm changes.^{9,10}

Legal Issues: Tasers are illegal or subject to legal restrictions on their availability and use in many jurisdictions. The proposed TASER use policy for the Indian Police Department would allow for the use of the Taser against an individual only if that person is actively resisting arrest or in circumstances where deadly force is authorized. Though use of tasers for personal security or self defense is legal in many countries, in India it is illegal to carry a Taser for personal use¹⁹.

Ethical Aspects: Taser should never be used on children, pregnant females, elderly, and heart patients having pacemaker, drug abusers, and routine mentally ill people. This is to avoid likelihood of injury and death.¹¹ The staff using a Taser gun should be properly trained in ethical use of force based on the scenario. The purpose of Taser is to subdue violent and dangerous individuals. It should never be used solely for the purpose of inflicting punishment or pain. Taser should only be used on dangerous individuals and never on those who are passively resisting arrest¹². Various philanthropic societies like Amnesty International consider Taser as a form of torture, causing extreme pain and sometimes severe injury or even death of the person struck by Taser.¹³

Social Aspects: Taser are guns are being used or overused in various developed nations throughout the world. As far as Indian society is concerned, they may not like the idea of being tasered. If some incident of injury or death occurs due to Taser use, this may lead to further protests by the Human Rights Activists, against the use of Taser. Besides, the law authorities should also be prepared for dealing with the compensation claims resulting from any accidental injury by the use this controversial gun.

The use of Taser guns in hospitals is debatable. Though many a times psychiatric patients are unruly, disturbed, noncompliant, and sometimes may turn dangerous, but they are not criminals and they shouldn't be getting the same treatment as criminals¹³. It may seem that use of Taser is excessive and unnecessary; especially when a person is experiencing

emotional crisis¹⁴. But at the same time we cannot ignore the fact that people with mental illnesses are likely to attack when they are armed¹⁵. Thus use of Taser is permissible when people with mental sickness are armed¹⁶. It's better to be proactive in hospitals where acts of violence occur so frequently. This will surely reduce the number of injuries relating to violent people on hospital premises.¹⁷

Guidelines for using Taser guns in Healthcare facilities^{20,21}

1. Hospital must have at least one certified trained staff expert in use of Taser. The same can function as instructor for the same.
2. Taser instructor will work with hospital securities and hospital administrators to formulate best policies and guidelines for Taser use in their hospital.
3. Proper training of staff to identify potentially violent patients and make appropriate decisions about vulnerable situations.
4. Taser guns should never used near inflammable substances (petrol, diesel, explosives, gasoline vapor etc) as Taser is electronic conductive devices.
5. There should be close monitoring and review of all Taser deployments.
6. Taser should be used only as the last resort to protect the patients, employees and visitors.
7. Taser should be used only in those conditions when there is significant risk of the patient hurting himself or others around him.
8. The shot of Taser should never be aimed near the chest area, eyes, ears, genitals.
9. After care of a tasered person- probes that have entered the sensitive parts should be removed under strict medical supervision. There should be protective gloves, probes container, alcohol swabs and adhesive plaster in Taser after care kit.
10. Immediate first aid attention should be given to the risk group which includes cardiac patients with pacemakers, alcohol intoxicated, drug abuser, pregnant female if pregnancy was not known previously, patients with low BMI, or a person who has received multiple shots, patient having a cochlear implant, or patient showing symptoms of excited delirium.
11. Special medical attention should be given if the patient doesn't recover within reasonable time, complains of excited delirium, difficulty in breathing, or if the probes have pierced the eyes, ears, tongue, lips, genitals, and breasts.
12. The probes should be removed by a trained medical person. Ensure that the probes have been completely removed and no part remains embedded in the subject's body.

13. After removing the probes, the contact site should be wiped with alcohol wipes and covered with a adhesive tape.

DISCUSSION

Introduction of new technology in India is a matter of debate. Taser gun is just one example among others. Many questions arise while using newer techniques in India. Acceptability depends on its outcome as well as social acceptance. One of the main aims of psychiatric hospitals is to control the violent patients. Use of Taser can be a better alternative to achieve this goal. While Taser provides an effective way to control or subdue a violent mentally ill patient, it does interfere with the ethical rights of the mentally ill. A new weapon to be effective is to be well accepted socially also. The political intervention in use of newer techniques is also to be kept in mind. Taser gun is a medically good technique as it causes temporary incapacitation of the culprits with minimum effects on the body. Legally the Taser gun cannot be given in public hands as they can misuse it. However properly trained staff can be authorized to use it. Ethically Taser can be used with some exceptions. Socially it may be not acceptable by the general public as is the case with other weapons also.

CONCLUSION

Thus we can say that introduction of Taser gun has got minimum medical dangers, least legal problems, ethically acceptable and socially sound. By using a Taser a dangerous and violent patient or violence could be controlled, thus preventing any injury or harm to hospital staff, innocent patients, or themselves. This reinforces the value of Taser as a useful tool to make the patient care safer and to resolve potentially violent situations effectively and rapidly. To conclude we can say that Taser is a proportionate, low risk means of resolving incidents where the hospital staff including doctors, face severe violence or the threat of such violence which cannot safely be dealt with by other means.

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Fatal Childhood Injuries in Shimla Hills

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ABSTRACT

Childhood injuries has been a neglected issue so far even though injury and violence are a major killer of children throughout the world. Due to paucity of data on child hood injuries from our country it becomes difficult to establish a baseline of such injuries so that preventive interventions can be instituted at the right time and the right place. Availability of such data can therefore significantly play an important in reducing mortality and morbidity of children due to fatal and non fatal childhood injuries.

Key words: *Fatal Childhood Injuries, Homicidal Injuries, Violence.*

INTRODUCTION

Child injuries are a major public health issue. Injury and violence is a major killer of children throughout the world. Unintentional injuries account for almost 90% of these injuries and they are among the top three causes of death among children aged 5-19 years. According to WHO UNICEF 2004 Report-RTA accounts for-720 death/day, drowning-480death/ day, burns -260death/day, falls -130 death/day and poisoning-125 death/day amongst children¹.

Globally, around 950 000 children under the age of 18 years die due to injury and violence each year². Injury is a major cause of death in children over one year of age in the South-East Asia (SEA) Region. In 2004, the Region had the second highest rate of unintentional child injuries (49/100 000 children per year) globally, following the African Region. In the South-East Asia Region, road traffic injuries, drowning, burns and self-inflicted injuries are the leading causes of death among children³.

Injuries disproportionately affect the poor. About 95% of all global child deaths from injury occur in low- and middle-income countries. Children over one year are most vulnerable to injuries. In general, boys are far more likely to get injured than girls.

However, burns are the only type of fatal injury that occur more frequently among girls than boys in South-East Asia and in low- and middle-income countries in the Eastern Mediterranean and Western Pacific Regions.

In India, injuries are the second leading cause of death in 5-14 year-old children and fourth leading cause of death in children under 15 years old⁴.

AIMS AND OBJECTIVES

- a) To ascertain the various aspects of unnatural deaths,
- b) To find remedial measures to bring down the incidence

MATERIAL AND METHODS

The present retrospective observational study was carried out in the Department of Forensic Medicine, IGMC Shimla. Records of all the autopsies conducted in the Department of Forensic Medicine from the months of June to December during the years 2000 & 2008 were procured and closely scrutinised. Records of autopsies conducted on children aged 0-18 years during these 2 years were segregated and the detailed data of these cases was collected and analysed. The results obtained there of for these two years were then compared and tabulated.

OBSERVATIONS

In the year 2000 out of total 197 autopsies conducted in the Department of Forensic Medicine from the months of June to December 13(6.59%) were cases of fatal childhood injuries. In the year 2008 out of total 211 autopsies conducted in the Department of Forensic Medicine from the months of June to December 20(9.5%) were cases of fatal childhood injuries.

Age distribution of cases in Year 2000

Sex	Mean age in years	Total No.	S.D
Male child	12.17	6	8.28
Female child	8.17	6	7.25
Total	9.38	13	7.90

Age Distribution of cases in Year 2008

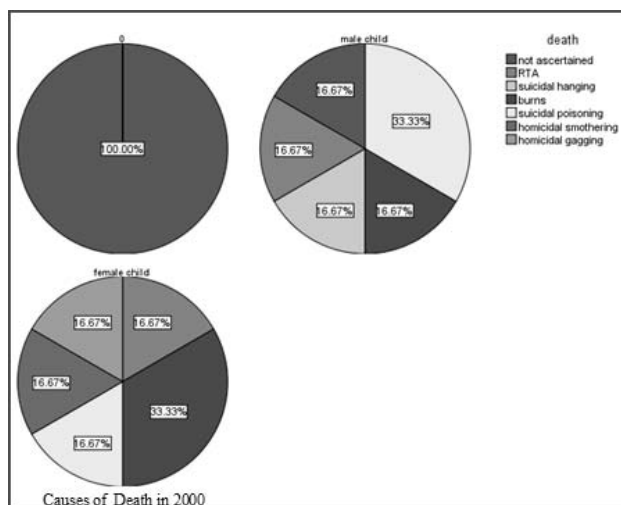
Sex	Mean age in years	Total No.	S.D
Male child	4.62	13	4.68
Female child	6.14	7	6.23
Total	5.15	20	5.16

Causes of death in cases in year 2000

	death	N	% of Total N
0	not ascertained	1	7.7%
	Total	1	7.7%
male child	not ascertained	1	7.7%
	RTA	1	7.7%
	suicidal hanging	1	7.7%
	burns	1	7.7%
	suicidal poisoning	2	15.4%
	Total	6	46.2%
	female child	RTA	1
	burns	2	15.4%
	suicidal poisoning	1	7.7%
	homicidal smothering	1	7.7%
	homicidal gagging	1	7.7%
	Total	6	46.2%
Total	not ascertained	2	15.4%
	RTA	2	15.4%
	suicidal hanging	1	7.7%
	burns	3	23.1%
	suicidal poisoning	3	23.1%
	homicidal smothering	1	7.7%
	homicidal gagging	1	7.7%
	Total	13	100.0%

Causes of death in children in year 2008

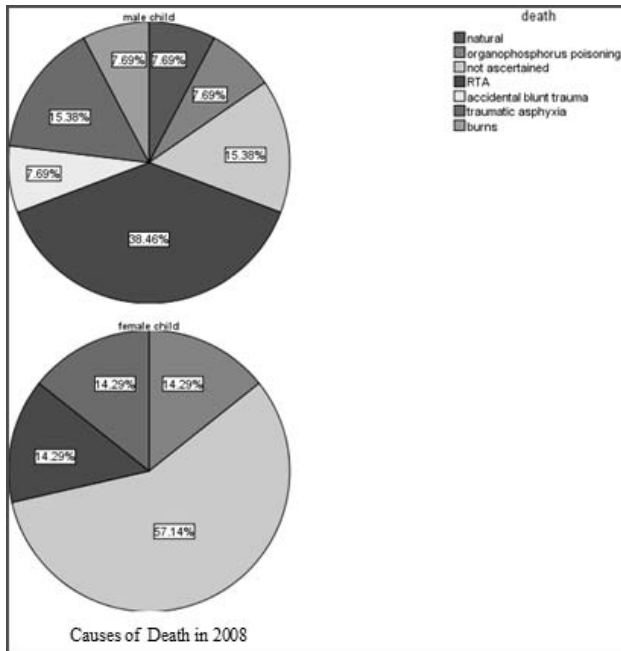
	death	N	% of Total N
male child	natural	1	5.0%
	organophosphorus poisoning	1	5.0%
	not ascertained	2	10.0%
	RTA	5	25.0%
	accidental blunt trauma	1	5.0%
	traumatic asphyxia	2	10.0%
	burns	1	5.0%
	Total	13	65.0%
female child	organophosphorus poisoning	1	5.0%
	not ascertained	4	20.0%
	RTA	1	5.0%
	traumatic asphyxia	1	5.0%
	Total	7	35.0%
Total	natural	1	5.0%
	organophosphorus poisoning	2	10.0%
	not ascertained	6	30.0%
	RTA	6	30.0%
	accidental blunt trauma	1	5.0%
	traumatic asphyxia	3	15.0%
	burns	1	5.0%
	Total	20	100.0%



Approaches

There is a need for multisectoral and multipronged approaches to prevent child injuries. High-income countries have been able to reduce child injury deaths by up to 50% over the past three decades⁵. The following approaches are recommended to prevent such casualties-

1. There is a need for focusing on strict legislation, regulation and enforcement.
2. There should be a provision for supportive home visits.
3. There is a dire need of modification of the environment.
4. We should ensure promotion of the use of safety devices such as safety belts and helmets along with product modification, especially standardizing helmets.
5. Develop strategies for education, life skills development and behavioral change.
6. Community-based projects for further research on this topic.
7. We have to ensure pre-hospital care, acute trauma



care and rehabilitation that reach rural communities.

- Further research is required to examine the epidemiology of injuries, effectiveness and cost-effective interventions.

CONCLUSIONS

Research on child injuries is too limited. Most countries around the world have limited human

resources to prevent the epidemic of child injuries and provide care and rehabilitation services for those injured. This problem is particularly acute in low-income countries where the burden of child injury is the greatest. Reductions in child injury mortality have been achieved in some countries as a result of the application of evidence-based programmes based on rigorous research and priority-setting. Research into the whole spectrum of child injuries – from primary prevention through to rehabilitation – needs much higher levels of funding. Such research will not only benefit developing countries enormously, but has the potential to uncover solutions not yet found in high-income countries.

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Acute Myocardial Infarction – An Extremely Rare Complication of Krait Bite

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ABSTRACT

The clinical picture following snake bite is usually characterized by local tissue reaction, haemorrhagic manifestations, respiratory muscle paralysis and nephrotoxicity. Cardiac involvement is extremely rare. There are few case reports of acute myocardial infarction (MI) following snake bite.^{1,2,3} We present here a case of anteroseptal with lateral wall myocardial infarction following Krait bite.

Key words: Neuroparalytic Snake Bite, Myocardial Infarction, Extremely Rare.

INTRODUCTION

Local and systemic complications of snake bite have long been well known. These include local tissue necrosis, haemolysis and haemorrhagic complications, nephrotoxicity, respiratory muscle paralysis and coagulation abnormalities. Acute myocardial infarction caused by snakebite has rarely been reported. Here we report a case of a 27 year old male who suffered from acute anteroseptal with lateral wall STEMI after 3 days of bite by a Krait, where thrombolysis had been done successfully. The diagnosis of myocardial infarction was confirmed by a typical history of retrosternal chest pain, characteristic electrocardiographic changes, and elevated serum creatinine phosphokinase (CPK-MB) & Troponin I. The patient had no risk factors for coronary artery disease.

CASE REPORT

A 27-year-old healthy male farmer was bitten on the left middle finger by a snake (Krait- as witnessed by the patient and his relatives) while working in his farm. A tourniquet had been applied immediately by his relatives on his left wrist and he was shifted to cottage hospital for further treatment .Within two hours of snake-bite, the patient started having difficulty in breathing & he developed bilateral ptosis. He was given first aid in cottage hospital along with prophylaxis against tetanus & then he was immediately referred to Krishna Hospital for further management.

On admission, the patient was alert, conscious and well-oriented. His blood pressure was 120/70mm Hg,

and his heart rate was 92/ minute. On examination, two fang marks were present on the left middle finger. He had bilateral ptosis, single breath count was 12, respiratory rate was 28 cycles/min. except for these, there was no other neurodeficit. All laboratory reports were within normal limits including bleeding time, clotting time and prothrombin time .Patient received lyophilized polyvalent antisnake venom 150 U in 150 ml of normal saline transfused slowly over one hour. Three cycles of injectable atropine(0.6mg) along with neostigmine(0.5mg) was given at an interval of 15 minutes. He didn't require mechanical ventilatory support.

On the third day, the patient complained of severe retrosternal chest pain associated with nausea and vomiting. The electrocardiogram (ECG) done immediately showed a pattern of acute antero-septal with lateral wall myocardial infarction. The chest pain lasted for approximately 40 minutes and was not responding to coronary vasodilators. Meanwhile, Troponin-I level was assessed which turned out to be positive. Patient was thrombolysed immediately with streptokinase 1.5 Million Units diluted in 100 ml of NS and transfused over 45 mins. He was put on nitrates, ACE inhibitor, antiplatelets, statins and supportive care. The patient's condition was thereafter stable. On the 9th day, he was discharged in a haemodynamically stable condition.

DISCUSSION

The point made by Harvey needs to be re-emphasised⁴: neurotoxicity with envenomation by snakes is a medical emergency that must be managed

by elective intubation and ventilation if necessary.

Chest pain was documented with elapid bites in 2 out of 7 cases reported by Blaylock⁵ and in a medical college treated by Saunders.⁶

Myocardial infarction has been described only with bites by the viper^{7,8,9} and the adder,^{10,11} the basis in these instances being a tissue toxin, directly affecting the myocardium.

Rare aetiological causes of myocardial infarction such as snakebite can cause disseminated intravascular coagulation with thrombotic occlusion^{12,13,14} in previously normal mid-sized coronary arteries.¹⁵ Some snake venom may also contain endothelins or sarafotoxins that have coronary vasoconstrictor effects.¹⁶

Acute coronary syndromes have been reported with Viper bite. ECG changes secondary to myocarditis are common with sea snake bites. The characteristic ECG changes of myocardial infarction, typical ischaemic progression with time and also Echocardiography are what are confirmatory. The gold standard would obviously be a coronary angiogram apart from cardiac markers like troponin levels.

Acute coronary syndromes have been reported following snake bite in a very small number in literature. But our case of neuroparalytic snake bite with antero-septal & lateral wall STEMI (thrombolysed) is the only case reported so far.

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An Unusual form of Complex Suicide — Case Report

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ABSTRACT

Suicidal deaths are not uncommon in India due to variety of reasons. To accomplish the suicide successfully a suicide may attempt more than one method depending upon the situation and the plan of the suicide. Cases with multiple simultaneous suicidal attempts (two or more) are known as complex suicides^{1,2}. Handful of literature is available regarding the complex suicides. Here we present a case of complex suicide completed by a common method (hanging) with a variant course.

Key words: Complex Suicide, Hesitation Cuts, Hanging, Suicide.

CASE REPORT

A 38 year old, 5.3 feet length female (homemaker), suffering from secondary depression was found dead in a kneeling position (Fig. 1) with a ligature around her neck by around 10a.m. The material used was a sari as it is easily available. As usual, forensic experts had not been called to the scene of death by the investigating authority (they are rarely being called upon in India). With the help of the other source our team visited scene of death by around 11.15a.m. The house had only one entrance that was opened by breaking the door which had been locked from inside (Fig. 2). The lady was found hanging in a kneeling position from the hook of the ceiling. The height of the hook from the floor was 10 feet. A soft ligature material had encircled her neck with the help of running knoose and knot on the right occipital region. Behind the body a wooden stool of height 1.2 feet was present. The head was tilted to her left side with salivary dribbling on left angle of the mouth and her face was congested. Kitchen doesn't show any sign of cooking and the gas cylinder valve was locked. The body was released and preliminary examination was done. Rigor mortis was established on the upper part of the body, with marbled livor mortis on the hands. Multiple superficial, parallel, linear cuts (Fig. 3) were present on the flexor aspects of the left forearm and 2 such kind of cuts on right forearm which were skin

deep. During the autopsy we found similar cuts over the left inner aspect of the leg over the tibia (Fig. 4) which were filled with minute clots apart from the typical ligature mark around the neck. The classical signs of asphyxia, so called obsolete these days were present without fracture of the neck structure. Thorough search was made to find out the weapon but we couldn't retrieve it. As per the police the LPG



Fig. 1. Scene of occurrence with victim in kneeling position.

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Fig. 2. The door was broke open from outside.



Fig. 3. Multiple, superficial & parallel cuts on the left forearm.



Fig. 4. Multiple, superficial & parallel cuts on the left leg.

gas cylinder valve was kept open when they entered the house by breaking open the door but there wasn't any peculiar smell.

DISCUSSION

Complex suicide have been reported in 1.5 -5% of the medicolegal autopsies². In complex suicides, two or more methods are applied either simultaneously or one after the other. This may be divided into planned and unplanned complex suicide. In the first group, two or more methods are applied simultaneously in order to make sure that death will occur even if one method fails. In unplanned complex suicides, the mode of

performance is changed after the first method failed or was too slow or proved to be painful³. The fatalities due to planned complex suicide are rare. When a complex method was used by victim, differentiation between suicide and homicide is sometimes difficult, and a risk of misinterpretation always exists in such cases. Hanging is the most commonly used method to accomplish and almost all were suffering from psychiatric illness⁴.

A rare case of planned complex suicide by penetrating captive-bolt gunshot followed by hanging has also been reported by Viel G and colleagues⁵. Self-poisoning has a lower case fatality rate than other methods such as hanging and use of firearms as reported by Stark C and colleagues⁶.

In our case manner of death was confusing initially regarding the point of suspension and accessibility, the possibility of operating the inter lock from either side, the time of death and opened LPG gas valves. As already mentioned the distance between the hook and the floor was 10 feet and the person height was 5.3ft. The only aid she had was a wooden stool with the height of 1.2 feet alongside the body. When we interrogated the police nothing was fruitfully, ultimately the scene of death photograph taken before we reached the scene revealed a ladder in front of the deceased (Fig. 5). The husband of the deceased told that as it is a "Diwali" (festival) season I had to stay at my shop overnight. It is true that in India Diwali is a one of the few festivals which is being celebrated grandly.

He further added that they got married 7 years back and couldn't beget a child because of which she was depressed in the recent past and when we asked about the gas he said it got emptied and were waiting for the next cylinder. The first method the person tried could be the LPG gas and asphyxiation (though it was empty) followed by suicidal cuts across the limbs and accomplished with hanging. Though the cylinder was empty the possibility of attempted suicide by this means can't be ruled out as the person who is suffering from depression most of the time absent mindedly, forgets the routine things.

The finding which is consistent with suicidality is the presence of hesitation cuts^{2,3,7} without any deep ones in an accessible body parts that too without damaging the cloths. Here the interesting thing is presence of cut marks in the leg. It's unusual to find multiple cuts over here and it reflects the poor anatomical knowledge of the victim. One study reports the association of LPG gas and asphyxiation used as



Fig. 5. Photograph of scene of occurrence taken immediately after breaking open the door (by the police).

first method. In a multicentre study conducted in England about suicidal hanging, seven individuals (4.3%) had engaged in simultaneous self-poisoning⁸.

Among the complex suicides reported in the literature the most common method by which a person accomplishes the process is by hanging as in our case and also the suicidal cuts. In a study conducted in Northern Ireland out of 110 cases of hanging 5 bore recent incisions on or both upper limbs, invariably between the elbow and wrist. They were all superficial and did not endanger life of the person⁹.

Hanging is a frequently used method of suicide in many countries. Hanging is a particularly lethal method of suicide with an estimated fatality rate of

over 70%. In contrast to overdose there is little opportunity to change one's mind as death generally occurs rapidly after suspension,¹⁰ which is seen in our case also.

CONCLUSION

Studies about complex suicides are rarely published in the literature though short reports are getting published occasionally. This depicts the rarity of this kind of case in medicolegal practice. This report warrants the importance of scene of death investigation by a forensic expert before it gets altered by the public or investigating authority.

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Study of Anatomy of Abstracts of Original Articles Published in Indian Journals of Surgical Origin

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ABSTRACT

Background and Objectives: Abstract of any biomedical publication summarises the information provided in the article and may be the only substantive portion of the article available in many electronic databases. This study was conducted to assess the reporting patterns of abstracts in selected medical journals of India related with surgical field. It examined the anatomy of abstracts of original articles of selected journals (structured or nonstructured and if structured which format) .Though some studies have been conducted on this topic abroad but this is a unique attempt in our country.

Methods: Five peer reviewed journals of surgical origin were selected at random. The study included 386 abstracts of original articles from 2005-2009. The web sites of all the journals in the study provided the input.

Results: Out of 386 of total abstracts 311 were structured and 75 were nonstructured. Out of 5 journals selected for study 4 gave special instructions for formatting of abstracts under different subheadings and one of them though requested for structured abstract, but was silent on the issue of formatting. Out of 311 structured abstracts 4 subheadings abstracts were 213(68.48%).

Interpretation and Conclusions: From the study it was clear that till date the editors of these peer reviewed journals, though agreed on structured abstracts, and were not particular as far as formatting of abstracts of original articles were concerned. Abstracts with four subheadings were most popular among the authors and editors as well. It was clear from this study that there was need to standardize and improve the formatting of structured abstracts. As far as the quality and accuracy of abstracts was concerned, it was beyond the scope of this study.

Key words: *Anatomy of Abstracts, Structured Abstracts, Original Articles.*

INTRODUCTION

An abstract is a formal and compact summary of an article's main body and the most commonly read components and also available in data base for research purpose. Authors and peer reviewers should analyze the abstract contents closely to ensure that the abstract accurately represents the full-text article¹. Abstracts are an advertisement for the research described and they can have a major impact on successful publication.² Abstracts are almost always the initial decision point that an editor uses to further consider

submitted papers³. Likewise, abstracts also provide the first impression of the value of the work for reviewers and can influence the outcome of the review process. A well-written abstract will present a rationale for why the study was performed, a summary of the methods used, data that support the main message, and conclusions that do not extend beyond the findings⁴. The abstract has increasingly become a crucial source of information for the busy physician accessing the medical literature⁵.

MATERIAL AND METHODS

Five peer reviewed Indian journals of surgical origin were taken up for study. The journals were accessed online. The period of study was from 2005-2009. The journals were -

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Indian Journal of Surgery [IJS]^{6,7}

Journal of Minimal Access Surgery [JAMS]⁸

Indian Journal of Urology [IJU]⁹

Journal of Indian Association of Paediatric Surgery [JIAPS]¹⁰

Indian Journal of Plastic Surgery [IJPS]¹¹

Only the articles published under original category were selected for the study. The abstracts of all the original articles were downloaded and analysed. The instructions given to the authors on the website of respective journals for preparation of abstracts of original articles were studied in relation to its compliance as far as structuring and formatting of abstracts were concerned. The controversy of publication of the articles under original category has not been explored, as this was beyond the objective of this study.

The reasons for selecting only abstracts of original articles were:

- a. Most biomedical articles are categorised as original research.
- b. Original research articles are important sources of new knowledge for health professionals.
- c. Lots of work has been done in developing guidelines for evaluation of abstracts of original research articles.

RESULT

Out of the 386 abstracts studied 311(80.57%) were structured and 75 were nonstructured (19.43%). The maximum percentage of nonstructured abstracts were found in Indian Journal of Paediatric Surgery (64%). The Indian Journal of Surgery was the only one in which all published abstracts were structured (Table 1). As far as formatting of abstracts were concerned IJU, IJS and JIAPS gave instructions for four subheadings and IJPS for 7 subheadings. JMAS was silent on the issue of formatting of the structured abstracts. Out of 311 structured abstracts 213(68.48%) were published under four headings (Table 2). The distribution curve based on subheadings of structured abstracts was almost bell shaped with a steep peak at 4.

DISCUSSION

Ever since the inception of scientific publication in 1665, authors and editors are working for improving

Table 1. Showing break-up of structured and unstructured abstracts

Journal	Total no of abstracts	Structured	Nonstructured
IJS	104	104	00
IJU	80	78	02
JMAS	37	34	03
JIAPS	82	60	22
IJPS	83	35	48
Total	386	311	75

Table 2. Showing break-up of structured abstracts based on headings

Journals	IJS	IJU	JAMS	JIAPS	IJPS	Total
Headings						
02	00	01	00	00	01	02
03	01	06	04	03	06	20
04	55	60	26	51	21	213
05	23	06	02	04	05	40
06	14	03	01	02	02	22
07	11	02	01	00	00	14

the quality of scientific literature. This is a dynamic process and is the backbone of any scientific field. The scientific article in the health sciences evolved from the letter form and purely descriptive style in the seventeenth century to a very standardized structure in the twentieth century known as introduction, methods, results, and discussion (IMRAD). The IMRAD structure, in those journals, began to be used in the 1940s. In the 1970s, it reached 80% and, in the 1980s, was the only pattern adopted in original papers¹².

Most clinical journals did not include abstracts with articles until the late 1960s. Then, the Journal of the American Medical Association and the Canadian Medical Association Journal moved the summary and conclusions of papers to the beginning. Thus started the trend of abstract for biomedical journals¹³. Abstracts were intended to replace the summary that was usually found at the end of the article and to provide readers with a sense of direction of the article. The abstract is, aside from the title, the most frequently read and most easily accessed portion of an article reporting original biomedical research. The abstract provides an irreplaceable resource for busy clinicians, researchers, and authors searching for pertinent material in the source journal or in computerized databases¹⁴.

The first structured abstract was published in 1987 in *Annals of Internal Medicine*. In 1987 the Ad

Hoc Working Group for Critical Appraisal of the Medical Literature proposed guidelines for informative seven-heading abstracts. The structured proposal was for original articles dealing with the cause, course, diagnosis, and treatment of health care problems^{15, 16}. Accepting Altman's proposal, Haynes et al., in 1990, revised the format and content requirements for structured abstracts to an eight-heading format (objective, design, setting, patients, intervention, main outcome measures, results, and conclusions for original articles)^{17,18}. In 1996 July the editors of the *Annals of Internal Medicine* realized that the structured abstract did not provide adequate context for a study, and asked authors to add a Background section. Finally, in 2004 March the editors of the *Annals of Internal Medicine* proposed a new type of structured abstract (a critical one). They became concerned that abstracts may give readers the impression that the research has no flaws. In the structured abstract, they included a new section on Limitations, located immediately before Conclusions, a spot that should attract the attention of the readers. Reflecting on the limitations of a study can help readers decide whether results apply to their patients¹⁹. So came the 10 headings structured abstracts in vogue.

Whether the adoption of structured abstracts could improve the quality of articles continues to be controversial²⁰. However, it is certain that structured abstracts make it easier for clinical readers to select appropriate articles more quickly and facilitate peer review before publication. However majority of authors have supported recommendations that suggest the use of structured abstracts. The structured abstract provides a more robust vehicle for disseminating research through traditional routes as well as through new channels made possible by emerging technologies^{21,22}. The number of Medline journal publishing structured abstracts increased between 1989 and 1991. Articles with structured abstracts had more access points (Medical Subject Heading [MeSH®] terms and text words) than MEDLINE articles as a whole²³. This study also found that all the editors agreed for the structured abstracts for original articles.

The International Committee of Medical Journals Editors under the Uniform Requirements for Manuscripts Submitted to Biomedical Journals states 'The abstract should provide the context or background for the study and should state the study's purposes, basic procedures (selection of study subjects or laboratory animals, observational and analytical methods), main findings (giving specific effect sizes

and their statistical significance, if possible), and principal conclusions. It should emphasize new and important aspects of the study or observations. Because abstracts are the only substantive portion of the article indexed in many electronic databases, and the only portion many readers read, authors need to be careful that abstracts reflect the content of the article accurately. Unfortunately, many abstracts disagree with the text of the article²⁴. The format required for structured abstracts differs from journal to journal, and some journals use more than one structure. Furthermore, if readers care to examine current practice, they will find that even though the subheadings used here are typical, they are not rigidly adhered to. Editors normally allow authors leeway in the subheadings that they use. This fact was observed in this study. But the authors should prepare their abstracts in the format specified by the journal they have chosen for publication and keeping this in mind the abstract of this article has been prepared.

AS far as the formatting of structured abstracts were concerned IJS, IJU and JIAPS gave instructions for four subheadings for preparation of abstracts of original articles. The journal of MAS did not give any instruction for formatting, while JIPS gave instruction for seven subheadings structured abstracts to the author. On analysis it was found that the editors are not firm on compliance of their own instructions. It is worth mentioning here that all the journals in the study group except IJS are indexed in pubmed. Of the 5500 plus journals covered in the Pubmed system, just 39 (0.71%) are from India²⁵. But IJS was the only journal which published original articles with structured abstracts exclusively. All the journals are well known peer reviewed journals of their respective surgical field. There are many variations in the structured abstract formats prescribed by different journals. But even in recent years, not all abstracts of original articles are structured^{26,27}. This was very much clear from this study also. A study was conducted to find out whether giving specific instructions to authors after submission of articles could improve the quality of abstracts in the next submission. The study was unable to prove the effectiveness of such instructions²⁸. Till date the editors of these peer reviewed journals, though agreeing on structured abstracts, were not particular about the formatting of abstracts of original articles. But structured abstracts with four subheadings were much popular among the authors and editors. More work has to be done on evolving a uniform simplified structured format for the abstracts. As far as the quality and accuracy of abstracts were concerned this study did not cover this aspect.

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Mystery Prevails over Plasma Cell Gingivitis: A Case Report and A Review

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ABSTRACT

Plasma cell gingivitis is a rare benign condition which presents as an enlargement of the gingiva, characterised by dense infiltration of plasma cells in the subepithelial connective tissue. Even after fifty years, since the first reported case, the etiology of many still remains obscure. It is characterized by sharply demarcated erythematous and edematous gingivitis often extending to the mucogingival junction. It may be related to specific allergen present in certain substances like chewing gum, pepper, tooth paste etc. This article features a case of plasma cell gingivitis (PCG) which presented itself without any obvious identifiable cause and which “refused” to heal with all conventional therapies.

Key words: Plasma Cell Gingivitis, Gingival Enlargement, Atypical Gingivitis, Hypersensitivity Reaction, Gingivitis, Allergen, Plasma Cell.

INTRODUCTION

Plasma cell gingivitis is a benign lesion which manifests as an enlargement of the gingiva characterized by diffuse and massive infiltration of plasma cells into the sub-epithelial connective tissue from which the condition gets its name.¹

It was thought to represent a hypersensitivity response affecting the gingival tissues,² but the exact etiology is uncertain. It was first reported in 1960 as plasmacytosis circumorificialis.³ The condition is of historic interest because it was relatively predominant at one point in time but is rarely encountered today. Clinicians speculated that the formulas or the sources of the offending ingredients were changed making the product non allergenic. Plasma cell gingivitis is known by a variety of other names such as atypical gingivostomatitis, idiopathic gingivostomatitis and allergic gingivostomatitis.⁴ It is analogous to balanitis plasmacellularis which was first described by Zoon in 1950.⁵

The importance of this lesion is that it may cause severe gingival inflammation, discomfort, bleeding and may mimic more serious conditions. Plaque control and conventional periodontal therapy alone will not cure this disease. The etiologic agent must be identified and the substance eliminated from use.

The case reported is of plasma cell gingivitis presenting as a well demarcated localized, reddish, and granular enlargement in the mandibular incisor region, involving the free and attached gingiva persisting for the past seven years without any obvious identifiable cause. The lesion refused to ‘heal’ inspite of conventional treatment modalities.

CASE REPORT

A nineteen year old female reported to the institute with the chief complaint of red, swollen gums in the lower front teeth region with burning sensation of the area for the past seven years. She gave a history of undergoing therapy with conventional and alternative treatment modalities for the same, but all proven to be unsuccessful. There was no significant family history and she was not on any medication for any systemic disorder. She had no known allergies and her general health was good. The history elicited was that of persistent ‘wax and wane’ pattern of localised gingival enlargement which measured about 3x2cm in size.

Clinically, the patient had mild to moderate inflammation and enlargement of the gingival tissues which was granular in appearance which extended from the free gingival margin to the mucogingival junction in the region of permanent mandibular left

incisors confined to the facial aspect (Fig. 1). On palpation, the gingiva was soft and oedematous. Bleeding was present only on probing.



Fig. 1. Clinical picture showing the swelling in the anterior mandibular gingiva.

Routine radiological examinations by periapical films and panoramic radiograph did not show any abnormalities .

Hematological investigations showed normal red blood cell and white blood cell counts, which ruled out leukemia and other blood dyscrasias. A negative Nikolsky's sign and absence of skin lesions ruled out dermatological diseases.

Patient was instructed to keep a detailed diet history and a list of all the substances which came into contact with the oral mucosa. Possible allergens like chewing gums or oral hygiene products with strong flavouring agents like cinnamon and peppermint were eliminated by discontinuing their use, in an attempt to elucidate the etiological factor. The patient underwent conventional plaque control therapy as part of the treatment plan as well as topical steroid therapy for a period of four weeks.

Biopsy was carried out under local anaesthesia of the lesional area and was diagnosed as plasma cell gingivitis.

MICROSCOPIC FEATURES

Microscopic examination revealed intact, hyperplastic, stratified squamous epithelium with narrow and elongated rete ridges. There were no areas of ulcerations. The epithelium showed spongiosis and intense infiltration by chronic inflammatory cells dominated by mature plasma cells. The plasma cells were seen as dense, diffuse, sheets and strands separated by collagen septae in the connective tissue and presented no cellular atypia (Fig. 2 and 3). The plasma cells did not show anaplasia or prominent

nucleoli. Dilation of the superficial capillaries were seen. Mitotic figures were not identified. No suprabasilar clefting or acantholysis was seen which excluded the dermatological diseases.

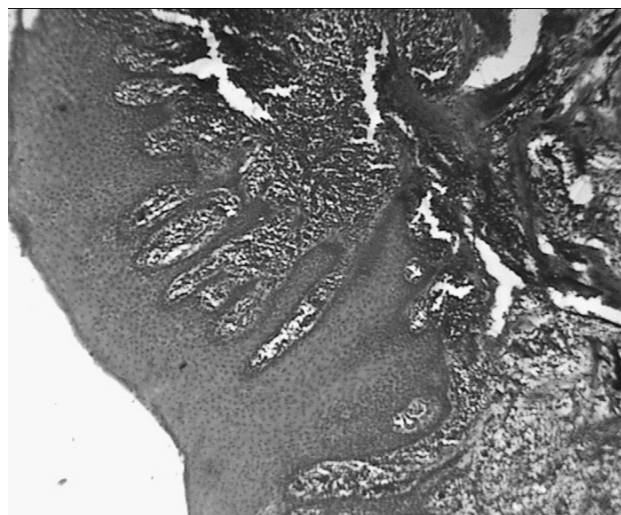


Fig. 2. Photomicrograph of H and E stained sections X 10.

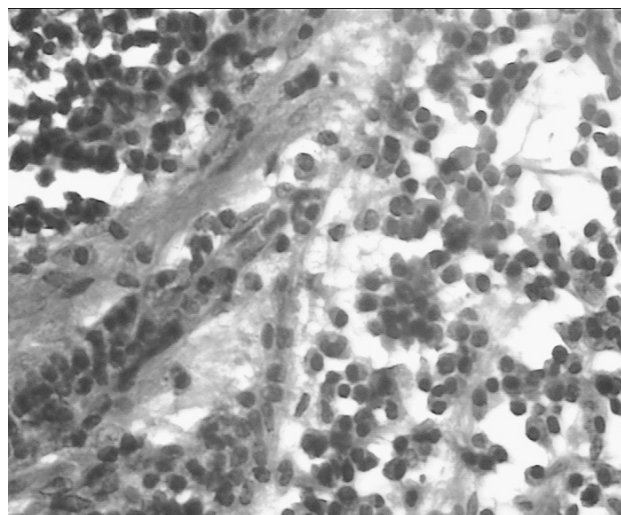


Fig. 3. Photomicrograph of H and E stained sections X 40.

DISCUSSION

Owings in 1969 described four patients with the triad of cheilitis, glossitis, and generalized gingivitis, which he called "atypical gingivostomatitis." He speculated that the lesions were caused by an autoimmune reaction triggered by an anaerobe from the gingival crevice, a possible true allergic response, or an undetectable hormonal imbalance. Poswillo discussed the possible neoplastic nature of a subset of these lesions. In November 1971 Kerr et al described twelve patients, ranging in age from eleven to fifty eight years old, with what they called plasma cell

gingivitis.^{18,23}

In 1977 Silverman and Lozada wrote an article entitled "An Epilogue to Plasma Cell Gingivitis". They believed that plasma cell gingivostomatitis was a transient syndrome affecting a few people during the period of 1966 to 1970 as a result of a hypersensitivity reaction to an unknown allergen.^{18,23}

Plasma cell gingivitis is a rare condition characterised by diffuse and massive infiltration of plasma cells into the sub-epithelial gingival tissue.⁶ The condition affects adults and occasionally children of either gender, though commonly seen in females between twenty and fifty years of age and can last for several months to years.

Allergic factors like toothpaste including herbal brands, chewing gum with cinnamon flavouring, cakes, mouthwash, menthol etc, or spicy foods containing chillies, black pepper, mint, cardamom etc, autoimmune reaction, hormonal imbalance and hematologic infiltration has all been indicated as the causative factor.^{1,2,3,6} It has also been found in Khat habituates (*Cantha edulis*) which is a psycho-stimulating herb commonly chewed in the East African and Arabian peninsula. It is also possible than there are more than one etiological factor involved.² In certain cases, no etiology has been found^{1,6}.

Sollecito and Greenberg in 1992 have proposed a subdivision for these lesions based on the etiology into 3 types namely (a) lesions caused by an allergen, (b) neoplastic lesions and (c) lesions of unknown cause.¹⁸

Burning mouth, tongue, or lips is the usual complaint of patients. The onset is rather sudden and the discomfort may 'wax and wane'. It has been found to be intensified by dentifrices and hot or spicy foods. The classic presentation of plasma cell gingivitis is an asymptomatic, sharply demarcated, diffuse, erythematous and oedematous appearance of the gingiva which is usually confined to anterior maxillary gingiva which may have a granular or papillary appearance. It usually involves the free and attached gingiva often extending to the mucogingival junction. The lesion is friable and bleeds easily on minimal manipulation or trauma and usually does not cause attachment loss. The loss of normal stippling with gingival involvement as in the case presented here has been noted before.^{1,2}

Apart from gingiva, tongue and lip involvement has also been reported. Involvement of the lips results in dryness, atrophy, fissuring and angular cheilitis.¹

Involvement of tongue results in erythematous enlargement, furrows, mild crenation and loss of typical dorsal coating.¹ Patients usually do not present with lymphadenopathy or any systemic manifestations as seen in the present case.¹²

Extraoral involvement is also possible and a case associated with similar histological lesion affecting genital mucosa has also been reported. The supraglottic region may also be involved.¹²

The histopathological appearance of the classic plasma cell gingivitis is characterised by heavy plasma cell infiltration into the gingival connective tissue. The epithelium may show psoriasiform hyperplasia and spongiosis with intense exocytosis and neutrophilic microabscesses. Langherhans cells are also prominent and apoptotic keratinocytes may occasionally be seen.² The histopathological changes mimic those of more serious lesions like that of leukemic infiltrates, multiple myeloma, solitary plasmacytoma and Waldenström macroglobulinaemia.^{2,3,22}

Immunohistologic analyses of the phenotype of plasma cell infiltrate may be necessary to rule out the possibility of an extramedullary monoclonal plasma cell neoplasm. These neoplasms require radiation therapy and upto 30% can progress into multiple myeloma.¹¹ But extramedullary plasmacytomas are usually seen in adult males in the age group fifty to sixty years, as nondescript, sessile or polypoid, reddish, soft tissue masses which are well circumscribed, non tender and which tend to become lobulated as they increase in size with destruction of the underlying bone. Allergic and idiopathic cases of plasma cell gingivitis demonstrate a polyclonal mixture of plasma cells and a normal profile on plasma electrophoresis.

T-cell marker analysis of biopsy specimens had been earlier carried out by Sollecito and Greenberg, 1992 in order to establish whether the condition is of neoplastic or reactive/inflammatory origin, using direct immunofluorescence. They were analysed to be of a reactive/inflammatory nature.¹⁸

Management of plasma cell gingivitis is usually symptomatic. It should aim at removal of the offending substance along with plaque control and conventional therapies. For this, the patient should be instructed to keep a detailed diet history and a list of all the substances taken inside the mouth. Possible allergens should be eliminated in an attempt to discover underlying cause. If no agent is apparent then extensive allergy testing and diet elimination should be undertaken.²

In patients with no obvious underlying cause, treatment with medications like betamethasone rinses, fluocinonide gel (0.05%), topical triamcinolone (0.1%) and topical fusidic acid (2%) have been tried with varied results^{2,5,16}. In spite of all the therapeutic interventions some people, as in the present case, do not respond to the treatment especially when there is no obvious identifiable cause.

SUMMARY

Plasma cell gingivitis is a unique, benign entity presenting as a sharply demarcated erythema and enlargement of the free and attached gingiva and histopathologically characterised by massive infiltration of plasma cells into the subepithelial connective tissue. The etiology is as of now uncertain, though allergic reactions to ingredients in various products like chewing gum, toothpaste etc has been alleged. Despite its benign nature, plasma cell gingivitis is a problem that can be disabling for the patient in its acute phase. If the allergen has been detected, treatment includes elimination of the allergen at the earliest and local treatment with medications like corticosteroids. But in some cases, a substantiated antigenic factor cannot be identified such as in this case, remaining as a mystery and refusing to “heal”. In such cases, a close follow up is recommended with a palliative treatment and more immunological studies are required to understand the exact pathogenesis of these lesions.

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WHITE SPONGE NEVUS - A Report of Two Cases

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ABSTRACT

A 24 and 21 year old female patients presented with an asymptomatic, white, folded, soft, poorly-demarcated, diffuse plaques bilaterally on their buccal and labial mucosa. There is no family history of similar lesions. The clinical examination and histopathologic findings were consistent with a diagnosis of white sponge nevus. This rare disorder is typically inherited; however, as in these two cases, there have been only few other cases reported without a familial background.

Key words: *White Sponge Nevus, Buccal Mucosa, Diffuse white plaques.*

INTRODUCTION

White sponge nevus (WSN) is a rare autosomal dominant disorder which was first described by Hyde in 1909, but the term was coined in 1935 by Cannon. It was also named as familial white folded dysplasia, Cannon's disease, Hereditary leukokeratosis of mucosa and Leukoedema exfoliativa. The condition predominantly affects non-cornifying stratified squamous epithelia, such as the oral mucosa and, less frequently, the extra oral sites, including the mucosal membrane of the nose, oesophagus, rectum and vulvovaginal mucosa, but not the skin. HPV 16 homologous DNA sequences in the biopsy specimen of oral White Sponge Nevus have been detected in one report.

The onset of white sponge nevus usually occurs before 20 years of age and often in early childhood. It exhibits no race or sex predilection. However, because of this condition's autosomal dominant pattern of transmission, several family members may manifest the disorder.

It presents in the mouth, most frequently as a thick bilateral white plaque with a spongy texture, usually on the buccal mucosa, but sometimes on the labial mucosa, alveolar ridge or floor of the mouth. The gingival margin and dorsum of the tongue are almost never affected. The white appearance is probably caused by the fluid absorption by the thickened spongiotic surface layers of the mucosa.

Although this condition is perfectly benign, it is often mistaken for leukoplakia. Moreover, as this disorder is self limiting and as there are no serious clinical complications and the prognosis being excellent, treatment is usually not required, unless otherwise indicated for esthetic or patients psychological concerns.

CASE NO 1

A 24 year old female patient reported to the Department of Periodontics with a chief complaint of a gummy smile since childhood, before and after the eruption of her permanent teeth.

Intra oral examination of the right buccal mucosa revealed a soft, cheesy enlargement which was non tender, asymptomatic, slippery with a cobble stone like appearance (Figure 1). The severity was much less on the left buccal mucosa. The tongue showed small pearly, light pink appearance on the lateral border of the tongue with fissuring.

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Fig. 1. Clinical picture – Right Buccal mucosa



Fig. 4. Clinical picture – Labial mucosa/lower lip

Differential Diagnosis included White Sponge Nevus, Heck’s Disease (Focal Epithelial Hyperplasia) and Lymphangioma. Three incisional biopsy specimens were taken from the right buccal mucosa measuring approximately 1.0cm, 0.5cm and 0.6cm respectively.

Histological examination by hematoxylin and eosin sections (H & E) revealed hyperkeratinized stratified squamous epithelium with cells showing intracellular oedema along with few inflammatory cells and was diagnosed as white sponge nevus. (Figure 2 and 3).



Fig. 5. Clinical picture- Labial mucosa / upper lip

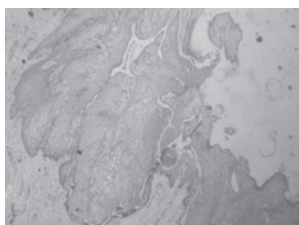


Fig. 2. Microphotograph/H & E sections(x100)

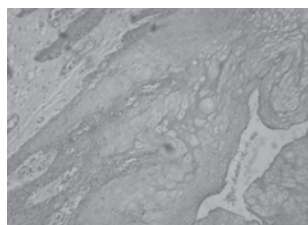


Fig. 3. Microphotograph/H & E sections (x 400)

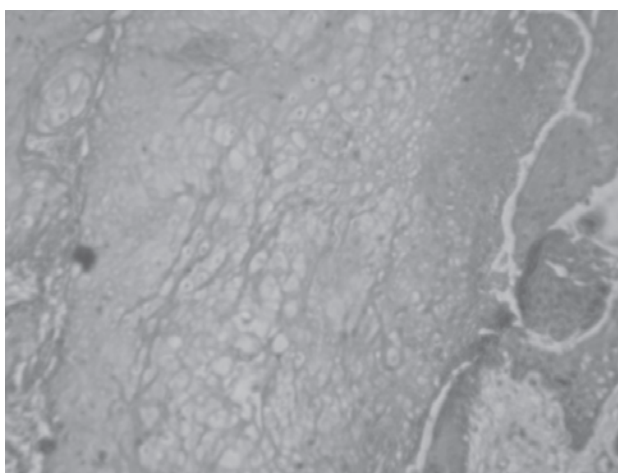


Fig. 6. Microphotograph / H & E sections (x 400)

CASE NO 2

A 21 year old female patient reported to the Department of Periodontics with a chief complaint of bleeding gums since six months. On examination labial mucosa of both upper and lower lips and the buccal mucosa revealed a soft, cheesy enlargement which was non- tender, asymptomatic, slippery with a *cobble stone like appearance* (Figure 4 and 5). The findings were more extensive when compared to the first case. The severity was much less on the right buccal mucosa when compared to the left. The histological findings were similar to the findings of the first case (Figure 6)

DISCUSSION

White sponge nevus (WSN), which was described by Cannon in 1935, is also known as familial white

folded mucosal dysplasia, leukoderma exfoliativum mucosae oris, and hereditary leukokeratosis¹. It has been classically described as a benign, uncommon, autosomal dominant disorder that involves a mutation in mucosal keratin that predominantly affects non-keratinized stratified-squamous epithelia². Cases without a familial background also has been reported³. The usual onset is in early childhood, with 50 percent of patients being diagnosed before age 20^{4,5,6}. White sponge nevus is attributed to a mutation in the helical domain of mucosal specific keratins, K4 and K13⁶. The mutations are in the form of insertions, deletions, and substitutions that result in abnormal aggregation of tonofilaments and keratin filament instability^{7,8}. Lesions of WSN appear as white-to-gray, diffuse, painless, spongy folded plaques that are typically found on the buccal mucosae. Other common sites include the labial mucosae, tongue, floor of the mouth, and alveolar mucosae. Less frequently, the mucous membranes of the nose, esophagus, genitalia, and rectum are also involved^{4,5}. White sponge nevus may be confused with other white lesions of the oral mucosa, which include cheek biting, lichen planus, lupus erythematosus, hereditary benign intraepithelial dyskeratosis, tobacco-induced keratotic lesions, pachyonychia congenita, keratosis follicularis and candidiasis.

Histopathologic findings include parakeratosis, acanthosis with the formation of large, blunt rete ridges, spongiosis, and extensive vacuolation of suprabasal keratinocytes. Dyskeratotic cells exhibit dense peri- and paranuclear eosinophilic condensations, which correspond to tonofilament aggregates. Odland bodies are abundant within keratinocytes, but few are present in the intercellular spaces. This observation suggests a lack of acid phosphatase, which leads to retention rather than normal shedding of superficial cells⁶.

No standard treatment for the condition exists although vitamin A⁹, antifungal therapy¹⁰, and tretinoin cream have been used¹¹. Antibiotic treatment with oral penicillin¹², ampicillin¹³, and tetracycline has met with various degrees of success; the use of tetracycline mouthwashes also has been advocated^{13,14,15}. WSN is not considered to be of bacterial origin. However, since some cases remit with antibiotic therapy, it is possible that infections or inflammation may play a role in the expression of disease¹³. One must consider that the possible beneficial effect of tetracycline is due to modulation of epithelial keratinization¹⁶. Although WSN is painless, patients may complain of an altered texture of the mucosa or that the lesions being unaesthetic. There may be periods of exacerbation and remission and typically no treatment is sought by the patients. Generally,

progression of the disorder stops at puberty and there is no malignant transformation¹⁷. Reassurance is all that is required.

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Carbon-monoxide an "Invisible Killer"

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ABSTRACT

Carbon monoxide (CO) an "INVISIBLE KILLER". Having high affinity for hemoglobin, it forms carboxyhemoglobin. Resulting decrease in both oxygen-carrying capacity and oxygen release leads to end-organ hypoxia. Common sources of CO poisonings in urban areas is from automobiles and in home from ill fitted gas heaters. Signs & Symptoms of poisoning depend on the exposure to percentage in the inhaled air. At low levels it can lead to headache & nausea where as neurological symptoms and even death at high levels .

We report four cases of accidental death due to carbon monoxide poisoning in a rural area of central INDIA while cleaning an old well.

Key words: Carbon-monoxide, Carboxyhaemoglobin, Hypoxia, Cherry Red, Petechial Haemorrhage.

INTRODUCTION

Carbon monoxide (CO) poisoning, one of the most Common fatal poisonings, occurs by inhalation. CO is a Colorless, odorless gas that results from incomplete combustion of hydrocarbons. Common sources of CO in poisonings include house fires and improperly vented automobiles, furnaces, hot water heaters, wood- or charcoal-burning stoves, and kerosene heaters, Gasoline and diesel powered generators, Spray paint, engine, fumes and non-electric heaters, solvents, degreasers, and paint removers¹.

CO is produced when natural gas (methane or propane) burns. Inhaling tobacco smoke results in CO in the blood but not enough to cause poisoning. Mechanisms of CO toxicity are not completely understood. They appear to involve displacement of O₂ from Hb, shifting of the O₂-Hb dissociation curve to the left, and inhibition of mitochondrial respiration. Direct toxic effects on brain tissue are possible².

CASE HISTORY

Reporting four cases of sudden death in an old well

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while cleaning it. On a summer day, some people of a village were trying to clean an old well. After pumping out whole water from the well with the help of a diesel water pump, two men entered to clean the remaining waste. To their surprise one of them became unconscious. Three more men went inside the well to help him. The unconscious person was successfully pulled out but the remaining four persons who were inside the well died. Their bodies were pulled out of well after 3 hours and brought to morgue of S.V.N.G.M.C, Yavatmal. Next day the autopsy was carried out.

AUTOPSY FINDINGS

- a) Whitish blood stained froth from mouth and nostrils.
- b) Protruding Tongue.
- c) Cherry pink lividity over nails, tongue, palm & sole with cherry pink discoloration all over the body.
- d) Brain, lungs, liver, intestine showed cherry pink discoloration.
- e) Petechial hemorrhages in brain.
- f) Both lungs were Congested & severely oedematous.

Autopsy findings in the above four victims showed cherry red discoloration of organs which suggests exposure to significant amount of carbon monoxide. The Petechial hemorrhages in brain were suggestive of hypoxia.

BIOCHEMICAL INVESTIGATIONS

Blood was directly collected from the heart & investigated for :

1) % of Carboxy-hemoglobin by Spectrophotometer-

Principle - Oxyhemoglobin is converted to reduced hemoglobin by adding sodium dithionite which does not affect the COHb immediately, then COHb is measured at 544 and 541 nm.

Results for COHb % were as follows-

- i) Case 1 - 72%
- ii) Case 2 -68%
- iii) Case 3 - 69%
- iv) Case 4 -55%

2) **Spectroscopic examination** of blood-Pattern similar to Oxy-hemoglobin (one band in D region & one in E region) was observed. But on addition of sodium dithionite reduced hemoglobin was not formed in three of the four samples (i.e case numbers 1 to 4) which is suggestive of the presence of carboxyhemoglobin in the blood. In sample no 4 formation of reduced hemoglobin on addition of sodium dithionite suggested the presence of oxyhemoglobin along with carboxy hemo-globin.

3) **Dilution test** - Dilution of the sample upto 100 times retained the cherry red discoloration of the blood which was also suggestive of presence of carboxyhemoglobin in the blood.

Note - There is no evidence that CO may be formed during the process of putrefaction as the gas cannot be absorbed by the body after death.

DISCUSSION

CO is absorbed through the lungs and diffuses across the alveolar capillary membrane. The exchange of CO between inhaled air and blood is controlled by both physical (mass transport and diffusion) and physiological (alveolar ventilation and cardiac output) mechanisms. It combines with hemoglobin to form carboxyhemoglobin (COHb) displacing oxygen and reducing systemic arterial oxygen (O₂) content.³

A characteristic cherry-red discoloration to the skin and mucous membranes of the victims in this case pointed towards acute poisoning resulting from the carboxyhemoglobin. Depending on the rapidity of death morphologic changes may not be present, but with longer survival the brain may be slightly oedematous and may have punctuate hemorrhages and possibly hypoxic neuronal changes. It should be

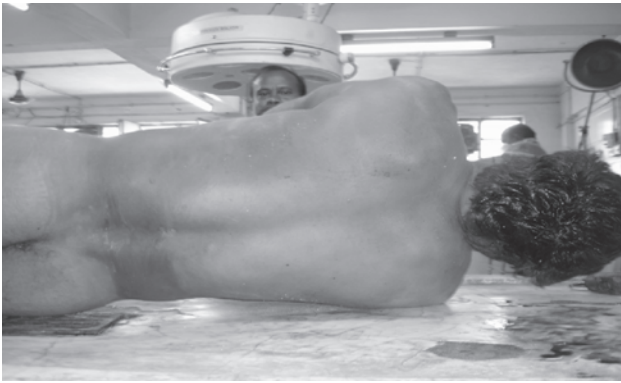


Fig. 1. Note the colour of PM Lividity in CO poisoning.



Fig. 2. Blood & Froth oozing per nostrils in CO poisoning.



Fig. 3. Note the colour of meninges and brain in CO poisoning.



Fig. 4. Note the colour of the organs in CO poisoning case.

noted that morphologic changes are not specific for CO, since they simply imply systemic hypoxia. Death often occurs so rapidly that the changes are not detectable by the light microscope and may or may not be discernible under the electron microscope.⁴

Significantly raised COHb levels in the blood and petechial hemorrhages in the brain of victims suggests that the cause of death was hypoxia secondary to CO poisoning. CO binds reversibly to hemoglobin with an affinity 200- 230 times that of oxygen.⁵ consequently, relatively minute concentrations of the gas in the environment can result in toxic concentrations in human blood.

Signs and Symptoms in CO poisoning in relation to COHb %.⁶

CARBOXYHEMOGLOBIN%	SIGNS & SYMPTOMS
10-30%	Headache, nausea ,vomiting, dizziness, exertional dyspnoea
30-40 %	Chest pain, blurred vision, confusion, weakness ,increasing dyspnoea, loss of muscular control, syncope, tachycardia, tachypnoea, prolonged reaction time, tinnitus, drowsiness, , generalized weakness, difficulty in concentrating and impaired judgment, hallucinations
>40%	Trismus ,muscle spasm, convulsion, palpitation, disorientation, ventricular arrhythmias, hypotension, myocardial ischemia, pulmonary oedema, coma, collapse & death

The most clear-cut mechanism by which CO toxicity occurs is competitive binding to the hemoglobin heme groups. Tetrameric structure undergoes a conformational change when CO is bound at one of the four heme sites, with a resulting increase in the affinity of the remaining heme groups for oxygen. This not only shifts the oxygen-hemoglobin dissociation curve to the left, however distorts its sigmoidal shape towards a hyperbola. The net result is a hemoglobin molecule that is poorly equipped to release oxygen at the tissue level. The decreased oxygen delivery is then sensed centrally, stimulating ventilatory efforts and increasing minute ventilation. The latter will increase uptake of CO and raise COHb levels, and will result in a respiratory alkalosis, further shifting the oxygen-hemoglobin dissociation curve to the left.²

Carbon monoxide directly impairs aerobic metabolism in tissues by binding mitochondrial cytochromes, preventing the binding and subsequent reduction of oxygen at the end of the cycle resulting in formation of destructive oxygen free radicals.⁷Fetal

hemoglobin binds CO more avidly than hemoglobin A, and with slow transplacental transport, fetal levels decrease much more slowly than in the mother. This accounts for the occurrence of occasional fetal death in nonfatal maternal exposures.⁸

As the autopsy was carried out next day there was no point in carrying out ABG analysis. As such also ABGs and pulse oximetry, alone or combined, are inadequate for diagnosis of CO poisoning because O₂ saturation reported in ABGs represents dissolved O₂ and is thus unaffected by carboxyhemoglobin concentration; furthermore, the pulse oximeter cannot differentiate normal hemoglobin from carboxyhemoglobin and thus provides a falsely elevated oxyhemoglobin reading.

The mean half-life of COHb is 320 minutes (128-409) in young healthy volunteers on room air. Administration of one hundred percent O₂ at one atmosphere reduces the half life to 80.3 minutes, while 100% O₂ at three atmospheres will reduce the half life to 23.3 minutes.⁹

CO binds to cardiac and skeletal myoglobin as well as hemoglobin (Hb). Cardiac myoglobin binds three times more CO than skeletal myoglobin.¹⁰ Carboxymyoglobin dissociation is slower than COHb due to the increased affinity of CO for myoglobin. A “rebound effect” with delayed return of symptoms has occasionally been observed, corresponding to a recurrence of COHb elevation.¹¹Presumably, this is due to late release of CO from myoglobin with subsequent binding to Hb.⁸The elimination half-life of CO is about 4.5 h with inhalation of room air, 1.5 h with 100% O₂, and 20 min with 3 atmospheres (pressure) of O₂ (as in a hyperbaric chamber).¹²

CONCLUSION

Carbon monoxide being such a poisonous gas, it’s levels in the atmosphere needs to be strictly controlled especially in urban areas & metro cities, where levels are obviously high because of several industries and large no of vehicles. Also people living in rural areas should be made aware of the poisonous effects of the gas and the use of wood or charcoal burning stoves should be strictly avoided in a closed room. The automobiles, gas geysers, diesel pumps etc i.e. the things which are likely to emit CO gas should have a warning written over it. Moreover it should have inbuilt CO detector with an alarm fitted in it so that the harmful levels of gas can be detected soon so as to prevent further complications.

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An Unusual Malignancy Associated with the Mandible : A Case Report

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ABSTRACT

Carcinomas in the mouth and jaws usually arises from the epithelium lining of the oral cavity or the salivary gland tissue. It may arise within the mandible as a metastatic lesion from primary tumor in the breast, thyroid, kidney or lungs. However carcinoma arising as a primary tumor within the mandible is very rare. Here we report such a rare case of malignancy arising de novo in the mandible.

Key words: Primary Intraosseous Carcinoma (PIOC), Pre Existing Odontogenic Cyst, Odontogenic Carcinoma.

INTRODUCTION

Squamous cell carcinoma originating in the bone is a rare but well recognized entity.¹ This entity is known by an assortment of names in the literature which includes- primary intra alveolar carcinoma (PIOC), Primary intraalveolar epidermoid carcinoma, Primary epithelial tumor of the jaw, Central squamous cell carcinoma, Primary odontogenic carcinoma, Intra mandibular carcinoma & Central mandibular carcinoma.²

CASE REPORT

A 60 year old female presented with painful swelling in the left lower third of face since two-three months and also complained of pain preceding the swelling about two weeks. Pain was severe, continuous, throbbing type, radiating towards head and aggravates on chewing food and drinking hot water. There was no history of trauma but she gave history of fever since one week and weight loss. Patient has habit of betel nut chewing since 30 years and used to have it three- four times daily.

Extra orally, solitary diffuse swelling was present on left lower part of face, roughly oval in shape, measuring 3.5 x 5 cms extending antero-posteriorly 1cm away from midline to about tangential line from 1.5 cm away from outer canthus of eye & superio-

inferiorly from the line joining angle of the mouth to tragus to 2cm from lower border of the mandible. Surface appears normal with no evidence of secondary changes. (Fig.1) On palpation the swelling was tender & hard in consistency in the submandibular region and firm in other areas. Step deformity of the lower border of the left side of mandible & also paresthesia on the left side of the mandible was present.



Fig 1. Presentation of extra oral swelling.

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Intraorally, vestibular obliteration was present in relation to 33, 34, 35, 36 & 37. Diffuse vestibular swelling was evident extending anterior-posteriorly from 33 to 37 and bucco-laterally from marginal gingival to 1.5cm laterally. Surface color appears reddish pink and erosion was seen on the gingival in respect to 36 and no other secondary changes were present. On palpation swelling was found to be soft to firm in consistency and tender but it was tender and hard in consistency, lingually in respect to 34, 35 & 36. (Fig. 2)



Fig 2. Showing intra oral swelling.

Clinically missing 21,26 & 28, root stump of 16, 22, 27 with grade 2 mobility and 34, 35, 36, 37 & 38 with grade 3 mobility was noticed.

Cropped OPG revealed an ill defined radiolucency on the left side of the mandible involving the alveolar process i.r.t 34, 35, 36 & 37 & extending inferiorly & involving the inferior alveolar canal. The borders of radiolucency are somewhat ill-defined with complete loss of trabeculation. Peripherally no sclerotic borders can be appreciated. The internal structure of the lesion revealed complete radiolucent area; there is loss of lamina dura in relation to 34, 35, 36, and 37 giving it a floating tooth appearance. There is slight discontinuity in the left lower border of the mandible. (Fig. 3)

Radio graphically and clinical impression was accomplished as Primary intra- alveolar carcinoma or Secondaries in mandible. A full medical examination did not reveal any evidence of a separate primary site and metastasis in the body. An incisional biopsy was performed under local anesthesia.

Microscopic picture revealed the tumor epithelial islands invading into the underlying connective tissue. The cells in the epithelial islands exhibit various

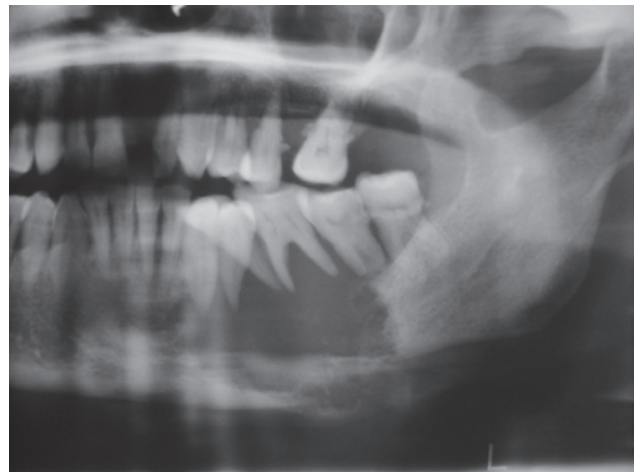


Fig 3. Cropped OPG showing ill defined radiolucency on the left side of the mandible involving the alveolar process of premolars and first & second molars.

dysplastic features like cellular and nuclear pleomorphism, altered nuclear- cytoplasmic ratio, individual cell keratinisation and epithelial pearl formation. Diffuse chronic inflammatory infiltrate chiefly lymphocytes and plasma cells were evident (Fig. 4 & Fig 5). The final diagnosis of Moderately Differentiated Squamous Cell Carcinoma was given.

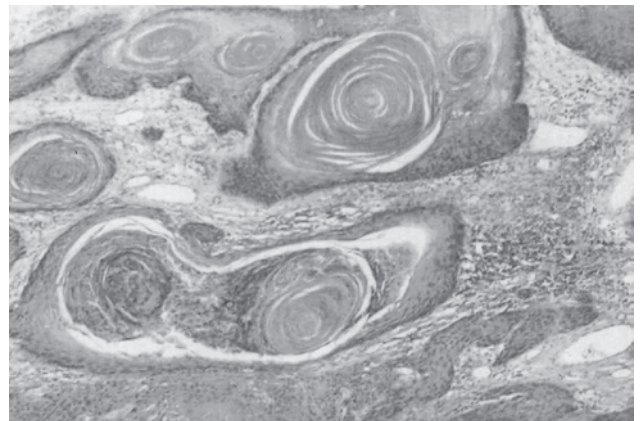


Fig 4. Demonstrating epithelial islands & keratin pearl formation in the connective tissue.

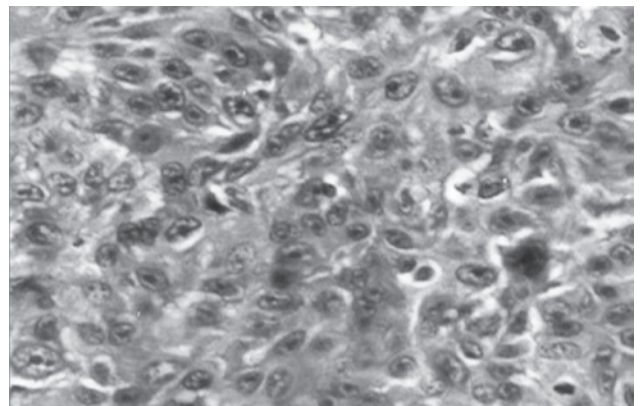


Fig 5. Showing moderate amount of nuclear polymorphism.

Following which resection surgery was planned for the patient but patient did not turn up.

DISCUSSION

A carcinoma arising in as a primary tumor de novo within the mandible is rare. This tumor is believed to arise from the odontogenic epithelium and hence it is also referred as Odontogenic carcinoma. Intra osseous carcinomas do occur only in the jaws because of the fact that odontogenic epithelial rests may be trapped in the jaw bones.³

Going back to the origin of this term, it was described by Loos in 1913 as central epidermoid carcinoma of the jaws.⁴ However Willis in 1948 suggested the term intra alveolar epidermoid carcinoma⁵ while Shear called it as Primary intra alveolar epidermoid carcinoma.⁶ Pindborg & Co-workers suggested the term Primary intraosseous carcinoma (PIOC) to denote this rare entity in the first edition of the WHO classification for histological typing of odontogenic tumors.⁷

According to WHO, "A Squamous cell carcinoma arising in the jaws, having no initial connection with the oral mucosa, and presumably developing from residues of the odontogenic epithelium." PIOC includes carcinomas arising de novo from ameloblastomas or odontogenic cysts.⁸ Several other terms have also been used in the literature though these have been some what misleading.

The incidence of this entity in the general population is very low. Review of all the published cases of the English language literature by To et al. concealed only 21 reported cases to which he also added 3 cases.⁹ Combining the data from previously reported cases of PIOC arising de novo, the mean age of occurrence is estimated to be 50 with a male: female predominance¹⁰ but present authors have reported a case in 60 years aged female. Over 80% of the cases present in the mandible, with a striking predilection for the posterior region¹⁰ but the case reported by Coonar¹¹, which occurred in the anterior maxilla was the exception.

Common clinical features include pain & swelling of the affected area, and sometimes sensory disturbance like paresthesia & numbness.¹² In our case also patient presented with the numbness of the left lower lip. However in many instances, the non specific clinical findings stimulate inflammatory dental processes.¹² This can lead to delay in diagnosis. To et al. cited a delay from few weeks to as long as 18 months⁹.

The PIOC has been classified by Waldron & Mustoe¹³

Type 1	PIOC ex odontogenic cyst.
Type 2a	Malignant ameloblastoma.
Type 2b	Ameloblastoma carcinoma arising de novo, ex ameloblastoma or ex odontogenic cyst.
Type 3 A	PIOC arising de novo
	Keratinizing type
B	Non - keratinizing type
Type 4	Intra osseous mucoepidermoid carcinoma.

The present authors have classified the case in 3 (a) category as keratin pearl formation & individual cell keratosis was present.

The following criteria have been proposed for the diagnosis of PIOC^{9,14}:-

- 1) An intact oral mucosa prior to diagnosis.
- 2) No histological evidence of associated odontogenic cyst.
- 3) Ruling out a metastatic deposit from a distant primary.

Radiographically, de novo intraosseous carcinomas exhibit radiolucency with a wide variation in size and shape. Slowly growing tumors often exhibit well defined peripheries, whereas rapidly expanding lesions typically demonstrates poorly defined & ragged borders. Since the margins of PIOC's show great variation, they are usually indistinguishable from other benign or malignant tumors.¹⁴ Our case also demonstrated the ill defined borders & floating tooth appearance.

The histopathological findings may vary from well-differentiated tumors exhibiting significant keratinisation to non keratinizing poorly differentiated carcinomas.¹² Several features indicative of odontogenic origin like plexiform, palisading, alveolar growth pattern are frequently present & are helpful in reaching a diagnosis. However in our case significant keratinisation was evident & there was no evidence of pre existing odontogenic cyst.¹²

Currently wide surgical excision is the treatment of choice. Although metastasis to regional lymph nodes occurs in 40% of the cases, no relationship is seen between nodal involvement and survival time.¹⁴ The prognosis of PIOC is surprisingly good, being more favorable when they originate from odontogenic cysts¹³ rather than when they originate de novo.¹⁰

CONCLUSION

Primary intra alveolar carcinoma originating in the bone is rare but well recognized entity. The incidence

of this lesion is very low. A full medical examination should be done to rule out any possible metastasis. The prognosis of PIOC is poor & importance should be given to early diagnosis & prompt treatment.

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A Study of Nasal Index in 60 Adult Human Skulls and its Role in Sex Determination

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ABSTRACT

The skull appears to be the main reliable bone, apart from pelvis, exhibiting sexually dimorphic features.

AIM: the aim of the study is to carry out craniometric analysis of nasal bone and study its role in sexual dimorphism.

MATERIAL: The skulls of 60 individuals of known sex (30 male and 30 female) of Indian Punjab region were taken as material for the present study.

METHOD: A series of three metric variables: nasal height, nasal breadth and nasal index were taken using the sliding caliper.

RESULTS: Upon statistical analysis (stepwise discriminant function analysis) 71.7% of the skulls were correctly classified as male and female skulls. **CONCLUSION:** Thus the present study has established specific craniometric standards of the nasal bone for the population of this region and the data is of significance in the field of forensic medicine and physical anthropology.

Key words: Craniometric Analysis, Nasal Index, Sexual Dimorphism.

INTRODUCTION

Human identification is one of the most challenging subjects that man has confronted. The identification of human remains, when it is not possible to apply the scientific method of fingerprint identification, demands a forensic medicine investigation. The studies for sex determination are based on the dimorphism between the sexes that is present in the majority of human bones. The well known anthropologist Krogman¹ has presented the following estimates of the accuracy obtained from adult bones according to the bone specimens available. Entire skeleton - 100%; Cranium - 90%; Pelvic bones - 95%; Cranium and pelvis - 98%; Long bones - 80%. Since the skull is amongst the best preserved parts of the skeleton after death, many of these schemes have concentrated on cranial and mandibular measurements².

Forensic Anthropologists have at their command a variety of indicators of sex to aid them in their identification efforts, albeit with rare exceptions they are applicable to the post - adolescent period only³.

Diverse techniques for sexing of crania are based either on visually determinable descriptive features of the cranium or on exact measurements of various parts of cranium and their ratios. Methods based on measurements and statistical techniques are more serviceable for use in sex determination⁴. One of the advantages of metric analysis may be that it can appear more "scientific" when presented to juries in a courtroom situation. It may also be true that metric analysis allows for less error in the hands of those less experienced with skeletal morphology⁵. Most of older studies of sex differences in the skeleton (skull and pelvis mainly) centered on morphological traits in a descriptive manner. The newer studies focus on morphometry in a largely quantitative and statistical sense. There are a few studies which have used an exhausted list of metrical parameters for sexing the skulls (Keen⁶, Hanihara⁷, Steyn & Iscan⁸, Stewart⁹). The present study was initiated with the following aims and objectives:-

1. To know the reliability of nasal height, nasal breadth & nasal index in determination of sex in the Indian adult crania.

2. To know the usefulness of craniometric methods in forensic identification and reconstruction of face.
3. To supplement the existing data.

MATERIAL AND METHOD

60 dry adult Indian crania (30 of either sex) were used as a material for the present study. The material was procured from the Departments of Anatomy and Forensic Medicine, M. M. Institute of Medical Sciences & Research Mullana (Ambala) and Government Medical College, Patiala. The period of the study was year 2010-2011 and was carried out in the Department of Anatomy, M. M. Institute of Medical Sciences & Research Mullana (Ambala). The skulls of known sex were considered for the study. The study was done on skulls with all required bony landmarks (craniometric points) intact allowing full set of measurements without any approximation. The skulls with physical damage or loss of part (s), apparent deformity, defect or disease were excluded. The study was done on skulls in which spheno-occipital junction was synostosed and senile skulls which were edentulous with wasted alveolar processes were excluded from the study.

BONY LANDMARK (Figure 1)

1. Nasion (na)¹⁰: The intersection of the frontonasal suture and the median plane. A series of 3 metric measurements were studied on 60 adult dry human skulls, 30 each of male and female. The bony landmark was marked with a lead pencil and the metric

measurements were taken by the sliding caliper (Fig. 2) after excluding the error in the instrument. The methodology was adopted from Prof. William W. Howell¹⁰. Each All the readings were taken three times at different time intervals by the same observer to alleviate the error. The mean of three readings was taken as the final reading. These metric readings were then tabulated and subjected to statistical computations (stepwise discriminant function analysis).



Fig. 2. Sliding Caliper.

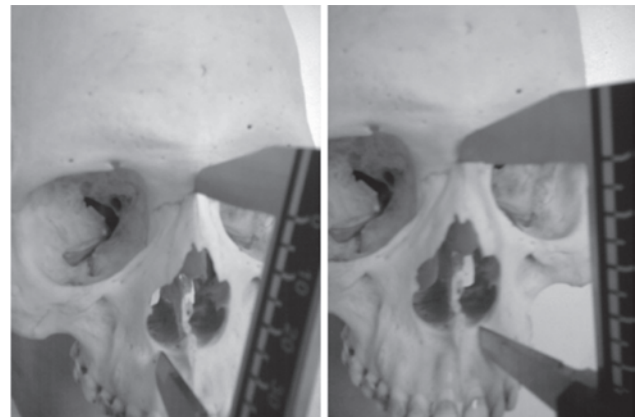


Fig. 3. Nasal Height.

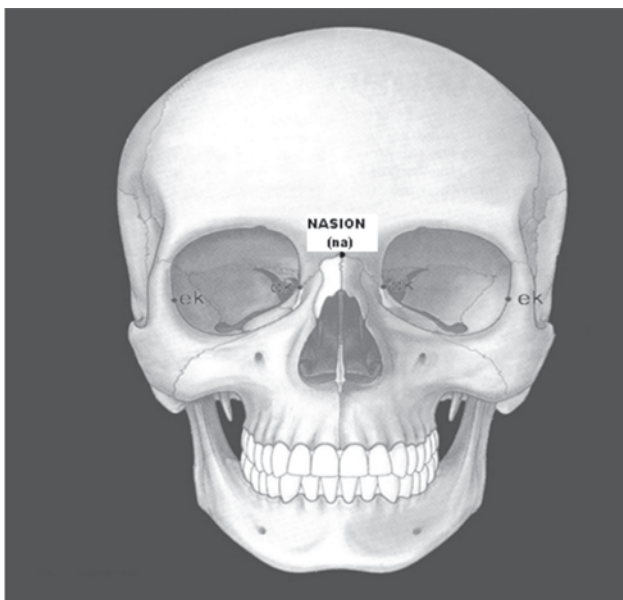


Fig. 1. Nasion: Bony landmark in skull.



Fig. 4. Nasal Breadth

METRIC MEASUREMENTS (IN MM)

- Nasal Height (NLH)¹⁰** (Fig. 3): The average height from nasion to the lowest point on the border of the nasal aperture on either side.
- Nasal Breadth (NLB)¹⁰** (Fig. 4): The distance between the anterior edges of the nasal aperture at its widest extent.
- Nasal Index¹¹**: $\frac{\text{Nasal height} \times 100}{\text{Nasal breadth}}$

RESULTS AND OBSERVATIONS

Statistical significance of metric measurements between males and females

t - test was applied to all the metric measurements and following results were found out (Table 1) :

Table 1. Mean and p-value

Measurements (in mm)	Mean		P value
	Male	Female	
Nasal Height	49.55	46.82	<.05**
Nasal Breadth	25.44	24.41	> .05*
Nasal Index	51.61	52.64	>.05*

*p > 0.05 Insignificant **p £ 0.05 Significant
 *** p£ 0.005 Highly significant

Statistical analysis of metric measurements by stepwise discriminant function analysis

SPSS PC+ program was used and following results were found out after using stepwise discriminant function analysis to the metric measurements (Table 2 & 3)

Table 2. Classification function coefficients

Measurements (in mm)	Sex	
	0 (Male)	1 (Female)
Nasal height	2.109	1.993
Constant	-52.956	-47.350

Fisher's linear discriminant functions

Table 3. Classification results

	SEX		Predicted Membership	Group	Total
	%				
Original		0	80	20	100
		1	36.7	63.3	100
Ungrouped cases			0	100	100

71.70% of original grouped cases correctly classified.

After applying stepwise discriminant function analysis to the metric observations, 71.7% of the skulls were correctly classified.

Following equation for sex determination of unknown skull was obtained using the sex discriminant functions of the above measurement:

For males

Score = X1 × 2.109 – 52.956

For females

Score = X1 × 1.993 – 47.35

X1 = Nasal Height

DISCUSSION

Inoue et al¹² in his study on sex determination by discriminant function analysis of lateral cranial form in 50 male & 50 female adult Japanese skulls had reported sex differences in the nasal bone, supraorbital ridge, forehead & vertex. The nasal bone & supraorbital ridge were more developed in male contour line.

Table 4. Nasle Breadth

Author	Population studied	MEAN	
		MALE	FEMALE
Kajanoja ⁴	Finnish crania	2.49	2.41
Giles and Elliot ¹³	American Negro	27..23	26.15
Giles and Elliot ¹³	American Whites	24.27	23.12
Steyn and Iscan ⁸	South African whites	24.8	22.9
Matamala DAZ ¹⁴	Skulls from individuals with white,brown & black skin	25.83	25.14
Present study	Indian punjab skulls	25.44	24.41

Nasal breadth was studied by various authors in their studies on skulls and it was reported that mean nasal breadth was more in skulls of male individuals as compared to skulls of female individuals which is in agreement with the present study (Table 4). Johnson et al in his study on human skulls has reported that nasal breadth was among one of the best variables for classification of sex in caucasoids as well as mongoloids.

Table 5 NASAL HEIGHT

Author	Population studied	P value
Song et al ¹⁵	Chinese skulls	NH< 0.05 NB>0.05
Carpenter ¹⁶	American Whites & Blacks	NH<0.05 NB<0.05
Present study	Indian Punjab crania	NH<0.05 NB> 0.05 NI>0.05

Song et al¹⁵ in his study on sex diagnosis of Chinese skulls using multiple stepwise discriminant function analysis had concluded that nasal height is significant in sex determination whereas nasal breadth is insignificant using t-test (Table 5). This is in consonance with the present study. Carpenter¹⁶ in his study on crania of American Whites & Blacks has reported that both nasal height & nasal breadth are significant in sex determination (Table 5). He also concluded in his study that nasal height was among the five variables which accounted for most variation by sex using stepwise discriminant analysis which is in agreement with the present study also.

In the present study, mean values for all the metric observations are higher in skulls of male individuals except for nasal index which was found to be higher in skulls of female individuals.

Discriminant function analysis results

Selected variables were subjected to both stepwise discriminant function analysis to calculate specific discriminant formulae. In the present study one measurement (nasal height) was found to be the best sex discriminator and 71.7% of the skulls were correctly classified (Table 3).

Till now most of the equations for sexual dimorphism have been calculated on whole of the skull by discriminant function analysis. But in determination of sex from fragmentary cranial remains where whole of skull is not available, it is important to find out the value of sex determination from various regions individually. In the present study, nasal index has been studied.

Johnson et al² found out in his study that best discriminators for sex are not necessarily the best for race. The sex within each race is best described by a unique discriminant function. Thus discriminant function equation obtained in the present study for sex determination is unique to skulls of Indian population only and this will provide a comprehensive basis for future sexing of complete or fragmentary cranial material.

SUMMARY AND CONCLUSION

There have been many studies on sexing of skeletal material, particularly skulls, from different populations. Regional variations may be because of race differences and functional anatomy of a particular group. The present study was initiated with the aim of evaluating the usefulness of nasal index in determination of sex. Very sophisticated methods of

statistical analysis (stepwise discriminant function analysis) were used in the present study to increase the accuracy of sex determination.

Mean values for all the metric observations are higher in skulls of male individuals except nasal index which was found to be higher in skulls of female individuals. Measurements whose means have been found to be statistically significant in sex determination of skulls by applying the t-test is nasal height. The measurements whose means have been found to be statistically insignificant is nasal breadth & nasal index. Similarly, the most reliable measurements after applying stepwise discriminant function analysis is nasal height which was able to classify correctly 71.7% of the skulls.

The discriminant function equations obtained in the present study for sex determination is unique to skulls of Indian population only. Thus, the study has also resulted in development of population specific craniometric standards designed for sex assessment from the skulls of Indian population. The present study also established the following facts:

- Predictive value of sex determination does not depend upon the number of variables that are being used but depends upon discriminatory power of the variables.
- Determination of sex from craniometric methods/indices is one of the essential pre requisite for identification and in reconstruction for forensic purposes. Thus, reliable standards can be established from the present study on the basis of statistically valid data and can be used for reconstruction methods for craniofacial identification.

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Study of Pattern of Injuries in Deaths due to Blunt Abdominal Trauma in Road Traffic Accident victims

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ABSTRACT

An autopsy study of deaths due to blunt abdominal trauma in victims of road traffic accidents was done at Department of Forensic Medicine, BMC&RI, Bangalore, with an aim to know the demographic trends and pattern of injuries. Data was collected from January 2008 to August 2008 and results were analysed. Eighty three cases of deaths due to blunt abdominal trauma in RTA were studied. Males constituted 85.56% and young population constituted the bulk (45.83%). Majority of the victims were pedestrians (42.16%) and heavy motor vehicles were the most offending factor amounting to 51.8%. Liver, kidney, mesentery and splenic injuries were present in 22.81%, 17.4%, 16.50% and 8.5% of the cases respectively. In liver, 23.59% showed transcapsular laceration with irregular/ multiple pattern of laceration, among splenic injury avulsed/ shattered laceration was the most common pattern present in 68.7% of cases and renal contusion were present in 76.4% of cases. Within an hour of the accident 51.8% of the victims died and 13.8% in next 6 hours.

Key words: Road Traffic Accident, Blunt Abdominal Trauma, Pattern of Injury, Survival Period, Cause of Death.

INTRODUCTION

The ultimate truth about life is "DEATH". No one has ever predicted the death though most of us fear it. Sudden death due to trauma is most devastating. Accidents are the leading cause of death due to trauma injury and tenth leading cause of all deaths. Now accidents are not considered as accidental as they are part of the price we pay for technological progress. Accident is an event occurring suddenly, unexpectedly and inadvertently under unforeseen circumstances. Accidents are at rise throughout the world especially in low and middle income countries like India. Among all types of accidents, those caused by motor vehicles claim the largest toll of life and tend to be most serious¹.

Victims of vehicular accidents sustain wide variety of injuries. Abdominal organs are vulnerable to the blunt force as these are not supported by any bony

cage except by massive lumbar vertebral column posteriorly, to some extent lower ribs anteriorly. Moreover, the diagnosis of abdominal injuries and its severity may be difficult as most of the times there are no or very few minor injuries visible externally. Pattern of abdominal injuries in victims of Road Traffic Accident (RTA) vary according to the status of victim, type of vehicle, position of the occupant and age.

MATERIAL AND METHODS

A prospective study was conducted during the period from January 2008 to August 2008 in the Department of Forensic Medicine, Bangalore Medical College and Research Institute, Bangalore. Victims of RTA brought for medico-legal autopsy with fatal blunt abdominal trauma were included and victims with fatal injuries other than blunt abdominal trauma were excluded. Ethical clearance for the study was obtained from the Institutional Ethical Committee. Data regarding deceased's age, gender, religion, occupation, literacy and per capita income; time and place of accident; circumstances of death were collected from the police and relatives. Socio-economic status of the deceased was graded by modified B G Prasad and Kumar's Classification² based on per capita income.

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Liver injuries were classified as contusion, laceration (transcapsular and subcapsular) and based on the part involved as coronal, inferior surface and contour coup at posterior surface.³

Grading of Splenic injury:⁴

Grade 1: Subcapsular hematoma of less than 10% of surface area or capsular tear of less than 1 cm in depth.

Grade 2: Subcapsular hematoma of 10%–50% of surface area, intraparenchymal hematoma of less than 5 cm in diameter, or laceration of 1–3 cm in depth and not involving trabecular vessels.

Grade 3: Subcapsular hematoma of more than 50% of surface area or expanding and ruptured subcapsular or parenchymal hematoma, intraparenchymal hematoma of more than 5 cm or expanding, or laceration of more than 3 cm in depth or involving trabecular vessels.

Grade 4: Laceration involving segmental or hilar vessels with devascularisation of more than 25% of the spleen.

Grade 5: Shattered spleen or hilar vascular injury.

Grading of Renal injury:⁵

Grade 1: Renal contusion or contained subcapsular haematoma.

Grade 2: Cortical laceration without urinary extravasation.

Grade 3: Parenchymal lesion extending more than 1 cm into renal substance.

Grade 4: Laceration extending across cortico-medullary junction.

Grade 5: Renal fragmentation or reno-vascular pedicle injury.

RESULT

During the study period, 83 cases of RTA with fatal blunt abdominal trauma were autopsied. Majority of the victims were male accounting to 85.56% (Table 1). Among the victims 75.9% were literate and 48.19% belonged to lower middle socio-economic class. Most of the victims (45.83%) were in the age group of 20-29 years (Table.1). Maximum victims were pedestrians (42.16%), followed by motor cycle rider (27.71%) (Table

2). More than half (51.8%) of the offending agents were heavy motor vehicles (Table 3). External abdominal injury was absent in 32 cases (38.56%). Fracture of lower ribs was seen in 45 cases among which 28 cases (62.22%) showed liver injury and 9 cases (20%) showed splenic injury (Table 4). Overall, most common organ injured was liver (22.81%), followed by kidney (17.4%) and mesentery (16.50%) (Table 5). Among liver injury, transcapsular laceration was most common (47.19%), followed by irregular/ multiple lacerations (23.59%) (Table 6). In splenic injury, majority (68.7%) were shattered and avulsed type (Table 7). In the kidneys, contusions (19.04%) were common (Table 8). Within an hour of accident 51.83% of the victims succumbed to injuries (Table 9); and, shock and hemorrhage was the cause of death in 77.10% cases (Table 10).

Table 1. Age & sex wise distribution of victims

Age (Years)	Male		Female		Total	
	No.	%	No.	%	No.	%
< 10	3	3.61	0	0	3	3.61
10 - 19	5	6.02	1	1.20	6	7.22
20 -29	32	38.55	6	7.22	38	45.83
30 - 39	15	18.07	1	1.20	16	19.27
40 - 49	10	12.04	0	0	10	12.04
50 - 59	2	2.40	2	2.40	4	4.81
60 - 69	2	2.40	1	1.20	3	3.61
≥ 70	2	2.40	1	1.20	3	3.61
Total	71	85.54	12	14.46	83	100

Table 2. Distribution of victims according to status

Status of the Victim	No.	%
Pedestrian	35	42.16
Motorcycle Rider	23	27.71
Motorcycle Pillion rider	9	10.84
LMV Occupant	7	8.41
HMV Occupant	9	10.84
TOTAL	83	100

Table 3. Distribution of offending agents

Offending Agent	No.	%
Motorcycle	15	18.07
LMV	21	25.3
HMV	43	51.8
Hard surface	2	2.4
Not known	2	2.4
Total	83	100

Table 4. Internal organ injury associated rib fracture

Organ	No.	%
Diaphragm	24	53.33%
Liver	28	62.22%
Spleen	09	20.00%
Kidney	00	00.00%

Total 5. Distribution of abdominal organs injured

Organ	No. of Injuries	%
Liver	47	22.81
Gall Bladder	10	4.85
Spleen	17	8.25
Pancreas	01	0.48
Small intestine	17	8.25
Large intestine	10	4.85
Mesentery	34	16.50
Great vessels	04	1.94
Kidneys	36	17.4
Pelvis	24	11.65
Vertebrae	06	2.91
Total	206	100

Table 6. Pattern of liver injury

Type of injury	No. of injuries	%
Subcapsular	5	5.6
Transcapsular	42	47.19
Coronal	8	8.9
Inferior Surface	8	8.9
Posterior Surface	5	5.6
Irregular / Multiple	21	23.59
Total	89	100

Table 7. Pattern of splenic injury

Pattern of injury	No.	%
Contusion	1	5.6
Grade 1	0	0
Grade 2	0	0
Grade 3	2	12.5
Grade 4	2	12.5
Grade 5	11	68.7
Total	16	100

Table 8. Pattern of renal injury

Pattern of injury	Right kidney	Left kidney	Total
Grade 1	15	11	26
Grade 2	0	0	0
Grade 3	0	2	2
Grade 4	2	0	2
Grade 5	2	2	4

Table 9. Distribution of cases based on survival period:

Survival period	No.	%
Spot death	24	28.91
<1hr	19	22.89
1 – 6hrs	12	13.48
6 – 24hrs	12	13.48
24 – 48hrs	6	7.22
2days – 7days	7	8.43
>7days	3	3.61
Total	83	100

Table 10. Distribution of cases based on cause of death

Cause of death	No.	%
Shock & haemorrhage	64	77.10
Shock	4	4.81
Injuries sustained	3	3.61
Septicaemia	9	10.84
ARDS	2	2.4
Coma	1	1.2
Total	83	100

DISCUSSION

In our study there was a clear predominance of male victims (M:F:6:1). This is similar to the result of the study by Singh H¹, where the males outnumbered females in ratio of 9:1. Males were the predominant victims in other studies also.^{6,7,8}

Maximum number of victims were in the age group of 20-29 years (45.83%) followed by 30-39 (19.27%). This rate is in accordance with the study done by Singh YN⁷ where the age group 21-30 years showed almost 1/3rd of total victims followed by 31-40 years (24.78%). This high rate among young adults could be because of lack of maturity, higher rate of exposure, learning and exploring idea with risk taking behavior.

Even the socio-economic status showed a classic crowding. Maximum number of deaths occurred in lower middle (49.19%) followed by upper lower class (20.48%). This probably indicates low purchasing power, long distance travel to earn more, poor safety of vehicles and unawareness regarding road safety even though 75.9% of the victims were literate.

Singh H¹ observed that pedestrians were the commonest group of victims involved, (28.7%), followed by occupants of cabs and jeeps (25.8%) and motor cyclists (23%)¹. In another study, it was observed that majority of the victims to be pedestrian (47%) followed by occupants/pillion riders (27.61%) and drivers/riders (14.20%).⁷ Our observations showed that 42.16% of the victims were pedestrians, followed by 27.71% motor-cycle riders which is in accordance with the above studies and also with the study undertaken by Union Ministry of Urban Development conducted in Bangalore which showed that pedestrians are the worst hit victims in RTA and this death rate is third highest in the country.⁹

In the present study also heavy vehicles were involved in most of the fatalities (51.8%), followed by light motor vehicles (25.3%). Similar findings were observed in the studies by Singh H¹ and Kaul A et al.¹⁰

Lower ribs were fractured in 54.21% of the cases of which 24 cases (53.33%) showed diaphragmatic contusion, 28 cases i.e, 62.22%, showed liver laceration and 9 cases splenic laceration. This was in accordance with study of Sherif MK et al.¹¹

Wakeman C et al¹² noted in their study that liver injuries occur commonly in blunt abdominal trauma. There were 93 cases with liver injuries during the five-year period reviewed, 71 cases were adults. Most of the liver injuries in adults were due to RTA. Similar findings were observed in our study, where liver was the most commonly affected organ. Studies by Shir Yazdi M et al¹³, Wegner S et al¹⁴, Kumar M et al¹⁵ and Herr S et al¹⁶ also showed similar results. In this study, splenic injury was present in 20.48% of cases and Grade 5 type of lacerations was most common pattern of injury (62.22%). Our findings are in accordance with Grandrath FA who observed splenic trauma accounts for approximately 25% to 30% of all intra-abdominal injuries.¹⁷ Among the 17 cases of small intestinal injuries observed, jejunum was injured in most followed by ileum which is in accordance with Coskun AK et al.¹⁸ Among the 34 cases of mesenteric injuries observed, 40% of mesenteric injuries were isolated finding and the remaining 60% had associated bowel injury. Similar observations were also noted by Herr S et al¹⁶ and Brofman N.¹⁹ It was observed in this study that all the renal injuries were associated with other visceral injuries, indicating that renal injuries were not solely fatal. This is in accordance with study by Hosam S et al.²⁰

In our study, 51.83% victims died either on the spot or within 1 hour of accident. Shir Yazdi M²¹ in Pakistan and Singh H¹ in Indian population also have similar figures of distribution of death related to time of survival. Shock and haemorrhage was the cause of death in 77.10% of the victims in our study, which was also the most common cause of death (36.9%) in the observations of Singh H.¹

CONCLUSION

Blunt abdominal trauma is one of the more complex issues which if not handled carefully, can cause major disasters in terms of mortality and morbidity. Males were affected most in our study, which also matched with other studies giving a global picture, with one third of the victims being in the middle age group, which is the active productive population of our country on whom other family members are dependent. From the study it is evident that whenever any RTA case is being treated, an open eye to any of

the earliest signs or symptoms indicating blunt abdominal trauma can definitely reduce the mortality. A standard protocol can be developed to examine any RTA case just by comparing and studying the pattern of injuries

Due to fast urbanisation, number of RTAs and parallel deaths due to blunt abdominal trauma are on an increasing rate. Educating, proper barricading and developing safety measures can to some extent prevent pedestrian accident which is the highest; and, immediate diagnosis and successful management of victims of RTA will definitely help in reducing the mortality and morbidity. Fatality can also be reduced effectively by the establishment of Trauma Care Centre at every taluk and district. Development of a standard protocol for identification, diagnosis and treatment of blunt abdominal trauma will be of great use.

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Evaluation of Lip-Prints in Identical Twins

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ABSTRACT

The word "twin", is obtained from old English: twin", meaning two-fold, double, two by two. Twins have been regarded with fascination and great awe since ancient times.

Identification or pin-pointing a particular individual of the twin is a mammoth task because of tremendous resemblance both physically and genetically.

Edmond Locard was one of the France' greatest criminologists who first recommended the use of lip print in personal identification and criminalization. The appearances of lip prints, like finger prints, vary from person to person.

The current study was performed to assess the intra-pair differences and variations of the lip-prints in identical twins and to determine whether the theory of uniqueness holds true for identical twins. Present study comprised of 25 pairs of identical twins, two sets of lip-prints were obtained from each pair of twin and labelled appropriately. Each pair of lip-print was then assessed with a good magnifying lens for intra-pair differences using Suzuki's Classification.

It was concluded that discrimination between a pair of identical twins can be made easy if lip-prints are assessed systematically and thoroughly.

Key words: *Twin, Lip prints, Identification, Suzuki Classification.*

INTRODUCTION

The word "twin", is obtained from old English :twin", meaning two-fold, double, two by two; akin to old German "zwinal", born a twin and Middle English, "getwin".

Modern English Dictionaries define the verb, "twin", as to match or to link together one with another, or to divide one into two equal parts. Literature has displayed a similar multiplicity of meaning when dealing with twins and the whole issue of doubling. Twins have been regarded with fascination and great awe since ancient times.

TYPES OF TWINS

1. Monozygotic /Identical twins:They are derived from the division of a single zygote [fertilised

ovum] during the first developing stages of the embryo after fertilization, hence the term monozygotic. Each of these twin usually has its own amniotic/inner membrane. 60% of twins have their own amniotic sacs and are contained within the same chorionic /outer membrane. However, like fraternal twins, monozygotic twins have separate amniotic and chorionic sacs and placentas. 25% of monozygotic twins have separate amniotic and chorionic sacs.

2. Dizygotic/ fraternal twins:They are derived from fertilization of two independently released ova- hence in dizygotics there will be not more genetically alike than ordinary brothers and sisters. Fraternal twins can be same sex or boy-girl. Egg pairs occur when there are multiple ovulations during the same ovulation cycle. Each egg is fertilised singly and develops singly. Dizygotic twins usually have their own inner and outer sacs, but can share placentas during instances when the placentas fuse. There are instances of two eggs being fertilized by two different sperms. Women have delivered twins fathered by two different men, as genetic tests have proven.^{0,0,0,0}

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3. **Half identical twin:** This could occur when the mother's egg splits before fertilization and each half is then fertilized by a different sperm also called as polar body twinning.
4. **Siamese/conjoined twins:** They arise from incomplete or late division of the zygote and subsequent cell masses result in conjoined twins. One in 50,000 to 80,000 births results in conjoined twins
5. **Mirror Image twins:** Twins who separate later in the course of development –like conjoined twins, they show signs of reversed asymmetrical physical characteristics. The “mirror effect” shows up in handedness, hair whorls, tooth development, birthmarks. Scientists also note that mirror and conjoined twins can be “opposites” personality-wise too. Mirror imaging occurs in nearly 25% of monozygotic twins.
6. **Disappearing twin:** Discovered in later part of 20th century due to advances in imageology-which enabled the doctors to examine within the uterus. Often a pregnancy which initially diagnosed as a twin pregnancy, later on leads to birth of one child. Scientists theorize that the other twin was absorbed by the surviving twin, or was aborted mid-pregnancy due to malnourishment. Few times, baby will be born with the sibling “still attached” as a cyst, an extra limb or more internal organs.
7. **Super twins:** More than a pair born at once. Combination can include monozygotic triplets and quadruplets [Dionne Quintuplets being the only known living identical quintuplets], or a combination of monozygotes with dizygotes. Most common is multiple birth which arises from multiple eggs being fertilised simultaneously.

DETERMINATION OF ZYGOSITY OF TWINS

MONOZYGOTIC TWINS: To determine if a twin pair is monozygotic, their sex has to compulsorily be the same. Eye colour is a genetically fixed trait. Monozygotic twins have same iris colour. Dizygotic may/ may not have same colour. Hair colour and form in monozygotic twins are same. Blood group is also the same.

HETEROZYGOTIC TWINS: Iris colour may be different. Hair colour and form in heterozygotic twins may be different.

It is clear from the table above that identification or pin-pointing a particular individual of the twin is a mammoth task because of tremendous resemblance both physically and genetically.

Forensic Odontology has been defined by Keiser-Nielson [1970] as that branch of odontology which in the interest of justice deals with the proper handling and examination of dental evidence and with the proper evaluation and presentation of dental findings.

It has been estimated with the help of computers that there were two billion possibilities in charting of adult dentition. This would rule out the possibility of two adults having exactly the same or identical mouths and it is on this fact that the science of Forensic odontology was based.

In the eye of most law enforcement agencies and courts, dental and oral maxillofacial clues are valid and reliable methods. E.g. finger printing and blood group procedures.

It is a common saying that no two individuals are identical. But what about clones of Nature? Identical twins, with the identical genetic makeup that have almost identical physical characteristics, enough to even baffle and confuse close relatives and friends.

How close is the similarity between twins expressed dentally?

Could the dentitions of identical twins be similar enough to pose a problem to a Forensic Odontologist?

As far as orofacial features and dental make-up is in question following parameters can be checked for:

1. Dmf / Def index
2. Molar relation
3. Overjet
4. Overbite
5. Rotation
6. Maxillary/mandibular arch width
7. Maxillary/mandibular arch length
8. Maxillary/mandibular arch shape
9. Number of rugae
10. Molar width
11. Cusp of carabelli
12. No. Of cusp on mandibular first molar
13. Mandibular second premolar width/ groove anatomy
14. Craniofacial measurements
15. Bit marks [subjective/objective]
16. Lip prints

Of these, literature reveals that molar relation, maxillary/mandibular arch shape, number of cusps on mandibular first molar resemble each other in the given set of twin pair. Hence, these parameters if used will not help us in differentiating one twin from the other. Objective measurement in bite marks and lip

prints tend to show much difference among the twin pairs. Edmond Locard was one of the France' greatest criminologists who first recommended the use of lip print in personal identification and criminalization¹.

Lip prints are normal lines, fissures in the form of wrinkles and grooves present in the zone of transition of human lip between the inner labial mucosa and outer skin. The appearances of lip prints, like finger prints, vary from person to person.²

REVIEW OF LITERATURE

In an attempt to differentiate among each pair of twins, following studies were recorded:

Sr	Researcher	Year	Study
1.	Kazuo Suzuki & Yusav Tsuchichashi ³	1970	They compared lip-prints of 18 uniovular twins aged 12-13 years of age. The lip-prints of these twins were extremely alike and their characteristics were inherited either from mother or father. No lip-prints manifested the same pattern in 280 individuals [age 6-57 years]. In total of 1400 subjects including 49 teen aged monozygous twins, repeated lip-prints over three years period showed persistently constant individual patterns
2.	Mc.Donell ⁴	1972	Described two identical twins who seemed to be indistinguishable dentally, but lip prints, hand-writing, voice prints and nail-clippings differed
3.	Hirth L., Gottsche H., Gwedde H.W ⁵	1977	Studied a sample of 500 persons including 76 families with 133 children, 22 monozygotic and 17 dizygotic twins. Lip prints were prepared for the study of variability and genetical basis of ridge patterns in the region of the mucous membrane of the lips. Taking 4 classes of patterns with different ridge branching as a basis they observed more frequent branched patterns of the upper lip and mainly simple pattern on the lower lip. About 30% of the lip prints showed whirling figures at the upper lip, simple and median at the lower lip. Investigations during several months showed stability against environmental factors. The results of the twin families, mother/father and child combinations proved a genetic basis for lip-prints.

AIM OF STUDY

1. To assess the intra-pair differences and variations of the lip-prints in identical twins
2. To determine whether the theory of uniqueness holds true for identical twins.
3. To estimate the co-relation between the lip-prints of each pair and thereby chalk out the trend followed in the lip-patterns

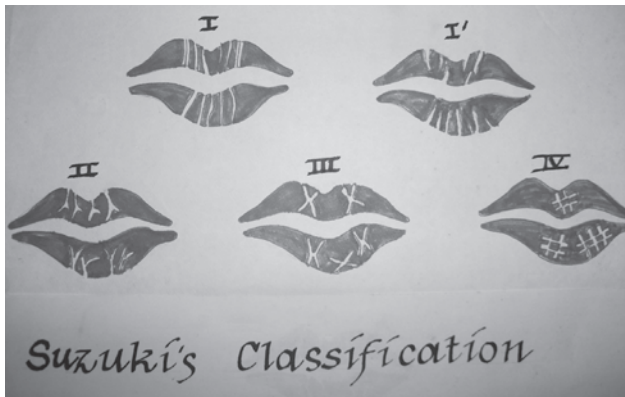
METHOD OF OBTAINING LIP-PRINTS

Lip-prints were obtained on bond paper by pressing the lips initially in the centre, left and then right side after applying dark frosted lipstick on the individuals vermilion border. Two sets of lip-prints were obtained from each pair of twin and labeled appropriately. Care was taken no lesion active or passive was present on the lip

MATERIAL AND METHOD

Present study comprised of 25 pairs of identical twins (25x 2=50 individuals) in an age range of 4-30 years. Of these 17 pairs were females and 8 were males.

Each pair of lip-print was then assessed with a good magnifying lens for intra-pair differences using Suzuki's Classification.



SUZUKI'S CLASSIFICATION

Suzuki's Classification: Pictorial representation

- I Complete longitudinal grooves/end-to-end running vertically across the lips
- I' Incomplete / Partial longitudinal grooves
- II Y-shaped [Branched] pattern
- III Criss-cross pattern
- IV Checks / at right angles

Pair no	Twin 1	Twin 2
P1	$\begin{array}{c c} \text{I I}' & \text{I I}' \\ \hline \text{I I}' & \text{I I}' \end{array}$	$\begin{array}{c c} \text{I III} & \text{III II} \\ \hline \text{I I}' & \text{I I}' \end{array}$
P2	$\begin{array}{c c} \text{I I} & \text{I I} \\ \hline \text{I I} & \text{I I} \end{array}$	$\begin{array}{c c} \text{I I} & \text{I I} \\ \hline \text{I I}' & \text{I I}' \end{array}$
P3	$\begin{array}{c c} \text{III II} & \text{II I} \\ \hline \text{II I} & \text{I II} \end{array}$	$\begin{array}{c c} \text{II I} & \text{II I} \\ \hline \text{II I} & \text{I II} \end{array}$
P4	$\begin{array}{c c} \text{II I} & \text{I I} \\ \hline \text{I I}' & \text{I I}' \end{array}$	$\begin{array}{c c} \text{I I} & \text{I II} \\ \hline \text{I I} & \text{I II} \end{array}$
P5	$\begin{array}{c c} \text{I II} & \text{I III} \\ \hline \text{II I} & \text{I II} \end{array}$	$\begin{array}{c c} \text{I II} & \text{I II} \\ \hline \text{II II} & \text{I II} \end{array}$
P6	$\begin{array}{c c} \text{I III} & \text{III I} \\ \hline \text{II I} & \text{I I} \end{array}$	$\begin{array}{c c} \text{I III} & \text{III I} \\ \hline \text{II I} & \text{I I} \end{array}$
P7	$\begin{array}{c c} \text{I I}' & \text{I II} \\ \hline \text{I II} & \text{I I} \end{array}$	$\begin{array}{c c} \text{I I} & \text{I I}' \\ \hline \text{I II} & \text{III I} \end{array}$
P8	$\begin{array}{c c} \text{I II} & \text{III I} \\ \hline \text{II III} & \text{II I} \end{array}$	$\begin{array}{c c} \text{I I}' & \text{I I} \\ \hline \text{II II} & \text{III I}' \end{array}$
P9	$\begin{array}{c c} \text{I I}' & \text{I II} \\ \hline \text{I I}' & \text{I II} \end{array}$	$\begin{array}{c c} \text{I I}' & \text{I II} \\ \hline \text{I I}' & \text{I II} \end{array}$
P10	$\begin{array}{c c} \text{I II} & \text{II II} \\ \hline \text{I II} & \text{II II} \end{array}$	$\begin{array}{c c} \text{I III} & \text{III II} \\ \hline \text{II I}' & \text{I II} \end{array}$

Sr.no	Twin 1	Twin 2
P11	$\begin{array}{c c} \text{I II} & \text{II I} \\ \hline \text{I I}' & \text{I I}' \end{array}$	$\begin{array}{c c} \text{I II} & \text{II I} \\ \hline \text{I I}' & \text{I I}' \end{array}$
P12	$\begin{array}{c c} \text{I III} & \text{III I}' \\ \hline \text{II I} & \text{I II} \end{array}$	$\begin{array}{c c} \text{I III} & \text{II I}' \\ \hline \text{II I}' & \text{II II} \end{array}$
P13	$\begin{array}{c c} \text{II II} & \text{I II} \\ \hline \text{I I} & \text{I I}' \end{array}$	$\begin{array}{c c} \text{II II} & \text{I II} \\ \hline \text{I I} & \text{I I}' \end{array}$
P14	$\begin{array}{c c} \text{I II} & \text{I I}' \\ \hline \text{I I} & \text{I II} \end{array}$	$\begin{array}{c c} \text{I I}' & \text{II I} \\ \hline \text{I II} & \text{I I} \end{array}$
P15	$\begin{array}{c c} \text{II II} & \text{I II} \\ \hline \text{II II} & \text{II I} \end{array}$	$\begin{array}{c c} \text{II I} & \text{I I} \\ \hline \text{I II} & \text{II I} \end{array}$
P16	$\begin{array}{c c} \text{II II} & \text{II II} \\ \hline \text{I I} & \text{I II} \end{array}$	$\begin{array}{c c} \text{II III} & \text{II II} \\ \hline \text{II II} & \text{I II} \end{array}$
P17	$\begin{array}{c c} \text{I I}' & \text{I I}' \\ \hline \text{I I}' & \text{II I}' \end{array}$	$\begin{array}{c c} \text{I I}' & \text{I II} \\ \hline \text{I I}' & \text{II I}' \end{array}$
P18	$\begin{array}{c c} \text{II II} & \text{II II} \\ \hline \text{II II} & \text{II II} \end{array}$	$\begin{array}{c c} \text{II II}' & \text{II II} \\ \hline \text{II II} & \text{I II} \end{array}$
P19	$\begin{array}{c c} \text{II I} & \text{II II} \\ \hline \text{I II} & \text{I II} \end{array}$	$\begin{array}{c c} \text{I III} & \text{II II} \\ \hline \text{I II} & \text{I II} \end{array}$
P20	$\begin{array}{c c} \text{I I II III} & \text{III II I}' \\ \hline \text{II I II III} & \text{III III I I} \end{array}$	$\begin{array}{c c} \text{I II III III} & \text{III II I I}' \\ \hline \text{I I II III} & \text{III III I I} \end{array}$
P21	$\begin{array}{c c} \text{II III III II} \\ \hline \text{II I I II} \end{array}$	$\begin{array}{c c} \text{I III III II} \\ \hline \text{II I I I I} \end{array}$
P22	$\begin{array}{c c} \text{I II} & \text{II II} \\ \hline \text{II II} & \text{II II} \end{array}$	$\begin{array}{c c} \text{I I} & \text{III I} \\ \hline \text{I I} & \text{I II} \end{array}$
P23	$\begin{array}{c c} \text{I II} & \text{II I} \\ \hline \text{I II} & \text{II II} \end{array}$	$\begin{array}{c c} \text{I I}' & \text{II I} \\ \hline \text{I II} & \text{I II} \end{array}$
P24	$\begin{array}{c c} \text{I IV} & \text{III II} \\ \hline \text{II I} & \text{I II} \end{array}$	$\begin{array}{c c} \text{I III} & \text{III I} \\ \hline \text{II I} & \text{III II} \end{array}$
P25	$\begin{array}{c c} \text{II I} & \text{II II} \\ \hline \text{II I} & \text{I II} \end{array}$	$\begin{array}{c c} \text{II II} & \text{I II} \\ \hline \text{I II} & \text{I II} \end{array}$

RESULTS

Differences in lip-patterns = 24 pairs
 Identical patterns = 1 pair
 Mirror image in Upper Lip = 3 pairs
 Lower Lip = 2 pairs
 Same Pattern Only in Lower Lip = 1 pair

DISCUSSION

The study of lip prints is called Cheiloscopy. It is a method of identification of a person based on the characteristic arrangement of lines appearing on the red part of the lips. It is safe, however, to assume that cheiloscopy, in its present stage of development, has surpassed the limits of a method and has become a means of criminalistics identification.⁶ Lip prints are unique and do not change during the life of a person.⁷ However, major trauma to the lips may lead to scarring, pathosis and the surgical treatment rendered to correct the pathosis may affect the size and shape of the lip, thereby, altering the pattern and morphology of grooves.⁸ It has also been suggested that variations in patterns among males and females could help in sex determination.⁹ Lipstick smears can lead to indirect proof of a relationship or contact between a victim and a suspect or a suspect and a crime scene¹⁰. Hence in addition to fingerprints, lip prints can be of forensic interest.

The present study undertaken, made us closely realize the similarities and the differences in identical twins. And often it made us believe that indeed two individuals, no matter how much they resemble each other had differences. Even certain twins staying separate from each other showed unbelievable similarities. On the other hand twins persisting under same roof, with exposure to same environmental factors showed vast differences.

Lip prints in the present study were assessed thoroughly as they were acquired. Then they were studied to gauge the similarities and differences. If at all the patterns coincided in both individuals, inter-pattern distance was taken into consideration.

It was interesting to know that 3 set of twins showed mirror image of lip-print configuration in the upper lip. Whereas 2 pairs of twins showed the mirror image in the lower lip.

Most pairs showed that inter-twin lip patterns do not resemble each other. Thus theory of uniqueness can be applied and behold a potential for identification along with finger prints and other time tested forensic investigations.

Reliability still remains bleak since not many reports support this type of study.

CONCLUSION

Difference in a single twin pair may look difficult and various parameters need to be taken into consideration. Few studies have been undertaken due to lack of sample size and difficulty in getting homozygous twins. Discrimination between a pair of identical twins can be made easy if lip-prints are assessed systematically and thoroughly.

However, due to a small sample size a firm hypothesis cannot be arrived at. We need to explore some more set of twins and ascertain whether lip prints behold the potential for identification in identical twin pair

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A Retrospective Study of Suicidal Deaths at District Hospital, Tumkur

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ABSTRACT

Suicide is one of the causes of unnatural deaths. The pattern of suicide and the incidence of suicide vary from country to country. Society plays a major role in occurrence of suicides. To know the pattern of suicides a retrospective study of the autopsies conducted at district hospital Tumkur between the years 2006 - 2010 were considered. Of the total 2288 autopsies conducted during this period, 1155 deaths were due to suicides. The incidences of suicidal deaths are more in male than female with the ratio of 1.6: 1. The preferred modes of suicides were poisoning (448), hanging (268), burns (200), drowning (140) and train accidents (99).

Key words: Unnatural Deaths, Suicides, Poisoning, Hanging.

INTRODUCTION

Suicide is one of the most causes of unnatural deaths in the developing countries. Suicide means killing oneself to end his/her existence in this world. Most of the time people commit suicide when they feel dejected or depressed over their life or situations created, which they cannot face or failure in their performance in the field of work. People believe that the causes for suicide in one's life depends on bitter childhood experiences such as a lack of parental love and affection, physical abuse, more expectations in the life achievements. The other factors which also contribute to occurrence of suicide are loneliness, depression, stresses and strains of modern day life, alcohol dependence, chronic illnesses, marital problems, love failure, poverty, debt and unemployment. Poverty may not be a direct cause but it can increase the risk of suicide. Kasinathan N (1999)¹⁴ in his study says suicidal behavior is often referred to as a "cry for help", because it appears that most people who commit suicide or attempt to commit suicide really did not want to die. Some want to end their pain and fail to see any other way to do so other than suicide. It is also viewed as "a coping mechanism used to deal with stress and undesirable life situations". The

method of suicide varies between the countries. The most preferred methods are pesticide poisoning, hanging, burns etc.

MATERIAL AND METHODS

The autopsies conducted at the district general hospital Tumkur between the years 2006 – 2010 were considered for this retrospective study. Of this, 1155 deaths were of suicidal in nature based on the police inquest, postmortem and forensic science lab reports. The selected cases were studied in respect to age, sex, methods employed for committing suicide.

RESULTS

The total autopsies conducted during this period was 2288, of this 1155 (50.48%) were of suicidal deaths. The suicidal deaths commonly seen in both sexes were poisoning, hanging, drowning, burns and train accidents. Table 1. shows, Incidence of suicides between the gender and various age groups. The incidence of suicidal deaths is more in male than female with the ratio of 1.6: 1.

The deaths were more among age groups between 21 – 30 years (35.51%), followed by 31 – 40 years (22.65%) and 11 – 20 years (16.34%). As the age rises¹⁶ incidence of suicides decreases in both sex groups.

Table 2. shows the common methods employed to commit suicides among both sexes are as follows,

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Table 1. Distribution of suicidal deaths by age-group and sex

Age Group	Male	Female	Total
< 10	13	8	21
11 - 20	83	102	185
21 - 30	247	172	419
31 - 40	179	84	263
41 - 50	113	39	152
51 - 60	52	18	70
61 - 70	19	13	32
>71	7	6	13
	713	442	1155

Table 2. Methods used to commit suicide in both sex

Suicide Methods	Male	Female	Total	Percentage
Organophosphorous Poisoning	259	92	351	30.38%
Hanging	155	113	268	23.20%
Burns	73	127	200	17.31%
Drowning	97	43	140	12.12%
Train accidents	72	27	99	8.57%
Alcohol	14	0	14	1.21%
Miscellaneous poisoning	43	40	83	7.18%
Total	713	442	1155	100%

poisoning with organophosphorous compound 351(30.38%) followed by hanging 268 (23.20%), burns 200 (17.31%), drowning 140 (12.12%) and others 196 (16.96%) respectively.

DISCUSSION

Most of the suicides were due to family problems, some other were illness, love affairs, dowry dispute, drug abuse, poverty and crop failure in farmers.

In our study we found incidence of suicides is more in males 713(61.73%) compared to females 442(38.26%)^{1,2,4,5,7,9,10,11,15,18,19,20,21}. Our study differed from the other studies^{3,6} where females outnumbered males.

The incidences of suicides were more in age group of 21 – 30 years in both sexes and were similar to other studies^{2,7,11}. But the incidences of suicide in males were followed by 31 – 40 years and 41 – 50 years respectively. The incidences of suicide in females were followed by 11 – 20 years and 31 – 40 years respectively. In a study by Goren S.³ et al the occurrences of suicides in females were more in those under 20 years of age.

In our study the manner of committing suicides differed in both sexes. In males preferred methods were poisoning with organophosphorous compound followed by hanging and drowning, but in females methods used were burns followed by hanging and poisoning with organophosphorous compound. Our study was similar to other studies^{4,14} with poisoning

as first choice, but differed in other studies with respect to first choice where hanging^{2,3,5,7,11,20,21} or use of firearms^{1,10} or jumping from a height⁹ or carbon monoxide self poisoning¹⁹ is first method of choice. The use of firearms as a method to commit suicide is seen in other studies^{1,2,3,8,10} But in our study we did not find a single case of suicidal death using firearms. This shows use of firearms to commit suicide is none or least compared to other studies in different countries, is because of its nonavailability to common man easily. Poisoning with organophosphorous poisoning is more because of its easy availability in the household as insecticide sprays or for its use in agricultural purpose. Burns by way of self immolation, as mode to commit suicide is seen in both sexes in India, but more in females.

CONCLUSION

Suicide is a major public-health problem and is one of the most causes of unnatural death which can be prevented, if not atleast reduced by identifying the causative factors like in males, social and economic causes lead most to suicide, but it’s emotional and personal causes that drive females to the extreme step. In adolescents it is the love affairs and failure in exams are the one of the driving factors, farmers¹³ commit suicide in case of crop failure. The farmers need to be insured or provided support, so they don’t go into debt and consider suicide. There should be counseling centers at work place, at place of learning for students, family counseling centers all over to provide counseling and help any time.

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Death of A Chronic Smoker After Blood Donation: A Rare Case Report

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ABSTRACT

A blood donation is a process in which a person voluntarily has blood drawn and used for transfusions or made into medications by a process called fractionation. Various problems are encountered during and after the process of blood donation. In this paper we present an unusual case of death of a young male having history of chronic smoking, within two hours of blood donation. His pre-donation vitals were within normal range and he was not having any significant previous medical and family history. On autopsy and after histopathology, report revealed organizing thrombus in left coronary artery, partially blocking the lumen with atherosclerotic changes in the ascending aorta with pulmonary oedema. The present paper is a humble effort suggesting the preventive measures and care to be taken by healthcare persons towards blood donors like, rest to donor in lying position for minimum of 15 - 20 minutes, providing him high sugar snack, extra fluid supplement as well advising donor not to smoke for at least 3 hours after blood donation and not to do strenuous activity for minimum 5 hours.

Key words: Blood Donation, Death, Smoking, Coronary Thrombus.

INTRODUCTION

Blood is life. Blood cannot be artificially produced, though we know its constituents, but it can only be donated. A blood donation is a process in which person voluntarily has blood drawn and used for transfusions or made into medications by a process called fractionation¹ Blood donations are divided into groups based on who will receive the collected blood². An *allergenic* (also called *homologous*) donation is when a donor gives blood for storage at a blood bank for transfusion to an unknown recipient. A *directed* donation is when a person, often a family member, donates blood for transfusion to a specific individual³. Donors are typically required to give consent for the process and this requirement means that minors cannot donate without permission from a parent or guardian⁴. Donors are examined for signs and symptoms of diseases that can be transmitted in a blood transfusion, such as HIV, malaria, and viral

hepatitis. The donor is also examined and asked specific questions about their medical history to make sure that donating blood is not hazardous to their health. The donor's haematocrit or hemoglobin level is tested to make sure that the loss of blood will not make them anemic, and this check is the most common reason that makes a donor is ineligible⁵. Pulse, blood pressure, and body temperature are also evaluated. Elderly donors are sometimes also deferred on age alone because of health concerns⁶. Donors are usually kept at the donation site for 10–15 minutes after donating since most adverse reactions take place during or immediately after the donation⁷. Blood centers usually provide light refreshments or a lunch allowance to help the donor recover⁸. Hypovolaemic reactions can occur because of a rapid change in blood pressure. Fainting is generally the worst problem encountered⁹. Blood donation is as good as giving new life to the recipient patient. We rarely come across the complications of blood donation & it is very rare to see death in a donor. Sometimes death can occur if complications are not handled in time.

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In 2004 the International Society of Blood Transfusion (ISBT) and the European Haemovigilance Network (EHN) set up a Common Working Group

on Complications Related to Blood Donation (DOCO). The task was to create a set of definitions of issues in this new field, and thereby facilitate international benchmarking. The aim is to contribute to efforts to increase safety of blood donors worldwide. The intention of this standard is to present an internationally accepted description of the complications, including severity and imputability grades. A total of 18 categories have been defined as follows:¹⁰

A. Complications with local symptoms

- Thrombophlebitis
- Allergy (local)

B. Complications mainly with generalized symptoms

- Immediate Vasovagal reactions
- Immediate Vasovagal reaction with injury
- Delayed Vasovagal reaction
- Delayed Vasovagal reaction with injury

C. Complications related to apheresis

- Citrate reaction
- Haemolysis
- Generalised allergic reaction
- Air embolism

We hereby present an unusual case of death of 25 years old male, who was a chronic smoker, and died within two hours of blood donation.

CASE REPORT

A 25 years old male, weighing 87 kg., donated blood in the blood donation camp organized by a private firm at Aurangabad, Maharashtra. His pre-donation vitals were:

Blood Pressure - 124/86 mm of Hg.

Pulse rate - 84/minute.

Hemoglobin - > 12.5 gms %

He was a chronic smoker.

No significant previous medical and family history.

He donated blood at 5.00 p.m. uneventfully. Immediately after blood donation he went downstairs and smoked a cigarette. He complained of breathlessness, chest pain, vomiting and giddiness after half an hour. He was given primary resuscitation at the camp level and transferred to multi-specialty hospital. On receipt to the hospital in gasping condition at 6.45 pm patient was intubated and cardiac resuscitation was given but patient could not be revived, hence declared dead at 7.15 p.m. and was sent

for medico-legal postmortem examination at G.M.C.H. Aurangabad, Maharashtra.

AUTOPSY EXAMINATION

External examination

Clothes were soiled with vomitus. Well built young adult with evidence of I.V. puncture mark over ante-cubital fossa and cardio version-pad mark over chest. Cyanosis was evident at nail beds. Rigor-mortis was well developed in the whole body. Postmortem lividity was present over back and fixed.

INTERNAL EXAMINATION

No evidence of injury under scalp, skull intact.

Brain matter congested and oedematous, weight was 1450 grams. On cut section, it showed petechial hemorrhages over white matter.

Both lungs were congested and grossly oedematous, sub pleural hemorrhages seen over lung surfaces, trachea and bronchi showed a dark reddish froth in the lumen with fine food particles in the bronchial tree.

Heart weighed 325 grams and showed petechial hemorrhages over epicardial surface. Coronary ostia were patent with few atherosclerotic changes over ascending aorta.

Stomach contained 300 cc. of coffee colour fluid, without any peculiar smell, mucosa congested and hemorrhagic at places.

LABORATORY INVESTIGATION

No poison detected on chemical analysis.

Histopathology revealed organizing thrombus in left coronary artery partially blocking the lumen with atherosclerotic changes in the ascending aorta with pulmonary oedema.

DISCUSSION

Blood donation is life saving and inevitable. Although local complications are common in blood donors but death after blood donation is a very rare phenomenon.

Vasovagal syncope is one of the systemic complications of blood donation. Vasovagal syncope is the common faint that may be experienced by normal persons with no evidence of heart disease. Syncope



Fig. 1. Coronary ostia

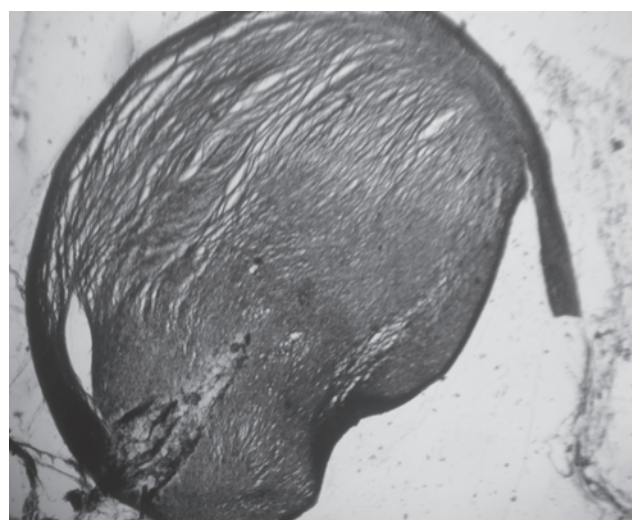


Fig. 2. Organising thrombus in left coronary artery

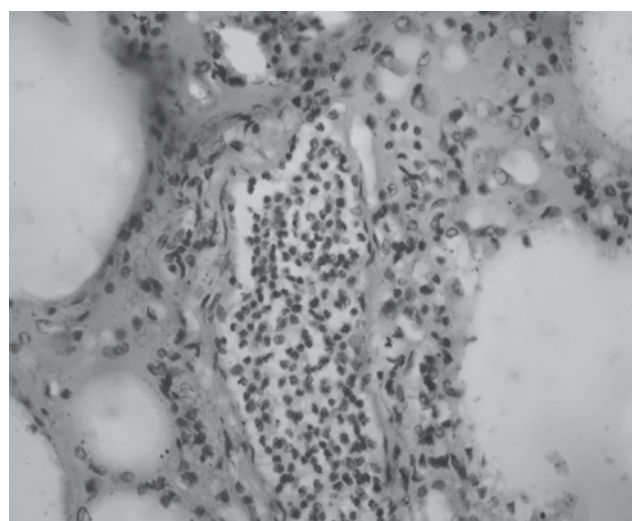


Fig. 3. Pulmonary oedema with congestion

(fainting) or pre-syncope (faintness or feeling faint before fainting) is usually brought about by low blood pressure with reduction of blood flow to the brain. Vagus nerve stimulation slows the heart rate, decreases the blood pressure; contracts the pupils; causes copious secretion of the saliva; and increases gastrointestinal activity. Stimulation of the vagus causes slowing of the heart rate and, if sufficient, can cause fainting or even cardiac arrest¹¹.

Vasovagal syncope is frequently recurrent and tends to take place during emotional stress (especially in a warm, crowded room), after an injurious, shocking accident, and during pain. Mild blood loss, poor physical condition, prolonged bed rest, anaemia, fever, organic heart disease, and fasting are other factors which increase the possibility of vasovagal syncope in susceptible individuals¹¹. It is the most common acute complication related to blood donation. Some of the most severe complications seen in relation to blood donation are delayed vasovagal reaction in donors who lose consciousness after leaving the donation site.

In the present case the donor, within half an hour of blood donation smoked a cigarette which was followed by breathlessness, chest pain, vomiting and giddiness which clearly indicates that the subject suffered from vasovagal reaction. Epidemiological studies have shown that smoking correlates significantly with increased mortality in acute myocardial infarction, and has subsequently been established as a coronary risk factor^{12,13}. The predisposition of smokers to develop ischaemic heart disease is related to endothelial cell damage and increased platelet aggregation, via elevated fibrinogen^{14,15}. Smoking acutely increases platelet thrombus formation on arterial media wall¹⁶. This increase in platelet thrombus formation is associated with an enhanced aggregation response to thrombin. It is of note that thrombin is a particularly important *in vivo* agonist of platelet aggregation at sites of vessel stenosis, plaque disruption, and high shear forces^{17,18}. There is an elevation of plasma catecholamine, mainly epinephrine, and associated increases in heart rate and blood pressure after smoking^{19,20,21}.

As per the history given by the relatives the donor in present case was a chronic smoker and also he had smoked immediately after blood donation which is strictly contraindicated for at least half an hour which leads to increased level of carbon monoxide²². The main mechanism by which carbon monoxide (CO) causes heart disease is production of hypoxia. The effects of

CO are more profound in the myocardium than in peripheral tissues because of very high oxygen extraction by the myocardium at rest²³. CO may also have direct myocardial effects. Toxins in the blood from smoking cigarettes like CO, nicotine also contribute to the development of atherosclerosis. Atherosclerosis is a progressive hardening of the arteries caused by the deposit of fatty plaques and the scarring and thickening of the artery wall. Inflammation of the artery wall and the development of blood clots can obstruct blood flow and cause heart attacks or strokes²⁴.

Blood donation with additive effect of immediate cigarette smoking caused a delayed vasovagal reaction, leading to dizziness, giddiness, hypotension and increased gastrointestinal motility followed by vomiting. As he was unconscious, he aspirated the food particles leading to severe laryngospasm and bronchospasm causing hypoxia.

Also histo-pathological examination shows left coronary artery evolving thrombus which suggests that the heart was already in a compensated state. Taking into consideration the above findings, the cause of death is ascertained as "Acute Myocardial Infarction."

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Ventricular Aneurysm- Cause of Sudden Cardiac Death in the Young: A Case Report

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ABSTRACT

This report highlights rupture of ventricular aneurysm as one of the rare causes of sudden cardiac death in the young. The victim was otherwise healthy and not known to have coronary artery disease. The lesion must have been present since early childhood as presumable from its morphology, and hence most probably a developmental cardiac anomaly.

CASE REPORT

A young man aged 19 years was admitted in a local hospital for complaints of sudden chest pain during travel, where he succumbed to the disease in spite of resuscitation and intensive care treatment. His body was then brought for autopsy to the Medical College Hospital, Alleppey. He was physically well built, tall (Height 173 cm) and weighing 100 Kg and not known to have been suffering from symptoms suggestive of heart disease.

Internal examination revealed 450 gms of blood clot in the pericardial sac, on opening of which, the heart weighing 350 gm showed a saccular outpouching of the wall, 5 x 3.5 x 3 cm in size, seen arising from the upper, anterior part of the left ventricle, close to atrioventricular junction (Fig. 1) and compressing the left atrium. Its attachment was by a broad base (Fig. 2), the wall 0.2-0.3 cm thick and its surface showed multiple small ruptures. Bluish discoloration was noticed on its surface as well as adjoining ventricular wall. On opening, its cavity containing thrombus and blood clot was seen communicating with that of the left ventricle (Fig. 3). The circumflex branch of the left coronary artery was coursing through its junction with the left ventricle and had no communication with it. Thickness of the left and right ventricular walls were 2 cm and 0.5 cm respectively. The septa, papillary muscles and valves were within normal limits. Both coronary arteries and their major branches were patent throughout their course as far as discernible by gross dissection.

Microscopic examination of the wall of the lesion showed thick fibrous tissue with adherent thrombus on its inner surface (Fig. 4). The endocardial lining was seen over most areas and there were tears in the wall

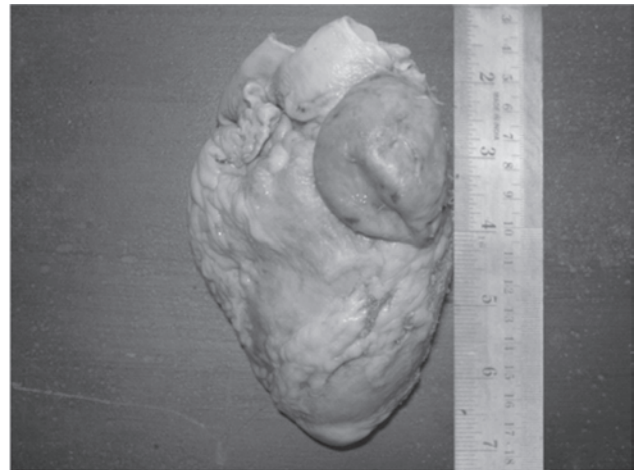


Fig. 1. The heart with the saccular aneurysm.



Fig. 2. The aneurysm- view from above.

with extravasation of blood. Numerous capillaries were seen in the wall, indicating organization of preexistent thrombus. No muscle tissue was noted in the entire wall of the lesion even after staining with



Fig. 3. Dissected aneurysm showing thrombus.

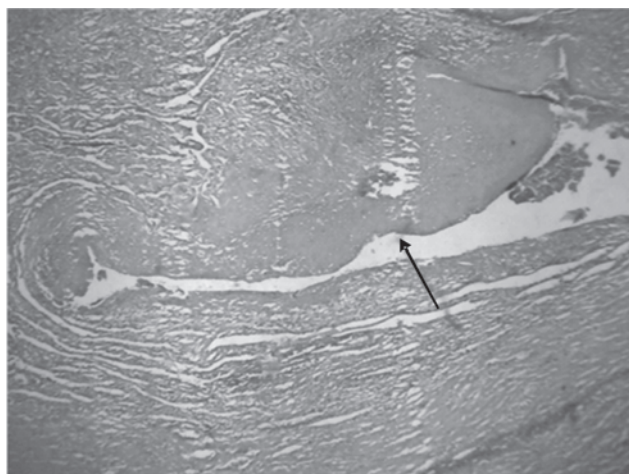


Fig. 4. Aneurysm wall- microscopy: H & E; x40. Fibrous wall with luminal thrombus (arrow).

Masson's trichrome (Fig. 5). The gross and microscopic features of the cardiac lesion were quite fitting with a saccular aneurysm of the left ventricle. There were no necrosis, fibrosis or inflammatory reaction in the myocardium around the base of the aneurysm.

Among the other organs, only the lungs and spleen showed some changes of significance. Lungs were edematous, weighing 600 and 560 gms (Right and Left respectively) and showed congestion and edema of

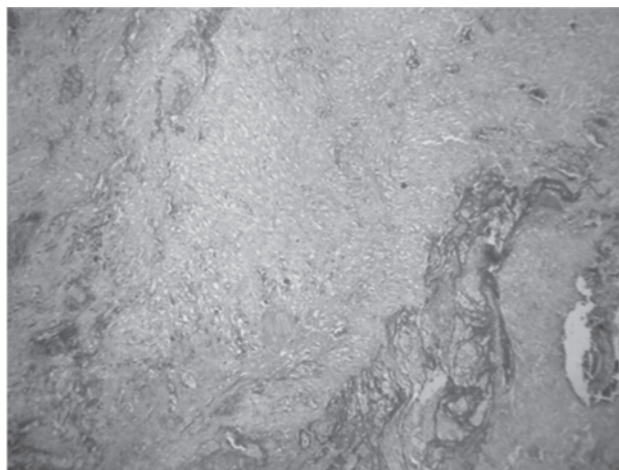


Fig. 5. Aneurysm wall microscopy- Masson's trichrome; x 40. Note the deficiency of muscular layer.

alveoli without heart failure cells. Spleen weighed 200 gm and showed diffuse congestion. Aorta showed a few fatty streaks. Other organs showed no significant changes other than congestion.

DISCUSSION

Ventricular aneurysms are rare, but important lesions, and the most common among them are acquired as a complication of myocardial infarction. Congenital ventricular aneurysms are only rarely reported, probably because most of them are clinically asymptomatic and are difficult to differentiate clinically from the more commonly occurring diverticula. According to Pome et al¹ aneurysms may or may not have muscle layer while diverticula have all the layers of the heart. The authors also have classified the diverticula as muscular and fibrous types, the latter being more commonly found near the atrioventricular valve ring. By gross morphology, differentiating between them may not be easy, although the broad base of attachment in contrast to the narrow stalk of a diverticulum and the localization away from the apex may favour aneurysm.^{2,3} However, congenital apical left ventricular aneurysm has also been reported.² The theory that the pathogenesis of aneurysms is most probably related to the deficiency of muscle fibres can be best explained in post myocardial infarction states and in cases of the berry aneurysms arising at the bifurcation points of arteries. The atrioventricular valve ring may also be likewise deficient in muscle fibres. In the heart, they may remain clinically silent until complicated by thromboembolic phenomena or rupture, the latter being the most fatal complication. Most of the cases are, therefore diagnosed only during autopsy. In our case, the large size and the thickness of the wall of the lesion in a

young man point to its early onset, also supported by the otherwise healthy myocardium and state of the coronary arteries, virtually ruling out the possibility of previous infarction. Absence of muscular layer demonstrated by microscopy differentiates it from diverticulum, supported by the absence of other co existing anomalies.

Despite the rarity of the lesion, modern day imaging technology is bringing out promising results in antenatal detection of such developmental anomalies⁴ and exclusion of other abnormalities. It may be amenable for surgical repair even in late adulthood, if promptly detected before life threatening complications ensue^{2,5,6}.

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Mitochondrial DNA - As a Tool for Identification

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ABSTRACT

The mitochondrial DNA (mtDNA) is a small circular genome located within the mitochondria in the cytoplasm of the cell. It provides a valuable locus for forensic DNA typing in many circumstances. The field of forensic science has been benefited significantly from the identification, characterization, and basic understanding of the mitochondria. The mtDNA is maternally inherited, so that any maternally related individuals would be expected to share the same mtDNA sequence. This fact is useful in cases where a long deceased or missing individual is not available to provide a reference sample but any living maternal relative might do so.

Key words: Mitochondrial DNA, Maternal Inheritance, Forensic Uses.

INTRODUCTION

The mitochondrial DNA (mtDNA) is a small circular genome located within the mitochondria in the cytoplasm of the cell.¹ It is a circular, double stranded and inherited maternally. It provides a valuable locus for forensic DNA typing in many circumstances. The field of forensic science has benefited significantly from the identification, characterization and basic understanding of the mitochondria. The mitochondrion is a subcellular organelle that is located within the cell and functions to produce energy for various tissues of the body. It contains its own genome distinct from the genome found in the nucleus (Nuclear DNA) due to many features, including its inheritance, replication, copy number and its size. About 0.3% of the DNA of human cells occurs in mitochondria.^{1, 2, 3}

The mtDNA has been used as a tool for forensic identification since 1993. The mtDNA typing is a method used by forensics scientists to match DNA from an unknown sample to a sample collected at a

crime scene. It is ideally used in special cases where the DNA is degraded or the source of the sample doesn't contain enough genomic nuclear DNA for analysis. As it is maternally inherited, the DNA from siblings and all maternal relatives should be identical. For this reason, the remains of missing persons can be rapidly identified by using mtDNA analysis of relatives. Additionally, there is generally a lack of recombination; therefore, even matriarchal relatives separated by several generations can serve as reference samples. Nuclear DNA samples cannot provide this function, due to multiple recombination events that take place throughout the nuclear DNA genome.^{4,5,6}

DIFFERENCE BETWEEN MTDNA AND NUCLEAR DNA

The mtDNA is circular, double stranded, and inherited maternally. The likelihood of recovering mtDNA in small or degraded biological samples is greater than for nuclear DNA because mtDNA molecules are present in hundreds to thousands of copies per cell compared to the nuclear complement of two copies per cell. Therefore, muscle, bone, hair, skin, blood and other body fluids, even if degraded by environmental insult or time, may provide enough material for typing the mtDNA locus. The mtDNA is inherited from the mother only, so that in situations where an individual is not available for a direct comparison with a biological sample, any maternally

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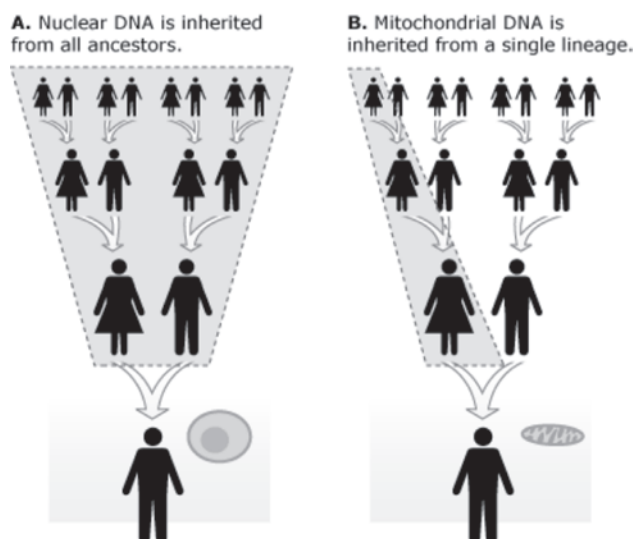
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related individual may provide a reference sample. The mitochondrial genome is roughly 16,569 base pairs in size (compared to the 3 billion base pairs in the nuclear DNA). Whereas nuclear DNA has only two copies of each gene, tightly woven into chromosomes, mtDNA can be copied 2–10 times per mitochondrion and there can be hundreds to even thousands of mitochondria per cell. With the mitochondria's role as an energy provider, different tissues contain different amounts of mtDNA, depending on the energy requirements of the cell. A higher copy number equates to greater sensitivity. This is particularly important if the DNA sample is significantly degraded, or the DNA is present only in a very small quantity. The likelihood of recovering mtDNA from a small or degraded sample is, therefore, greater in mtDNA samples compared to nuclear DNA samples since the mtDNA has a larger copy number. The low fidelity of DNA repair mechanisms to correct specific mtDNA mutations has led to a 5–10 fold higher mutation rate, and, in turn, a higher rate of evolution. The mtDNA typing using HV1 and HV2 can be readily performed by using an mtDNA-specific polymerase chain reaction and amplification of genomic mtDNA. This is followed by direct DNA sequencing and identification of sequence variations. The high number of nucleotide polymorphisms or sequence variants in the two hyper variable portions of the non-coding control region can allow discrimination among individuals and/or biological samples. The sample source can often determine which DNA typing system represents the ideal approach. For example, if a hair is left at the scene of the crime, nuclear DNA can only be analyzed if the root is intact. However, mtDNA can be analyzed from anywhere along the hair follicle, including the shaft. Bones and teeth also contain mtDNA and can be used in mtDNA analysis.



DISCUSSION

The Analytical Process - mtDNA analysis begins when total genomic DNA is extracted from biological material, such as a tooth, blood sample, or hair. The polymerase chain reaction (PCR) is then used to amplify, or create many copies of, the two hyper variable portions of the non-coding region of the mtDNA molecule, using flanking primers. Primers are small bits of DNA that identify and hybridize to or adhere to the ends of the region one wishes to PCR amplify, therefore targeting a region for amplification and subsequent analysis. Care is taken to eliminate the introduction of exogenous DNA during both the extraction and amplification steps via methods such as the use of pre-packaged sterile equipment and reagents, aerosol-resistant barrier pipette tips, gloves, masks, and lab coats, separation of pre- and post-amplification areas in the lab using dedicated reagents for each, ultraviolet irradiation of equipment, and autoclaving of tubes and reagent stocks. In casework, questioned samples are processed at different times than known samples and they are usually processed in different laboratory rooms. When adequate amounts of PCR product are amplified to provide all the necessary information about the two hyper variable regions, sequencing reactions are performed. These chemical reactions use each PCR product as a template to create a new complementary strand of DNA in which some of the As, Ts, Cs, and Gs (nucleotide bases) that make up the DNA sequence are labeled with dye. The strands created in this stage are then separated according to size by an automated sequencing machine that uses a laser to "read" the sequence, or order, of the nucleotide bases. Where possible, the sequences of both hyper variable regions are determined on both strands of the double-stranded DNA molecule, with sufficient redundancy to confirm the nucleotide substitutions that characterize that particular sample.

SAMPLES TYPICALLY CHOSEN FOR MTDNA TYPING

Candidates for mtDNA typing analyses would most likely be: 1) shed hairs with no follicle, tissue, or root bulb attached, 2) hair shaft fragments, 3) bones or teeth which have been subjected to long periods of high acidity, high temperature, or high humidity, 4) stain or swab material that has been previously unsuccessfully typed for nuclear markers, and 5) tissue (skin, muscle, organ) that has been previously unsuccessfully typed for nuclear markers.

Hair roots, when available, should be removed from the shaft and processed separately for nuclear

DNA markers prior to attempting mtDNA analysis on the hair shaft. Hair shafts or fragments are only suitable for mtDNA analysis as they can contain fewer than 100 copies of the mtDNA molecule and virtually no nuclear DNA.

Non-Forensic Uses - While mtDNA is useful for forensic examinations, it has also been used extensively in two other major scientific realms. First, there are a number of serious human diseases caused by deleterious mutations in gene-coding regions of the mtDNA molecule, which have been studied by the medical profession to understand their mode of inheritance. In addition, molecular anthropologists have been using mtDNA for two decades to examine both the extent of genetic variation in humans and the relatedness of populations all over the world. Because of its unique mode of maternal inheritance it can reveal ancient population histories, which might include migration patterns, expansion dates, and geographic homelands. Recently mtDNA was extracted and sequenced from a Neanderthal skeleton. These results allowed anthropologists to say with some conviction that modern humans do not share a close relationship with Neanderthals in the human evolutionary tree.

CONCLUSION

The mtDNA has advantages and disadvantages as a forensic typing locus, especially compared to the more traditional nuclear DNA markers that are typically used. It has now become widely accepted, its US courtroom debut being reported in both the scientific and popular press. As mentioned above, mtDNA is maternally inherited, so that any maternally related individuals would be expected to share the same mtDNA sequence. This fact is useful in cases where a long deceased or missing individual is not available to provide a reference sample but any living maternal relative might do so. Because of meiotic

recombination and the diploid (bi-parental) inheritance of nuclear DNA, the reconstruction of a nuclear profile from even first degree relatives of a missing individual is rarely this straightforward.^{7,8}

However, the maternal inheritance pattern of mtDNA might also be considered problematic. Because all individuals in a maternal lineage share the same mtDNA sequence, mtDNA cannot be considered a unique identifier. In fact, apparently unrelated individuals might share an unknown maternal relative at some distant point in the past.

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Cerebellar Metastasis with Obstructive Hydrocephalus: A Case Report

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ABSTRACT

Intracranial brain metastasis from sigmoid colon cancers is a rare occurrence in clinical practice. Moreover, metastasis to the cerebellum is even rare. Here, we are reporting a case 52 years male patient previously operated for sigmoid colon cancer presented with cerebellum metastasis causing obstructive hydrocephalus. He presented to an emergency department with abrupt onset vertigo, vomiting, dysarthria and truncal ataxia. The lobulated mass was found in the cerebellum compressing the fourth ventricle on C. T. brain imaging. He was operated for suboccipital craniotomy with subtotal cerebellar tumour excision.

Key words: *Cerebellar Metastasis, Sigmoid Colon Cancer, Obstructive Hydrocephalus.*

INTRODUCTION

Metastasis from colorectal carcinoma occurs by either lymphatic or hematogenous spread. The most common sites of colorectal metastasis are the liver and lung. Intracranial brain metastasis that too, cerebellar from sigmoid colon cancers is a rare occurrence in clinical practice.^{1,2} Cancer patients like other are living longer now because cancer treatment is more effective than in the past. Probably, that is the reason the number of people with spread to the central nervous system (CNS) is increasing. Here we are reporting a case of 52 years male patient who previously operated for carcinoma sigmoid colon; found to have cerebellar metastasis with obstructive hydrocephalus, which was treated with surgical decompression.

CASE HISTORY

A 52-year-old male patient an emergency department with abrupt onset altered sensorium vertigo, vomiting, dysarthria and gait ataxia. There was past history of operated for sigmoid colon cancer

7 years earlier. He underwent coronary artery bypass graft (CABG) to left main and circumflex artery 3 years back. On general physical examination, he was in a state of altered sensorium and was not responding to verbal commands. He was mildly dehydrated and had pallor. There was no focal neurological deficit other than truncal ataxia (cerebellar sign). His pupils were of bilaterally equal semidilated and were reacting sluggishly to light. The fundus examination showed bilateral papilloedema. His cardiovascular, chest and abdominal examination was normal.

INVESTIGATIONS

Hemoglobin: 10.3 gram%, total count: 7900 cmm with normal differentiation, blood sugar level: 108 milligram%, serum creatinine : 0.9 milligram%, serum sodium (Na⁺) 140 mmol/l, serum potassium (K⁺): 4.3 mmol/l and liver function tests: normal. Chest radiograph was showing right mid-zone metastatic lesion (Fig. 1). Electrocardiogram was showing old anteroseptal wall myocardial infraction. Ultrasound abdomen was suggestive liver metastasis. C. T. brain on admission was suggestive of cerebellar hemispheric & vermis multiple metastasis causing obstructive hydrocephalus with perilesional oedema, and causing a mass effect over the 4th ventricle with resultant obstructive hydrocephalus. Post operative C T brain was suggestive of significant reduction in hydrocephalus (Fig. 2). Histopathological examination of cerebellar specimen found to have metastatic well differentiated adenocarcinoma.

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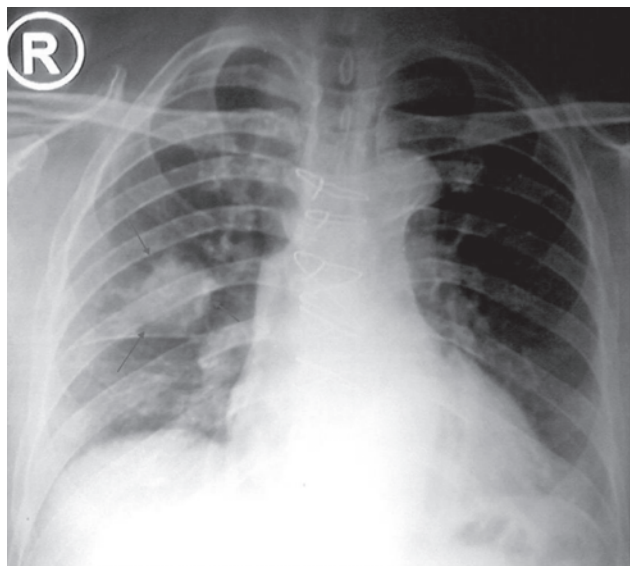


Fig. 1. Chest radiograph was showing right mid-zone metastatic (coin) lesion.

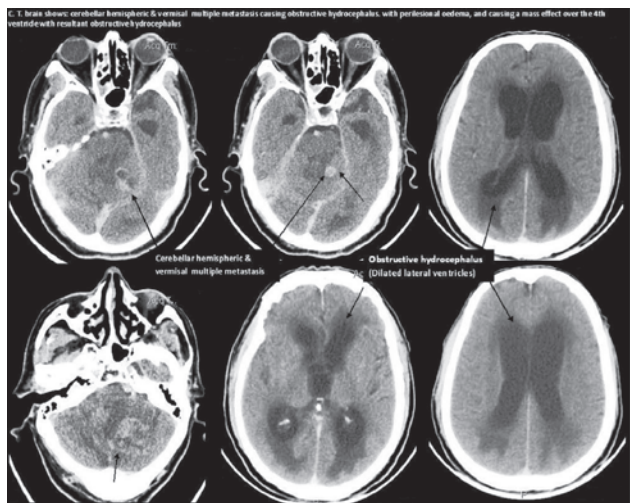


Fig. 2. C.T. Brain showing cerebellar metastasis with obstructive hydrocephalus

He was started on decongestive treatment in the form of mannitol and methylprednisolone in addition to supportive line of management. He responded slightly to the treatment in the form of improvement in the sensorium and alertness, but his cerebellar signs were persistent. In view of his past history of operated for carcinoma sigmoid colon and persistent cerebellar signs we thought of cerebellar metastasis. We planned for C.T. brain plain and contrast imaging to rule out the same. C.T. brain was showing cerebellar hemispheric and vermian multiple metastasis with perilesional oedema, and causing a mass effect over the 4th ventricle with resultant obstructive hydrocephalus. In spite of decongestive treatment after initial recovery patient didn't show expected recovery. We consulted neurosurgeon for the same and planned

for surgical posterior fossa decompression after explaining patient relative regarding risk of procedure and its possible benefit. After written and informed consent patient was planned for posterior fossa decompressive surgery. He was operated for suboccipital craniotomy with subtotal cerebellar tumor excision; specimen was send for histopathological examination and found to have metastatic well differentiated adenocarcinoma similar to the previous histopathological report of sigmoid colon malignancy. Patient tolerated operative procedure well and immediate post-operative recovery was smooth and uneventful. Post-operatively after 48 hours patient stated showing gradual neurological improvement in the form of sensorium and reduction in cerebellar signs mainly gait ataxia. Bilateral papilloedema also shows significant reduction after one week of surgery. After 10th post-operative day patient was planned for radiotherapy and chemotherapy for lung metastasis as a palliative line of treatment. After doing his surgical decompression neurologically he improved and became ambulatory within a week. For last one, three and six month follow up visit patient was doing well.

DISCUSSION

Cerebellar metastasis is associated with early papilledema due to increased intracranial pressure secondary to fourth ventricular compression compared to supratentorial metastasis. Patient in present case report has relatively long period between diagnosis of sigmoid colon carcinoma and presentation with cerebellar metastasis about seven year compared to other secondaries. Similar findings reported by Aslan et al¹, K Sambasivaiah et al², Attili VSS et al³. Patients with brain metastases are now eligible for a number of treatment options that are increasingly likely to improve outcomes The potentially substantial role for chemotherapeutics that cross the blood-brain barrier and for novel targeted molecular agents is now being elucidated. The treatment for intracranial metastases secondary to carcinoma sigmoid colon is usually palliative, as the prognosis of these patients is poor.⁴ Whole brain radiotherapy may be useful in symptom regression and can be considered for treating associated lung and liver metastasis.⁵ Many, if not all of these metastases, can be controlled or eliminated with aggressive treatment.⁶ Multidisciplinary management of brain metastases is advisable.⁷

They most frequently occur in the cerebrum (80%), the cerebellum (13-16%), and the brain stem (3%).⁸ Lungs, colon and renal cancers account for eighty percent of metastatic brain tumors in men. Breast, lung,

colon and melanoma cancers account for eighty percent of metastatic brain tumors in women.⁹ Fifty percent of the time multiple tumors are present, particularly in people with non-small cell lung cancer, breast cancer or melanoma. Renal and colon cancers are more likely to give rise to single tumors.¹⁰ The presence of symptomatic hydrocephalus or failure to respond to glucocorticoids initially are particularly ominous features that may be best managed by early neurosurgical consultation before beginning radiation therapy.¹⁰ Cerebellar metastases are considered a negative prognostic factor in patients with systemic cancers. Aggressive treatment including surgical resection and radiotherapy are associated with longer survival for selected patients with cerebellar metastases.¹¹

CONCLUSIONS

The palliative treatment in the form of surgical decompression followed by radiotherapy and or chemotherapy in patients with cancer sigmoid colon with cerebellar metastasis will definitely improve the survival and quality of life and should be strongly considered in suitable condition.

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Medico-legal Aspects of Intra-oral Camera Technology in Dentistry

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ABSTRACT

Minimizing medico legal complications in dentistry has been developed over the years by concentrating on informing patients of the proposed treatment before treating them through communication and recording treatment in dental records. Now, not only it is important to inform patients and keep good records, but also should include patients in the diagnosis and decision-making processes with regard to the proposed treatment plan. One of the root causes of many problems in dentistry is the failure of communication between the clinician and patient which leads to complaints and litigation. Fortunately, the new intraoral camera technology helps to bridge the gap in communication and allows the patient to become a "co- diagnostician" throughout diagnosis and treatment planning. Intraoral camera provide easy-to-use, high definition magnification and is one of the most powerful patient education and diagnosis tool within dentistry encouraging patients' acceptance of treatment plan. Other uses include medico-legal documentation, forensic documentation, insurance verification, and communication with laboratories, dental team members, and colleagues. This article advances the concept of minimizing medico legal complications through improved communication and photographic documentation by the use of intraoral camera.

Key words: Intraoral Camera, Photographic Documentation, Visual Communication, Medico Legal.

INTRODUCTION

Being in the information age, patients want to understand more so as to make their own informed decisions about their health. Patients are demonstrating a greater interest in their medical and dental care and demanding greater accountability from their health care professionals¹.

Proper diagnosis, prudent treatment planning, and careful application of proven principles in dental procedures are all required to achieve predictable results and meet patient expectations. The greater the gap between expectations and outcome, the higher the level of motivation to complain. In this world of consumerism and high expectations, patients are sometimes dissatisfied about treatment, which results in complaints. A complaint may be related specifically to the clinical treatment received or it may relate to administrative issues or interpersonal communications with staff. Failure in communication between the clinician and patient has been identified as the predominant factor in 80% of patient complaints and litigation. Having a complaint lodged is not a pleasant experience for the clinician, so efforts must be made to prevent such situations in dental practice.

PRECIPITATING AND PREDISPOSING FACTORS FOR RISE OF A COMPLAINT

Precipitating factors are those that actually give rise to the complaint such as an adverse outcome, providing incorrect care and system errors and mistakes. This could range from the laboratory work not being delivered in time for the patient's appointment to an anaphylactic reaction following the administration of a local anaesthetic. A predisposing factor on its own does not result in a complaint but increases the chance of it occurring, for example rudeness, delays, lack of attention, apathy or poor communication. The complaint occurs when precipitating and predisposing factors occur simultaneously². The primary motivating factor for litigation is the patient's feeling that their problems are not being addressed adequately by their dentist. This leads to frustration, disappointment and anger, which can potentially lead to a lawsuit.

ROLE OF COMMUNICATION

Communication is both a science and art. It is also a significant motivating factor upon which malpractice lawsuits are pursued and avoided. Inadequate,

inappropriate or ineffective communication increases the chances of diagnostic error, non-compliance, poor outcome and the likelihood of being sued. Conversely, effective communication improves diagnostic accuracy, enhances patient decision making. Good communication prevents erosion in the dentist-patient relationship and increases the acceptance of treatment plans. Moreover, it establishes realistic patient expectations and nonmeritorious claims are avoided and patient satisfaction levels are increased³. Most complaints can be resolved early on before they escalate to a higher level, provided that the doctor is aware of the dissatisfaction and takes prompt and appropriate actions to address patient concerns in effective way⁴.

Patient communication is not just describing a proposed treatment plan to a patient. A verbal explanation alone or paired with chairside drawings or models may be confusing or even daunting for a patient. When a pictorial representation is included along with an effective verbal communication, it can be elucidating and has a lasting impact. Again, the old proverb, "a picture is worth a thousand words" is applicable. Fortunately, the new intraoral camera technology helps to bridge the gap in communication and allows the patient to become a "co-diagnostician" throughout diagnosis and treatment planning. Intraoral camera has the ability to show patients their dental problems "tooth-by-tooth" and advantage of the power of visual communication can be taken along with verbal and nonverbal communication. When a patient can see for the first time what the dentist conceptualizes, this can broaden understanding of critical dental conditions for the patient and can add a whole new dimension to compliance and motivation⁵. As seeing is believing, the patients will readily take the ownership of their oral health status and more readily accept the evidence-based treatment-plan.. Such treatment plans become a mutually decided outcome of co-diagnosing with the patient and misunderstanding and doubts are less likely to occur, building trust in dentist-patient relationship. This trust relationship reduces the chances of a falsely alleged malpractice lawsuit being filed⁶. This trust relationship also helps in obtaining free, voluntary, valid consent of the patient to receive particular treatment, which is an absolute prerequisite for dental treatment¹.

INTRAORAL CAMERA

An intraoral camera is a camera which is designed to be used in the mouth for the purpose of taking video

or still photography. Intraoral cameras had their debut in dentistry in 1987⁷. Since then, their evolution has been profound⁵. They have transformed from oversized mobile units to pocket-sized lightweight wands; from time consuming to use to time efficient sensations; from crude, analog to high-definition, digital images.

Intraoral cameras fall into three major categories: analog, digital and hybrid. Analog cameras were the first to appear in the market and they showed the images captured on a standard TV monitor. Digital cameras use the computer screen to display captured images, instead of a TV monitor and provides many other functions, such as storage of images on the computer. Hybrid cameras merge the characteristics of both analog and digital cameras and display images on standard TV monitors as well as computers⁸.

USE OF INTRAORAL CAMERA

Intraoral camera should be used for patient education and photographic documentation at following stages:

1. Examination, diagnosis, treatment planning

The first use of intraoral camera should be done at examination, diagnosis and treatment planning phase, since often during an initial examination, many items are missed or overlooked. Typically intraoral cameras magnify teeth 40 to 60 times their original size. This allows discovery of certain types of defects instantly in bigger, better format than ever before possible and helps to discover dental problems in the early stages.



Fig. 1. Intraoral camera

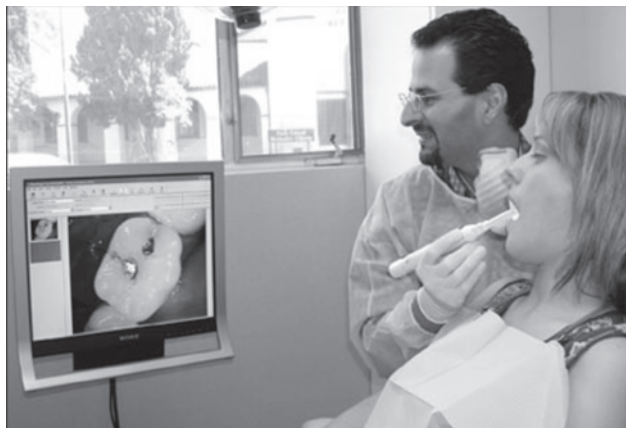


Fig. 2. Use of Intraoral camera for better communication

During the examination the dentist should pay special attention to the presence of caries, microcracks, faulty restorations, periodontal pathology and other defects. The intraoral examination should be done quadrant by quadrant, air drying the teeth to be examined prior to using the camera. This reduces light reflection and promotes a sharper image on the monitor. The patient's head should be somewhat facing the monitor, so he or she can have the same viewpoint as the dentist⁹. Intraoral photography is an ideal method for analyzing the pre-operative dental status at a later date.

2. Progress and monitoring

The second use of intraoral photography is for monitoring the progress of pathological lesions or the stages of prescribed dental treatment. It is obviously essential to monitor progress of soft tissue lesions to ensure that healing is progressing according to the plan. Other uses include tooth movement with orthodontic appliances, gingival health after periodontal or prosthetic treatment and soft tissue healing and integration following surgery or gingival grafts.

3. Treatment outcomes

Besides achieving health and function, which are relatively objective goals, the outcome of elective treatments such as cosmetic and aesthetic dentistry is highly subjective. In these instances, if dental photography is not routinely used as part of the course of treatment, it is a recipe for disaster and possible future litigation. Accurate and ongoing documentation by intraoral photography is a prerequisite for ensuring that the patient, at the outset, understands the limitations of a particular aesthetic procedure. In addition, if the patient chooses an option with dubious prognosis, or against clinical advice, photographic documentation is a convincing defense in court¹⁰.

BENEFITS OF INTRAORAL CAMERA

Sometimes patients are suspicious of what the dentist advise them, especially if they are not in any pain and don't believe that they have a problem. With an intraoral camera, patients have the option of seeing what the dentist is seeing, so after seeing patients believe and understand the dental problems. It is also seen that, for clinicians who use intraoral camera or digital images of the patient, there is an increase between 10% - 25% in case acceptance⁵.

Sometimes even problems that dentists might otherwise miss with a visual examination are discovered by the use of intraoral camera. Forgie et al, in his study concluded that compared to unaided vision, the use of an intra oral video camera significantly increases the number of occlusal lesions detected¹¹.

Erten H et al, compared the efficiency of unaided visual examination, intraoral camera and operating microscope according to a visual scoring system (ERK) at occlusal caries detection and concluded that, the use of an intraoral camera and operating microscope improved occlusal caries detection according to the ERK scale¹².

Murphy et al, conducted a study to examine the clinical technique of using an intraoral camera to monitor the size of residual oronasal fistulas in cleft lip-cleft palate patients, to assess its repeatability on study casts and patients, and to compare its use with other methods and concluded that intraoral camera method could be used in place of the previous graph paper method and could be developed for clinical and scientific purposes. This technique may offer advantages over the graph paper method, as it facilitates easy visualization of oronasal fistulas¹³.

Willershausen B et al, did a study aimed to determine the effectiveness of oral-hygiene instruction in improving oral health in 100 patients following oral hygiene instruction, with and without use of an intra-oral camera and concluded that the intra-oral camera can effectively augment oral-hygiene instruction and help create improvements in patient compliance¹⁴.

Along with benefits like excellent chairside diagnostic tool, improved patient communication and photographic documentation, the use of intraoral camera also helps to communicate with the dental laboratory more effectively and even helps in self-improvement of the clinician as documenting cases allows evaluating the success and shortcomings of treatment and help to improve. The recorded images

can be printed or disc copied and sent along with the patient for further discussion of the desired treatment plan with the family members or can be sent to dental specialist for consultation. Another significant reason for making documentary treatment images is to verify the treatment rendered to third-party payment companies. By sending a third-party company a digital image of the treatment carried out prevents a confrontation about the treatment¹⁵.

IMPORTANCE OF PHOTOGRAPHIC DOCUMENTATION IN MEDICO LEGAL COMPLICATIONS

The most invaluable importance of the intraoral photography is in the event of medico legal complications. It is always said that truth is the best defense. In the unlikely event a malpractice suit, with photographic treatment evidence, dentists have a clear and visual explanation of a case, with before and afters, progress reports, and treatment response.

Accurate and thorough documentation and record keeping play a vital role in an effective dental risk management program because they provide a strong defense in case of medico legal lawsuit. A dental record is the detailed document of the history of the illness, physical examination, diagnosis, treatment, and management of a patient. Nunn and Chaney comments, "documentation is an ethical, moral and legal responsibility that the health care professional must accomplish to treat the patient safely and to provide continuity of care"¹⁶.

It is known that an image is a more significant data than the written part of a paper. Photographs along with written description paint a complete picture of a case. It is advantageous to have photographic records of patients pre-treatment, during and post-treatment. This is an invaluable record of the patient that can be used as evidence of proper diagnosis and patient care in an ordered manner, in the event of litigation.

The modern dental practice has evolved significantly over the past few years. With current computer systems and softwares, offices can develop a chartless or paperless practice. With the use of electronic dental records, the expense of paper documentation can be markedly lower, provided the data acquisition and storage is structured accordingly. The world of digital imaging has continued to grow over the past couple of years, and this is to the advantage of the dentist for more efficient and safe practice. We should embrace the new technology and grow with it.

SUMMARY

The risks involved in the practice of dentistry must be identified and active measures to minimize exposure to these risks should be taken. These measures include establishing good rapport with patients, proper communication in the areas of treatment planning, setting realistic expectations, obtaining informed consent, and keeping proper treatment records. As the importance of patient communication and education rises, so does the need for technology that facilitates these interactions in an efficient manner. With an advanced intraoral camera, dentists can easily communicate with the patient and involve them instantly in the diagnosis and treatment plan. It plays important role in medico legal documentation and also has other uses like, forensic documentation, insurance verification, and communication with laboratories, dental team members, and colleagues. Improved communication and better documentation will help in preventing the lawsuit from becoming a reality. The management of risk is not a linear process; rather it is the balancing of a number of interwoven elements which interact with each other and which have to be in balance with each other.

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Open Source: An Innovation Paradigm

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ABSTRACT

Open source software represents a paradigm shift in the field of software development. It is a community based development model that invites programmers globally, to freely copy, share, and modify the software. Such a development infrastructure arguably assists in efficiently obtaining a more robust software at minimal cost. Given the success in the field of software, attempts have been made to apply the open source philosophy to the field of medicine as well. The contours of an open source development model, when adapted to the field of medicine may acquire a different hue given the uniqueness of each field, and therefore requires considered analysis.

Key words: *Open Source, Open Science, Open Innovation, Software, Bioinformatics, Genomics, Genetic engineering, Drug Discovery, Intellectual Property, License.*

INTRODUCTION

Open source software represents a paradigm shift in the field of software development. As opposed to the generically referred “conventional,” “proprietary,” “closed,” source code software, the open source software model emphasizes on unrestricted accessibility to the source code of the computer programme. Unlike, proprietary software, open source code development is not a solitary or a closed group task – it is a community based development model; it invites programmers globally, to freely copy, share, and modify the software. Also, the development model is not subject to prejudices based on maturity, education or experience. Furthermore, there is no need to assemble the community at one physical place, virtual interaction is sufficient. Thus, the open source model allows larger groups to interact, and increases accessibility to many more resources, while keeping the transaction costs at a minimal. Such a development infrastructure arguably assists in efficiently obtaining a more robust software at minimal cost.

Given the success in the field of software, attempts have been made to apply the open source philosophy to the field of medicine as well. The contours of an open source development model, when adapted to the field of medicine may acquire a different hue given the uniqueness of each field, and therefore requires considered analysis.

Legal Governance Structure of Open Source Software

Traditionally, copyright law was available to protect the literal, and patent law, the mechanical. “As a written work with a utilitarian purpose, computer programs deride and defy categorization in the present library of intellectual property protection.”¹ Despite the paradox, the current intellectual property regime, arrived at an accommodation, and protects various components of a computer programme separately. Trade secret law was the traditional vehicle of software protection; it can protect secrets embodied in or implemented through software. While, copyright chosen as the legislative vehicle, protects the literal expression of software; patent protection for software has grown doctrinally and essentially protects the technological expression of software. Additionally, trademarks, moral rights and design protection laws supplemented by technological protection measures and licensing too are applicable. It is not necessary that all the forms of protection would be exercised with every software; developers may choose to “rely on none, some, or all of these forms of intellectual property protection.”²

Interaction of the traditional intellectual property structure and computer software, generated the proprietary model of software development, which was the veritable apotheosis for over two decades.

However, with time, laments increased, that traditional intellectual property protection in software were steadily whittling down the public domain. The issues as regards legal protection of computer software were again raked up by open source software.

Open source software is not in the public domain. Rather, it depends on an explicit intellectual property regime, to permit its free distribution, via a series of licenses, which instead of being restrictive, promote access. "Open-source software subverts the foundation upon which the commercial software industry is built."³ Developing upon the mainstream intellectual property regime, open source, "shifts the fundamental optic of intellectual property rights away from protecting the prerogatives of an author toward protecting the prerogatives of generations of users."⁴

A. Existing Intellectual Property Protection and Open Source Software

Open source software's ideology is in complete conflict with Trade Secret law, thus rendering its application to open source software unfeasible. "Trade secret protection of open source is forfeited with the distribution of open source code."⁵

Open source proponents also disapprove of the current "proprietary" model of copyright protection for software. They perceive it as a deviant application of the justification for copyright law - to induce innovation; also they challenge the need for monetary incentives itself to induce innovation in software creation. Open source proponents believe that the proprietary software model restrict the benefits to society.⁶ In an effort to rectify this perceived erroneous state, the open source regime introduced their own vision of copyright protection for software. "The Open Source movement reflects the intent of its founders to turn traditional notions of copyright, software licensing, distribution, development and even ownership on their heads, even to the point of creating the term 'copyleft' to describe the alternative approach to these issues."⁷ Open source does not relinquish copyright, in fact, its success is dependent on copyright law. However, open source software subverts the foundation upon which the proprietary software industry is built and instead of using copyright law to 'exclude', use it to confer a right 'to distribute'.⁸ The open source modus operandi essentially is to copyright software and then mass license it for use, improvement or modification under the condition that the alterations are contributed back to the software community on the same terms. The option of donating the work to the public domain is not feasible for apprehension of

appropriation and conversion to the proprietary model, thus frustrating the essential open source agenda.

Moral Rights include the right of disclosure, the right of integrity, the right of withdrawal, and the right of paternity. They are inalienable and cannot be assigned. Moral rights are relevant with respect to open source software, especially that of attribution and reputation, as largely the open source approach is based on these rewards as opposed to monetary rewards.⁹

"The open source community has traditionally demonized software patents."¹⁰ The arguments against software patents, range from the procedural to the theoretical. The procedural arguments vilify the patent office's patent grants and procedure in computer software. They challenge the prolonged patent term, relaxed standards of non-obviousness for building-block programs, opaque prosecution process, non-disclosure of source code, abuse of continuation filings etc.^{11,12} The theoretical arguments, perceive software patents as the very antithesis of innovation by creating a "thicket" - "an 'anticommons' by which large numbers of 'building block' programs have become legally inaccessible."¹³ While the proprietary model has alternatives such as cross-licensing to navigate this thicket, open source program's very nature precludes it from these options. Open source proponents seek to revisit patent jurisprudence in context of software programs altogether. The open source movement is shoring its resources to combat any potential patent threat through some pretty innovative techniques viz. license provisions, creating patent pools, establishing prior art databases and emphasizing on proper prior art examination.

Open source developers showed considerable sophistication in their use of trademark law, adopting certification marks to indicate if a particular software complies with the open source scheme, for e.g. the 'OSI Certified' mark affixed by the Open Source Initiative for software complying with their Open Source Definition. Additionally, though not registered, the term Copyleft in itself has acquired a distinctive trade use.

B. Existing Contractual-License Protection and Open Source Software

"In the digital age, the licensing norm supplies a regime of private governance of all aspects of our information culture, both intangible and tangible."¹⁴ The legal instrument for propagating the open source

philosophy is the license. Much like the intellectual property laws, the open source movement designed a counterintuitive licensing system based on the same legal premise as the closed source software but to different ends. Yielding intellectual property rights through the means of licenses, the open source faction promote functional freedom for software, for developers and users alike. “[O]pen source licenses attempt to preserve control over the creative work while still allowing individual contributors the freedom to collaborate and develop improvements.”¹⁵

OPEN SCIENCE

The open source philosophy is finding application in several associated fields where communal endeavour was the traditional basis of their development. Important from the perspective of the medical field are open source movements in bioinformatics, genomics, genetic engineering, gene manipulation, development of medicines and database software, with other avenues being explored.

As an example, potential for application of the open source philosophy in drug development is enormous. Drug development is based on technological and economic factors. Technological ability is not available uniformly throughout the world. Similarly, drug development is concentrated on commercial viability and not need. Tropical diseases are an example where despite acute need, resources have found relatively less deployment because the commercial returns are not perceived to be sufficiently high given the poor paying capacity of the affected. As a counter, open source based initiatives such as the “Tropical Disease Initiative” have been proposed.¹⁶ This initiative proposes researchers conducting the computing portion of the research (analysing genomes, identifying drug candidates, estimating efficacy of drug candidate, etc.) much akin to the open source software development model. This would assist in global incremental development. Thereafter, researchers would perform the experimental part. “Because several different research groups may openly collaborate on these experiments, the cost to any one group can be significantly less than if that group had to perform all of the experiments alone.”¹⁷ An initiative in this regard called the Open Source Drug Discovery (OSDD) is currently under way in India through the Council of Scientific and Industrial Research (CSIR).¹⁸

The contours of an open source development model, when adapted to other arenas may acquire a different hue given the uniqueness of each

technological field. The various factors which facilitated the open source philosophy in the software field may not be applicable or available in the medical field nor have similar effects. While indirect financial and reputational rewards continue to be of much significance, the ability to diffuse costs may not be similarly possible as in software. This is primarily because software creation involves more intellectual and physical labour and minimal absorbable start up investment and entry costs. This is not so with the medical field; science experiments involve certain investment as a starting point, are far more diverse and complicated and their copying and reproduction is not easy nor inexpensive.¹⁹

Legally, open source software was promoted by virtue of the fact that software protection is essentially copyright based, which provides instant protection as of creation, with minimal costs and has a low criteria threshold for granting protection. This may not be the case with other fields. The medical field requires patent protection which does not provide instant protection as of creation, is expensive to obtain, has a high criteria threshold for granting protection and generally requires assistance from legal counsel.

It is undeniable that the current intellectual property regime, seems to suggest that an open source production model in other scientific fields “would be far less ‘open’ compared to the open source software movement.”¹⁷

Suggestions to motivate open source in other scientific fields involve creation of confidential protected commons, where developments would be made aware to a closed peer group, admitted to the commons after imposing adequate restrictions via contract law.¹⁷ These could be supplemented through patent pools, university research, global licensing policies etc. Though such methods are also not without drawbacks, still they go a long way in creating a momentum to harvest the intrinsic advantages of the open source model.

SOFTWARE, SCIENCE AND THE INNOVATION AGENDA

Debate is raging as regards intellectual property and software. Suggestions vary from application to non-application of property rights to software; from correct interpretation, to amendment to outright replacement of property laws with alternative models of protection for software.²⁰ Fuelling this debate is the current success of open source software, arguably

without the conventional mode of software protection. The open source movement is a viable mode of software development, and their argument that property rights should not apply to software may hold merit. However, the real question is whether absence of property rights would be incentive enough for software development. Moreover, a fundamental question to be answered is whether the open source movement would be an adequate replacement? The open source community may not be ideally suited to provide the requisite innovation impetus. Moreover, open source penetration is not sufficient and an overnight radical change could well mean disaster. Additionally, the software industry is not an island; any change in the protection regime, would have a cascading effect on several other industries. Furthermore, what needs to be considered is that "if there is a complete replacement of the proprietary structure with the open source model, the open source movement would then impose its business model on the software industry, from that of software creation to software servicing."²¹

The fact that the open source concept has evolved to the broader "open innovation" concept and the same model is being applied in other fields, prominently biotechnology, bioinformatics, genomics, and policy modelling, raises the issue that there might be several simmering grievances with the application of current intellectual property laws to emerging fields.²² Hence, it would be desirable to review the intellectual property system in light of the community development model.

CONCLUSION

The open source regime has acquired a stature that cannot be just brushed aside as an anomaly. Not taking advantage of such a scenario would amount to restricting infrastructural growth. Hence, it is preferable that a complementing stance be acquired to accommodate the open source model. Also, regularizing the open source model allows its proper regulation. The open source model provides a good counterbalance to the proprietary model. Besides preventing market dominance and monopoly it also allows for greater variety and reaping the best of each development model. At the end of the day, it is not desirable to establish an exclusive system where only one of the policy models exists. Adjustments would be needed to harmoniously integrate the open source model with the closed source model in the IP regime. Any regime not doing so, "runs the serious risk of remaining a vestige of twentieth-century IP regimes

focused on rights of exclusion rather than enabling and encouraging rapid ... development."²³

Instead of focusing on the debate as a means, the focus should be on the ends. The need of the day is efficient and cost effective innovation development. It is irrational, not to encourage any capable production mode, whether it be proprietary or open source. Both have their positive attributes and shortcomings. Moreover, it is difficult to assess whether either model would be more successful without the influence of the other. What needs to be realized is that as things currently stand, both the modes cannot be done without. "Essentially, both the approaches require balancing of commerce and user independence. To completely dismiss one approach in favour of the other is to abandon a mature method of fostering innovation for another that is still immature."²⁴ "Given the uncertainties in determining which kinds of endeavors can be safely left to open innovation, it is likely that a dual system will be operative in many technological fields."²⁰ "India should adopt a good mix of these models, a so called 'hybrid approach,' to harness innovation in the public health sector."²⁵ Ensuring such a move requires coordination amongst various interest groups viz. government, legislature, judiciary, and the community.

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Rare Case of Dichloroavas Induced Reversible Bilateral Vocal Cord Palsy

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ABSTRACT

Organophosphate compounds poisoning is common in India as either suicidal or accidental exposure. Organophosphorus (OP) poisoning is almost half of the hospital admissions due to poisoning. Acute poisonings due to organophosphorus (OP) compounds often present as medical emergencies, which require management in intensive care. There is urgent need for resuscitation, support or correction of function of vital organs (correction of arrhythmias, provision of ventilatory care), decontamination and antidotes. In the organophosphorus poisoning intermediate syndrome with cranial nerve palsies occasionally accompanied. After acute cholinergic phase of organophosphorus poisoning (OPP), only a few cases of vocal cord paralysis have been reported in the past. Here we are reporting a rare case of organophosphorus poisoning (dichloroavas) with bilateral vocal cord paralysis which occurred during a clinical recovery from acute cholinergic crisis.

Key words: Organophosphorus Poisoning, Bilateral Vocal Cord Paralysis, Acute Cholinergic Crisis, Dichloroavas, OPP

INTRODUCTION

Ingestion of organophosphorus compounds for suicidal purposes is a major problem, especially in developing countries. Organophosphorus insecticide poisoning can manifest three different phases of toxic effects, namely, acute cholinergic crisis, intermediate syndrome (IMS), and delayed neuropathy.¹ Among them, IMS has been considered as a major contributing factor of organophosphate-related morbidity and mortality because of its frequent occurrence and probable consequence of respiratory failure.² Muscular weakness affecting predominantly the proximal limb muscles and neck flexors is the cardinal feature of intermediate syndrome with cranial nerve palsies occasionally.³ In acute cholinergic phase of organophosphorus poisoning (OPP), only a few isolated cases of vocal cord paralysis have been reported in the recent past. Here we are reporting thirty year female patient presented with history of suicidal consumption of organophosphorus compound (dichloroavas) with isolated bilateral vocal cord paralysis.

CASE HISTORY

Thirty year female patient brought by relatives presented in emergency department (ED) with history of suicidal consumption dichloroavas (Organophosphorus compound) three hours back. There was no significant medical illness in the past. On examination patient had smell of Organophosphate (OP) compound. Patient was drowsy with excessive salivation and lacrimation. She had pin-point pupils, extensive fasciculation's and head lag. In general examination pulse was low volume, 50 per minute, blood pressure 100/80 mmHg and oxygen saturation was low (SpO₂: 65%). On auscultation heart sounds were normal with bilateral crepitations. Patient was transferred to intensive care unit for further management.

INVESTIGATIONS

Hemoglobin: 11.8 gm%, Total count: 8710, platelet count: 2.35 lac, BSL: 98 mg%, BUL: 28 mg%, Serum Creatinine: 1.1 mg%, Na⁺: 142 meq/l, K⁺: 4.5 meq/l, Urine examination: normal. Arterial blood gas analysis was suggestive of respiratory acidosis with increased PCO₂ with PH of 6.7. Serum cholinesterase was 279 U/L. Electrocardiogram was within normal limits. Chest radiograph was suggestive of aspiration pneumonitis with features of ARDS. Computerised

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tomography (CT) brain was normal. Cerebrospinal fluid study was within normal limits.

After initial clinical and laboratory assessment patient was treated with intravenous fluids as per requirement and input output charting. Ryles tube was inserted and aspiration of stomach content was done. Smell of Organophosphorus was present. First stomach sample was preserved for chemical analysis. Gastric lavage was performed with activated charcoal. Patient was intubated and kept on artificial ventilator for respiratory paralysis because of cholinergic crisis (type II respiratory paralysis). As an antidote atropine and PAM was started. Patient was catheterized and kept on broad spectrum antibiotics. Patient got atropinised after four hours of starting treatment. On fifth day of admission patient was showing signs of recovery from respiratory paralysis (reduced head lag and maintaining SpO₂: 96%). Gradually patient was weaned from ventilator in next 24 hours and elective extubation was done on sixth day. After four hours of extubation patient was complaining of breathlessness and dysphonia. Patient was in stridor. Immediate direct laryngoscopic examination was done which shows bilateral vocal cord palsy and both the cords fixed in paramedian position, with bilateral bowing of the cords, decreased laryngeal elevation, and marked pooling of secretions in the posterior cricoid and piriform sinuses. This was an unusual and rare finding in patient with organophosphorus poisoning who recovered from acute cholinergic crisis. There was no head lag and obvious weakness in the all four limbs. The patient was re-intubated and planned for tracheotomy. Patient was kept on tracheotomy tube in situ with 'T' piece oxygen supplementation for next three days without ventilator with adequate tracheotomy tube care. Over period of two weeks we did her indirect laryngoscopic examination which was showing normalization of vocal cord movement i.e. recovery of bilateral vocal cord palsy. Then we planned for weaning tracheotomy tube by deflating tracheotomy bulb and plugging the tracheotomy. Patient tolerated the plugging procedure well, and then we removed the tracheotomy tube. There was no stridor and no dysphonia after removal of tracheotomy tube. Appropriate nursing care was taken to prevent hypostatic pneumonia, decubiti, aspiration and other complications of patients with artificial ventilation. We did her bronchoscopy which was within normal limits with normal vocal cord movements and no obvious subglottic stenosis. After three week of hospital stay we did her psychiatry opinion to rule out the possible cause for her suicidal attempt and patient was discharged in ambulatory state. At the time of

discharge her Serum cholinesterase was increased up to 2270 U/L. and chest radiograph was showing resolution of aspiration pneumonitis.

DISCUSSION

Organophosphorus compounds are irreversible inhibitors of cholinesterase. Malathion, parathion, dimethoate, dichlorvos and diazinon are some of the commonly used insecticides.⁴ Acute organophosphate insecticide poisoning can manifest three different phases of toxic effects, namely, acute cholinergic crisis, intermediate syndrome (IMS), and delayed neuropathy. Among them, IMS has been considered as a major contributing factor of organophosphate-related morbidity and mortality because of its frequent occurrence and probable consequence of respiratory failure.^{4,5}

Death is likely during this initial cholinergic phase due to effects on the heart (bradycardia and other arrhythmias), respiration (central or peripheral ventilatory failure) and on the brain (depression of vital centres). The cholinergic phase usually lasts 24–48 hours and constitutes a medical emergency that requires treatment in an intensive care unit. The intermediate syndrome begins less than 1 to 4 days after poisoning and occurs after the cholinergic phase. Complete recovery occurs within 4 to 18 days if adequate ventilatory support is provided.⁵

In addition, disturbances of body temperature and endocrine function, electrolyte imbalances, immunological dysfunction and disorders of reproduction have been reported in animals and man. Vocal cord paralysis, cardiac arrhythmias and a wide range of neuropsychiatric disorders are known to follow acute and chronic exposure to organophosphorus compounds. Death in organophosphate toxicity usually results from cardiac or respiratory failure. Other reasons are ventilator associated, nosocomial pneumonia, aspiration pneumonitis, ARDS, septicemia etc.^{4,5} There is a need to devise a practicable management strategy for organophosphorus poisoning in India, which includes development of newer antidotes with oximes such as obidoxime and restriction of access to highly toxic pesticides and use of safer alternatives should result in fewer deaths.

Very few cases of isolated bilateral recurrent laryngeal nerve palsy are documented in the literature till date. Patient in present case report initially symptomatic for acute cholinergic syndrome and later on developed bilateral vocal cord paralysis which is

not a usual manifestation. Reversible bilateral vocal cord paralysis was observed for period of two weeks. Similar findings were observed by Jin YH et al⁵, L. Karalliedde⁶ and P.T. Haywooda⁷. Compared to other case reports, were the vocal cord palsy recovered with in hours to few days our patient took longer time to recover. Jin YH et al⁵ documented bilateral laryngeal paralysis suggesting the vagus nerve involvement by laryngeal electromyography (LEMG).

CONCLUSIONS

Organophosphorus compound poisoning is a serious condition that needs rapid diagnosis and treatment. Since respiratory failure is the major reason for mortality, careful monitoring, appropriate intensive care management and early recognition of this complication may decrease the mortality rate among these patients. Physicians should account for the neurotoxic effects of organophosphate poisoning during the first line management of exposed patients. Bilateral vocal cord paralysis should be excluded as a cause, if dysphonia or respiratory distress occurs after extubation in patients with recovery from acute cholinergic crisis or intermediate syndrome. Laryngoscopic examination is important when we require re-intubation for patient who has recovered from respiratory paralysis due to either acute cholinergic crisis or as a part of intermediate syndrome. There is no specific treatment required for bilateral vocal cord paralysis other than either re-intubation or

tracheotomy, but its timely diagnosis is vital for doing proper airway management. People attempting suicide by any mean for any reason should not die.

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Prosthetic Rehabilitation of a Partial Nasal Defect - A Case Report

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ABSTRACT

Facial prosthetics often plays a life changing role in patients who have lost an eye, ear, nose or sustained damage to the intraoral structures. Road traffic and occupational accidents, burns, head and neck cancer and congenital defects are the most common reasons for full or partial loss of these structures. Facial defects lead to functional and cosmetic deficiencies. These defects can be reconstructed surgically and/ or prosthetically depending on the location and size of the defect. The success in prosthetic rehabilitation includes proper selection of materials, esthetics and retention qualities. Author report a case of post traumatic partial nasal defect, where rehabilitation with silicone partial nasal prosthesis was employed successfully.

Key words: Nasal Prosthesis, Silicone, Adhesive.

INTRODUCTION

The face represents the identity of an individual. Any defect in oro-facial structure brings about a noticeable change in an individual's personality. Many patients who suffer facial tissue defects have an impaired social life stemming from esthetic problems.¹ Surgical reconstruction techniques, prosthetic rehabilitation or a combination of both of these methods to restore facial disfigurements may improve the level of function and self confidence for the patient, thereby significantly improving the quality of life.² This case report describes treatment using a silicone prosthesis with adhesive and mechanical aid of retention for a patient with partial nasal defect secondary to trauma.

CASE REPORT

45-year-old gentlemen reported with history of trauma resulting in defect of left ala of the nose. He underwent surgical reconstruction in the form of skin graft, but was not satisfied with the esthetic outcome. At examination a part of the ala of the nose was destructed and there was evidence of surgical scarring

(Fig. 1). Rehabilitation of the defect with a definitive nasal prosthesis was considered. However, since plastic surgery was done to recontour the defect and as there was no retentive anatomic undercuts, adhesive and mechanical method for retention was chosen.



Fig. 1. Clinical photograph of the patient with post traumatic partial nasal defect following surgical repair.

Procedure: The outline for the impression was marked on the face and boxing wax was used to confine the impression material (Golden Dental Products, Hyderabad, India). Cotton roll was placed within the nostril to prevent posterior flow of impression material and patient was advised to breathe through the mouth during the impression procedure [Figure 2a]. The impression of the defect was made with irreversible hydrocolloid (Prime chrome, Prime Dental Products Pvt. Ltd, Thane). Paper clips were placed in the irreversible hydrocolloid [Figure 2b] for reinforcement with dental plaster (White gold, dental grade plaster, Asian chemicals, Rajkot, India) (Fig. 2c). The impression was poured

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with Type-III dental stone (Kala Stone, Kala Bhai Pvt. Ltd, Mumbai, India) (Fig. 2d). A wax pattern was sculpted on the resultant cast, using preoperative photographs. The whole morphology and the anatomic contours of the nose were developed according to normal contours. The trial wax pattern was completed (Fig. 3a). The adaptation of the margins, contour and position of the wax pattern were verified during try-in (Fig. 3b). Wax up of the nasal prosthesis was invested and the wax boiled out. After the boil-out procedure, room temperature vulcanizing (RTV) silicone elastomer (Cosmesil RTV) was manipulated according to manufacturer's instructions. Intrinsic coloring was incorporated in the silicone to match the basic skin tone and painted into the mold, layer by layer. RTV silicone elastomer was allowed to vulcanize

at room temperature under pressure. The prosthesis was finished to thin the borders to blend with the surface of the skin. Medical grade adhesive was used and was further augmented by mechanical method of retention through the eyeglasses. A recall checkup was done after 2 weeks for evaluation of the prosthesis (Figure 4).

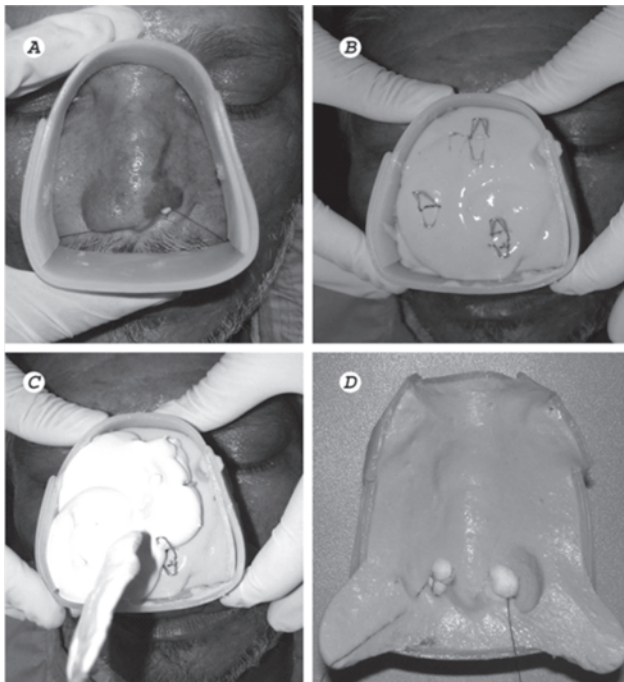


Fig. 2. Procedures in impression making: (a) Defect boxed with wax to confine the impression material, (b) and (c) Paper clips placed in the irreversible hydrocolloid for reinforcement with dental plaster, (d) Impression of the nasal defect.

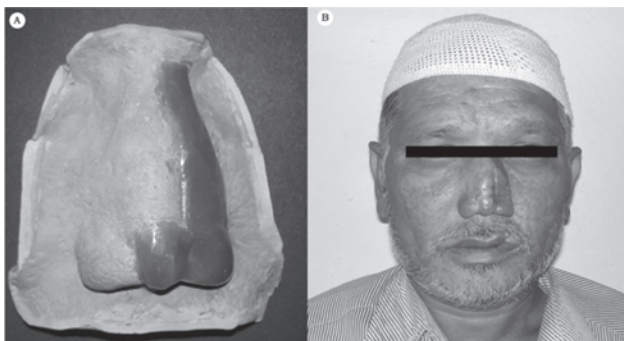


Fig. 3. Trial wax pattern: (a) Wax pattern sculpted on the cast (b) Trail of the finished wax pattern on the patient.



Fig. 4. Clinical photograph at follow up.

DISCUSSION

Maxillofacial defect can be congenital, but also occur secondary to trauma, infection, neoplasm and burns. Nose is a prominent feature of the human face and nasal defects produce severe cosmetic impairment.³

Surgical reconstruction techniques, prosthetic rehabilitation or a combination of both of these methods can restore facial disfigurements. Following surgical reconstruction of the defect, many patients require prosthetic rehabilitation for esthetic reasons. The method of rehabilitation depends upon the site, size, etiology, age and lastly the patient's wish.³ Retention becomes an important factor for the satisfactory rehabilitation of such defects.⁴ Retention methods include mechanical, anatomic and adhesives. Mechanical methods include use of thread, wire loops, eyeglasses, stainless steel studs, pins, tubes and magnets. Anatomic methods include projections/ depressions of tissue and surgically constructed skin

bridges. Adhesives include cements, medical adhesives and double coated polyethylene tape.³

The definitive prosthesis can reestablish esthetic form and anatomic contours of mid-facial defect.⁵ For the purpose of prosthetic rehabilitation for facial defects, biomaterials such as polymethyl methacrylate, polyvinyl chloride, polyurethane and silicone have been used. Silicone materials are widely used for facial prostheses because of their superior properties.⁶ Advantages include chemical inertness, thermal and dimensional stability, elasticity, flexibility and skin-like texture. They can be easily colored, molded and cured at room temperature and have an effective cosmetic appearance. The techniques used are comparatively simple; they are easier, less time consuming and more accurate. The chief disadvantages of silicone rubber are its low tensile strength and lack of shearing resistance at the peripheral thinness which is required in most maxillofacial replacements. This has been overcome by incorporating strong, thin nylon and Dacron fabrics in the prosthesis.⁷

Traditionally, facial prostheses were hand-sculpted. CAD/CAM (computer-assisted design/computer-assisted manufacture) techniques have revolutionized the field. Recently, several authors have attempted to design facial prostheses (auricular and nasal) using computer aided design/computer-aided manufacturing (CAD/CAM) technology to reduce time and to increase the quality of the final product.⁸

Newer advances in rapid prototyping technologies have demonstrated significant advantages compared to more conventional techniques for fabricating facial prostheses. The use of selective laser sintering technology is an approach for fabricating a wax pattern, wherein the wax nasal pattern can be generated directly and reduce labor-intensive laboratory procedures.⁹

Advancements in dental technology have made prosthetic rehabilitation more reliable, especially if the prosthesis is retained by osseointegrated implants.¹ Osseointegrated implants have various advantages over either adhesive or spectacle retained prostheses for the reconstruction of the facial defects. They provide better retention of the prosthesis, so that the prosthesis is properly positioned and the patient can wear it more confidently. There is no skin irritation from adhesive and the prosthesis does not need to have adhesive cleaned off each time it is used. The prosthesis

can be made thinner, with feathered edges that blend with the skin, which offers the patient improved aesthetics.¹⁰ However; it requires a multidisciplinary approach and is costlier than conventional prosthetics.

In the present case considering the extension of the defect and patients economic constraints a conventional method of rehabilitation with silicone prosthesis was considered. The prosthesis fit accurately into place, was retentive and esthetically acceptable to the patient.

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Pattern of Poisoning Reported at BC Roy Hospital, Haldia Purba Midnapur, West Bengal

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ABSTRACT

Poisoning is a common medical emergency and one of the important cause of mortality and morbidity in developing countries like India due to easy availability of poisonous substances and its low cost. The study group comprised 130 cases admitted to BC Roy Hospital, Haldia (W.B), Organophosphorus poisoning constituted 55.39% of total cases. Maximum number of poisoning cases were between the age group of 21 - 30 years and of low socio economic status. Male were more affected than female. 60.76% of the cases were from rural area and pulmonary oedema was the most common complication and most common cause of death in this present study.

Key words : Poisoning, Organophosphorus, Suicide, Haldia.

INTRODUCTION

With rapid industrialization, urbanization, application of fertilizers and exposure to chemical products, massive use of pesticides, insecticides, increased alcohol consumption are the most hazardous for the society.

Easy availability and low cost of hazardous chemical plays a major role in suicidal and accidental poisoning in India. Most of the fatality rate is of intentional poisoning by organophosphorus compounds which has been reported from Haldia(W.B)

According to W.H.O (1999) more than 3 million poisoning cases has been reported out of which 2,51,881 deaths occurred world wide annually of which 99% of fatal poisoning occur in developing countries predominantly among farmers due to various kinds of poisoning including poisonous toxins from natural products and handled.

Organophosphorus compounds are used extensively in India to control insects so as to increase production of agriculture commodities.

Person engaged in manufacture, formulation, transport and applications of pesticides encountered direct exposure to organophosphorus and cellphos poisoning.

Individuals consumed insecticides for suicidal

purpose because of its low price, high toxicity and easy availability.

A large number of deaths can be prevented with prompt treatment, timely administration of antidotes and other supportive measures.

So this study has been taken to determine the various aspects of poisoning such as incidence, type of poisoning, type of occupation etc. in Haldia, Purbamidhnapur (W.B)

MATERIAL AND METHOD

This study was conducted in Emergency, Medical Ward, I.C.U of B.C Roy Hospital Haldia from 31 august 2010 to 1 Sep. 2011.

During this period 130 poisoning cases were admitted to B.C Roy Hospital Haldia.

The patients were studied from at the time of admission to the wards and followed up in the hospital until recovery or death.

The information was collected from the following sources

- 1) Interview from relatives
- 2) In patient case sheet

The information was collected into a performa including age, sex, marital status of the patient, occupation, type of poison consumed, Clinical features and complications for each case and analyzed.

RESULTS AND OBSERVATIONS

In one year study total 130 cases were admitted in BC Roy Hospital due to suspected poisoning out of 72 were due to organophosphorus poisoning and 30 were due to cellphos poisoning and rest due to Benzodiazepines and poisoning of unknown nature.

1. Total number of male patients admitted in hospital due to poisoning were 95(73.07%) and female 35(26.92%).
2. Fifty four victims were the aged between 21 to 30 years(41.55%).
3. Seventy Four victims were married(56.92%) and 56(43.07%) unmarried.
4. Seventy nine(60.76%) victims belong to the rural population and rest 51(39.23%) urban.
5. In present study agriculture was the most common occupation of the victims followed by Housewives, students and labourers respectively.
6. In this study organophosphorus 72(55%) was the most common poison consumed followed by cellphos 30 (23.07%).
7. In the present series most of the victims belong to lower socioeconomic status 68.46% followed by middle class 20 % and least involved were the upper class 2.30%.
8. Pulmonary Oedema was most common complication and the most common cause of death in present study.

Table 1. Showing incidence of sex

Sex	Number of cases(N= 130)	Percentage %
Male	95	73.07
Female	35	26.92
Total	130	99.99

Total number of male patients admitted in hospital due to poisoning were 95 (73.07%) and female 35 (26.92%).

Table 2. Showing incidence of age

Age Group	Male	Female	Total (N)	Total(%)
0 - 10	0	0	0	0
11 - 20	7	7	14	10.76
21 - 30	38	16	54	41.53
31 - 40	27	9	36	27.69
41 - 50	14	2	16	12.30
51 - 60	06	01	07	5.38
> 60	03	00	03	2.30
			130	99.96

54 victims were aged between 21 – 30 years (41.55%) and least number of cases were seen above the age group of 60.

Table 3. Marital Status of the victims

Marital Status	Number N= 130	Percentage %
Unmarried	56	43.07
Married	74	56.92
	130	99.99

Table 4. Show area wise distribution

Area	No. of Cases N = 130	Percentage
Urban	51	39.23
Rural	79	60.76
	130	99.99

Table 5. Occupation of victims

Occupation	Number N = 130	Percentage %
Farmer	60	46.15
Housewife	27	20.76
Labourer	14	10.76
Student	16	12.30
Unknown	13	10
	130	99.97

In present study agriculture was the most common occupation of the victims (46.15%) followed by Housewives, students and labourers respectively.

Table 6. Socioeconomic Status

Socioeconomic Status	Number N = 130	Percentage
Lower socioeconomic class	89	68.46
Middle socioeconomic class	26	20
Upper socioeconomic class	03	2.30
Unknown	12	9.23
	130	99.99

Most of the victims belong to lower socioeconomic status (68.46%) followed by Middle class (20%) and least involved were the Upper class (2.30%).

Table 7. Shows Type of poison consumed

Type of poison	Number N = 130	Percentage
Organophosphorus	72	55.39
Aluminium Phosphide(cellphos)	30	23.07
Benzodiazepines	10	07.69
Others	12	09.23
Unknown	6	04.61
	130	99.99

In our study organophosphorus (55.39%) was the most common poison consumed followed by Cellphos (23.07%)

Table 8. Manner of Death

Manner of Death	Number N = 130	Percentage
Suicidal	103	79.23
Accidental	27	20.76
Homicidal	0	0
	130	99.99

Suicide being the commonest manner of death in this study(79.23%). No homicidal cases were recorded in this study.

Table 9. Clinical features and complication observed

C/F and Complicatons	Number N = 130	Percentage
ARDS	31	23.84
Pulmonary oedema	70	53.84
Ventricular fibrillation	30	23.07
Septicaemia	14	10.76
Hemetemesis and Malena	12	9.23
Misllaneous	37	28.46

Pulmonary oedema was the most common complication and the most common. Cause of death in this series.

DISCUSSION

In present study male are more effected than females. The other studies shows similar pattern. The reasons are that male are more involve in outdoors visits, more actively involve in occupation and sustaining more stress and strain. Persons who are not able to sustain these stressfull situation are the major victims of either suicidal or accidental poisoning.

Similar observation were made by dalal et al and agrawal etal that male consisting 63%, 72% cases of poisoning respectively.

In our study most of the victims belong in the age group of 21-30 years. This particular age group (21- 30 years) is the most active phase of life for men who are involved physically, mentally and socially.

The other study showed the similar pattern which was done at Allahabad, Rohtak, Sri Lanka.

The incidence of poisoning were common in married people (56.92%) of rural population .

Similar observation were made by SC Chatterjee and S Gupta et al.

68.46% victims were belong to lower socioeconomic class . this observation were similar to studies done by dalal et al (1998).

Farmers were the most common victims 46.15% because of illiteracy and poverty. They totally depend on the agriculture income for their needs. Due to some reason if they are not able to earn or get reasonable prices for there agriculture products, they may get frustrated and take step to suicide by weed killers, pesticides, insecticides(organophosphorus and aluminium phosphide) etc.

Organophosphorus and aluminium phosphide are cheap, easily available, more toxic and cause rapid death

similar studies done by Ingiennes et al and found that maximum number of victims involved were farmers.

In present study, the commonest poison observed was the organophosphorus (55.39%).

CONCLUSION

The present study shows that organophosphorus poisoning constitutes about 55.39% of total poisoning

cases admitted to BC Roy Hospital Haldia. Male aged between 21 – 30 years of age group farmers by occupation of lower socioeconomic classes were more involved.

To decrease the incidence mortality and morbidity of the poisoning cases following precautions and measures should be taken.

1. protective clothing consisting overall of white cotton and rubber apparon, gloves and boots for organophosphorus and cellphos poisoning.
2. The face and hands should be thrughly washed with soap and water after handling organophosphorus.
3. Strict rules and regulations over the sale of insecticides, rodenticides, and pesticides.
4. Incidence of deaths can be reduced with prompt treatment, early administration of antidotes and other suitable measures.

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