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Contents

Original Articles

Determination of Sex by Quantitative Analysis of Ischium and Pubis in the Population of Jharkhand **93**
Kumari Sandhya, Singh Bhoopendra, Chanda Camellia, Prasad Renu

Profile of Fatal Poisoning Cases in and Around Rajkot Region: A 3 Years Retrospective Study **101**
K.N. Pipaliya, V.J. Aghera, M.N. Patel, R.D. Vaghela, R.K. Masharu

Pattern of Scalp Injuries in Relation to Cranio-Cerebral Trauma: An Autopsy Based Study **105**
Sridhara Chary Rangu, B. Lakshmi Prasanna, Bharath Kumar Reddy, Nishat Ahmed Sheikh

Estimation of stature from Foot length in Middle Gujarat Population **111**
Pankaj Prajapati, Pratik Patel, Nisarg Modi, Bhargav Oza, Dixit Patel

Estimation of Personal Height From the Percutaneous Length of Ulna in Maharashtra Region (Regression Analysis) **115**
Pawar Sudhir E., B.R. Zambare, Lingaswamy Veeramalla

Assessment of Medico-Legal Knowledge among Interns and Residents at Vikhe Patil Institute of Medical Sciences **121**
Sandeep S. Kadu, Ranjit M. Tandle, Sarita Gurjar

Study of Presenting Complaints and Survival Time in Cases of Sudden Death **125**
Akhilesh K. Pathak, Pankaj H. Barai, J.S. Tanna

Age Determination from Epiphyseal Union of Bones at Shoulder Jointin Boys of Central India **129**
B. Tirpude, V. Surwade, P. Murkey, P. Wankhade, S. Meena

Estimation of Stature from Hand Length in Gujarati Population **135**
Dipen M. Dabhi, Rajendra D. Kharadi, Rahul A.Mehta, Mahesh M. Trangadia, Alpesh B Bambhania, Mehul C. Upadhyay

A Study on the Establishment of Poison Control Centre: A Need for the Region of Warangal **139**
T. Krupal Singh, Lavanya Kowsil G., Jakkam Surendar

Pattern of Injury among Motorized Two Wheeler Road Traffic Accidents: An Autopsy Based Study **145**
Perugu Vanishri, Nishat Ahmed Sheikh

Pathological Findings of Liver in Autopsy with Emphasis on Incidentally Detected Lesions **153**
Sapna Patel, Rajalaxmi B.R., Manjunath G.V.

Reliability of Sternal Index in Determination of Sex in Rajkot Region: A Prospective Study **161**
S.D. Bhuva, M.T. Vijapura, H.M. Mangal, S.G. Momin, M.N. Patel, R.K. Mashru

Self Poisoning Deaths **169**
B.Karunaker, Abhijit Subhedar, Mojammed Taquiddinkhan, JakkamSurendar

Study of Incidence of Psychotropic Drug Abuse among the UG & PG Medical Students in Padmashree Dr Vithalrao Vikhe Patil Foundation's Medical College, Ahmednagar, Maharashtra **173**
RishiRaj Ashok Sinha, Dilip Kumar Gund

Profile of Fatal Craniocerebral Injuries **179**
Vikrant S. Kalokhe, R.S. Bangal, Anand P. Dongre

Case Report

Anomalous Origin of Left Coronary Artery from Pulmonary Trunk **185**
Monil P. Thakrar, Sapna Gandhi, Alpana Jain, Arpita Jindal

Plasma Cell Leukemia: Clinicopathological Profile of Five Cases **189**
Bajaj Preeti Sumeet, Kasture Jyoti Uttamrao, Shah Balbir Singh

Guidelines for Authors **193**

Original Article

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Determination of Sex by Quantitative Analysis of Ischium and Pubis in the Population of Jharkhand

Kumari Sandhya*, Singh Bhoopendra, Chanda Camellia***, Prasad Renu******

Abstract

Background: Determination of sex from a small fragment of skeletal remains of human has been frequently a challenge with which a forensic expert comes across in his day to day life. Because of showing sexual dimorphism, hip bone remains to be a favourable part of skeleton for this purpose. Since long it has been proven that hip bone shows racial differences also. *Materials and Methods:* This study was conducted on a set of 41 hip bones, of which 24 belonged to male and 17 belonged to a female. Length of pubic and ischial part was measured and then iscio-pubic index was calculated with the help of formula given by Washburn (1949). *Results:* Ischio- Pubic Index was found to be 76.72 ± 0.13(Range 65.71-96.08) in males & 85.87 ± 2.40 (Range 73.48-98.42) in females. Ischiopubic index remained in between 73.34 to 80.10 in male and between 78.27 and 93.47 in female with confidence limit of 99%. *Conclusion:* Our study results and it's comparison with results of other workers shows that hip bone not shows only dimorphism but it's metric values are population specific also.

Keywords: Hip Bone; Sex Determination; Pubis; Ischium; Ischio-Pubic Index.

Introduction

The accurate identification of human skeletal remains crucial in forensic science and physical anthropology, especially because of the escalating crime rates, which have become a worldwide phenomenon. If all soft tissues are absent, identity depends solely on osteological examination and measurements and the recognition of any pathological or anatomical abnormalities in bone. The determination of sex is statistically the most important criterion, as it immediately excludes approximately half the population, whereas age, stature and race each provide points within a wide range of variables. Obvious sex differences do not become apparent until after puberty, usually in the 15–18 year period, though specialized measurements of the pelvis can indicate the sex even in foetal material. Sex and age are linked, especially where body size and weight are concerned. Similarly, race confuses sexing, for example, the size of the supraorbital ridges in a normal Negroid female may exceed those in the average Caucasian male. The accuracy of sexing is hard to estimate, as various loading factors exist [1]. Krogman's [2] scored 100 per cent accuracy, using the whole skeleton, 95 per cent on pelvis, 92 per cent on skull, 98 per cent on pelvis plus skull, 80 per cent on long bones and 98 per cent on long bones plus pelvis. He admitted, however, that, as most anatomy department material has a sex ratio of about 15:1 in favour of men, marked bias could be introduced by assigning all doubtful bones to the male category.

Apart from above, when bones are incomplete or fragmentary, the problems escalate rapidly. If the ends of long bones are present, then their non-human shape may be more readily determined, but cylindrical segments of the central shaft have little in the way of distinguishing features, apart from size. Burnt bone fragments offer similar problems, added to which is the possibility of heat distortion and shrinkage. The advice of an anatomist is needed in such cases, preferably one with forensic experience and enthusiasm for the project.

Authors Affiliation: *Associate Professor, ***PG Student, ****Professor and Head, Department of Anatomy, RIMS, Ranchi. **Toxicologist (Associate Professor), RIMS, Ranchi.

Reprints Requests: Bhoopendra Singh, Toxicologist (Associate Professor), Dept of Forensic Medicine &Toxicology, Rajendra Institute of Medical Science, Ranchi – 834009 Jharkhand.
E-mail: drsinghb@gmail.com

The literature contains sufficient evidence that metric and morphological biologic differences exist amongst Caucasoid, Mongoloid and Negroid races [3,4]. Measurements of Pubic, ischium and ilium bones and determination of related indices and angles have been very useful in not only forensic science [5], but also in clinical practice, (most especially Obstetrics and Gynaecology) and Physical Anthropology [6]. Davivong [6] and Washburn [7] determined the ischiopubic index obtained by dividing the length of pubis by the length of the ischium. Sexual differences in adult pelvis have been studied and measured extensively. These studies involved metrical and non –metrical characteristics whose range overlap between the sexes. According to Udoaka et al [8], the pubic bone was longer in females while the Ischium was longer in males. They stated that Ischio-pubic index greater than 90 would most probably be that of a female and less than 90 would most probably be that of a male. Similar observation was reported by various other authors those conducted similar study in different parts of the world like Black Malawians [9] - 85 in Male and 104 in Female; France [7]-82 in Male and 94 in Female; Americans [10] - 67.4 in Male and 93.1 in Female; White Americans [10]- 63.4 in Male and 88.4 in Female; Black Americans [10]- 65.8 in Male and 85.2 in Female; Calabar indigenes [11]- 94.2 in Male and 118.8 in Female; and Nigerians in Rivers [12] - 90.88 in Male and 114.8 in Female. In addition to this various studies were conducted in Indian population and findings of few studies were included in this text as in Uttar Pradesh [13] - 89 in Male and 100 in Female; Punjab [14] – 98.2 in Male and 104.24 in Female.

After detailed review and considering the facts that there were many morphologic biologic differences exists amongst population globally. Thus, the present study was carried out to provide reliable data on population in this part of country (Jharkhand).

Materials and Methods

The study was conducted in the Department of Anatomy, Rajendra Institute of Medical Sciences, Ranchi. Material for the present study comprised of 41 adult hip bones of known sex (M: F =24:17) of Jharkhand population were used for this study. These bones were available in the museum of the department of Anatomy that were supplied from the mortuary of Rajendra Institute of Medical Sciences, Ranchi for routine teaching purpose. The inclusion criteria used were fully ossified, undamaged bones showing no pathological changes.

At first marking of the junction point of three parts of the hip bone, i.e. pubis, ischium and ilium, on acetabular surface (point J in Figure 1) and inside of the pelvis (point J in Figure 2) were done with the help of Schultz's [5] method. The osteometric measurements for the following two variables were taken with the help of slide callipers, technical quality divider and metallic (steel) graduated scale with readings up to one millimetre.

Pubic Length

It is a straight line JS as shown in the Figure 2. It is the greatest distance of the junction point on acetabulum (and inside pelvis) from the symphyseal surface of the body of pubis [5] (JS in Figure 2).

Length or Height of Ischium

It is a straight line JT as shown in the Figure 2. (Length of Ischium term was coined by Davivongs (1963) [6], whereas Seidler (1980) [15] described it as the greatest distance between the central point of acetabulum and the farthest point on inferior aspect of ischial tuberosity which has been named ischial point by Thieme (1957) [16]. It is a straight line JT as shown in the Figure 2. (JT in OB in Figure 2). This length was recorded with the help of slide callipers on both the sides Figure 2)

Ischiopubic Index

It was calculated with the help of the formula given by Washburn (1949) [17]

$$\textbf{Ischiopubic index} = \frac{\text{Length of Pubic bone (Fig.1 JS)}}{\text{Length of Ischial bone (Fig. 2 JT)}} \times 100$$

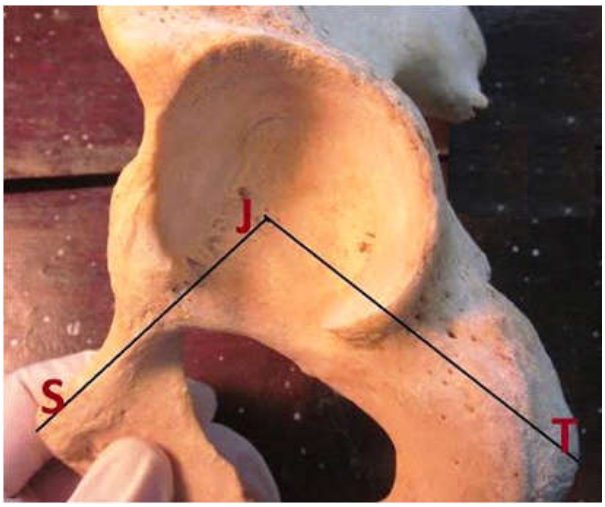

Fig. 1:

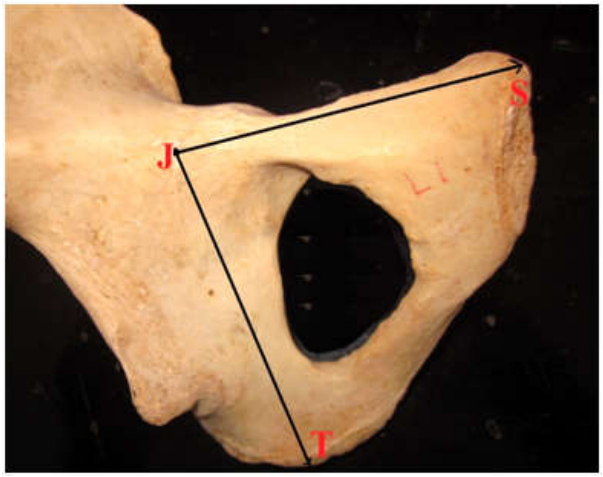

Fig. 2:

Statistical Analysis

Data on all the parameters studied were analysed for mean, range and standard deviation using discrete statistics and significant differences using SPSS -16. The actual range of the male and female sexes was determined from the data. The 99% confidence limits were calculated for the population. The Fisher's t- test was also applied to test the Null hypothesis on the 3 variables (Pubic Length, Ischial length and Ischio-Pubic Index).

H0 – The Mean Length of Pubic Part of Hipbone in Male and Female is equal.

HA - The Mean Length of Pubic Part of Hipbone in Male and Female is not equal.

Results

Since, there was no statistically significant difference was observed between right and left sides in both sexes for the two linear measurements, the data for the two sides have been pooled.

The Range, Mean, Standard deviation and Standard Error of the three measurements are shown in Table 1, Table 2 and Table 3.

Table 1: Showing Range, Mean, SD and SE of the Length of Pubic Bone in mm

Measurements (in mm)	Male (N=24)	Female (N=17)
Range	54.5-78.2	60.0-74.8
Mean	66.0	66.8
Standard Deviation (SD)	8.6	7.6
Standard Error (SE)	1.76	1.84
99% Confidence Limits	Lower limit -61.06 upper limit -70.94	Lower limit -61.43 upper limit -72.17
t value	0.083	
p value	0.01	

Table 2: Showing Range, Mean, SD and SE of the Length of Ischial Length in mm

Ischial Length (in mm)	Male (N=24)	Female (N=17)
Range	71.0-100.0	71.0 – 86.0
Mean	86.6	78.2
Standard Deviation (SD)	0.59	0.71
Standard Error (SE)	0.12	0.17
99% Confidence Limit	86.26 to 86.94	77.70 to 78.70
t value	4.72	
p value	0.01	

Table 3: Showing Range, Mean, SD and SE of the Length of Ischio-pubic Index

Measurements and Calculation and calculations	Male Ischiopubic Index	Female Ischiopubic Index
Range	65.71 to 96.08	73.48 to 98.42
Mean	76.72	85.87
Standard Deviation (SD)	6.85	7.58
Standard Error (SE)	1.40	1.84
99% Confidence Limit	72.78 to 80.65	80.5 to 91.24
t value	3.70	
p value	0.01	

Table 4: Mean Ischiopubic indices of various populations

Population	Sex	Mean ±SD	N	P	Authors
	Male	85.0 ± 15.7	120		Igbigbi and Msamati [9]
Black Malawians	Female	104.6 ± 15.7	135	<0.05	
France	Male	82.0 ± 7.2	93		Wasburn[7]
	Female	94.5 ± 3.1	61	<0.05	
	Female	71.3 ± 3.1	253		
Americans	Male	67.4 ± 8.1			Tague[10]
	Female	93.1 ± 10.4	212	<0.05	
White American	Male	63.7 ± 7.8	50		Tague[10]
	Female	88.4 ± 8.5	50	<0.05	
Black Americans	Male	65.8 ± 8.7	50		Tague[10]
	Female	85.2 ± 8.5	49	<0.05	
	Male	<60	–		Caldwell and Moloy[16]
Caucasians	Female	<90	–	<0.05	
South-South	Male	81.4 ± 6.4	30		Oladipo et al.[3]
Nigerians	Female	104.2 ± 11.1	40	<0.05	
Middle Belt	Male	83.1 ± 5.8	20		Oladipo et al.[3]
Nigerians	Female	101.7 ± 11.3	30	<0.05	
Eastern Nigeria	Male	84.0 ± 10.4	100		
	Female	102.6 ± 11.7	100	<0.05	Oladipo et al.[3]
Port Harcourt,	Male	81.0 ±5.70	46		Udoaka et al.[3]
Nigeria	Female	102.7± 9.20	54	<0.05	
Calabar indigenes	Male	94.2± 9.9	114		Ekanem et al.[12]
	Female	118.8± 12.8	100	<0.001	
Nigerians in	Male	90.88±5.52	268		Udoaka et al.[4]
Rivers	Female	114.87 ±8.08	406	<0.05	
State					
	Male	76.72 ± 6.85	24		Present study
	Female	85.87 ± 7.58	17		

Length of Pubic

The mean of pubic length was 66.0±8.6 mm in males and 66.8±7.6 mm in females. The 99% confidence limit was between 61.06 mm and 70.94 mm in males and between 61.43 mm to 72.17 mm in females (Table 1). **T**he Fisher's t-test was applied to test the Null Hypothesis for pubic length. The 't' value was found as 0.083 (non significant) so Null Hypothesis may be true that there was no significant difference in the pubic length among the male and female in the studied group.

Length of Ischial

The mean Ischial length of males and females hipbones were 86.6±0.59 mm (Ranged 71.00–100.00 mm) and 78.2±0.71 mm (Ranged 71.00 – 86.00 mm), respectively. The 99% confidence limit was between 86.26 and 86.94 mm in males and 77.70 and 78.70 mm in female. The Fisher's t-test was applied to test the Null Hypothesis for the Length of Ischial. The't' value was found as 4.72 and thus Null Hypothesis was rejected ; it showed that there was a significant difference in the Ischial length of male and female in the studied group.

Ischiopubic Indices

The mean Ischio-pubic Indices in both males and females bones were 76.72±6.85 (Range - 65.71 - 96.08) and 85.87±7.58 (Range - 73.48 - 98.42), respectively. The 99%, confidence limit was between 72.78 to 80.65 in males and from 80.5 and 91.24 in females (Table 3). The Cochran's t test was applied to test the Null Hypothesis for Ischiopubic indices. The't' value was found as of 3.70 which was significant showing that the null hypothesis is not true while alternative hypothesis is true. It showed that there was a significant difference in the Ischio-Pubic Index of hipbone amongst the male and female in the studied group.

Discussion

Sex differences in the human pelvis are well defined in different literature and contributions from anatomists, anthropologists, and obstetrician all are there on this topic. The action of oestrogens on osteoblastic activity is a well-known fact, today leading to its differential growth according to reproductive requirement [18].

According to Washburn SL [19] the pubic region is most responsive to sex hormones; therefore the pubic structure is best indicator of sex determination of a skeleton. He has also expressed that the pubis is more reliable than any other bone, because female

sex hormone responsible for causes sex differences in these dimensions.

The Ischio-pubic index was observed to be a very useful index in sex differentiation. In this present study, the identification point for female was >85.87 whereas that of males was <76.72. The mean values of this index were observed to be statistically significant.

It is observed from the findings of various different studies that the pubic length, ischial length and ischiopubic index differ in different races. A comparative data of these parameters in different races are shown in Table 4.

In this present study, the mean length of pubic bone was found 66.00±8.6mm (Range 54.50 - 78.20 mm) in males and 66.80±7.6 mm (Range 60.00 -74.80 mm) in females. This was justified the dimorphic character and showed that pubic length was more in females than in males. The similar observation was reported by Sachdeva et al [14] in Punjabies populations that mean was 85.60±0.47 mm (Range 77.50 – 95.30 mm) in females and 79.20±0.71 mm (Range 56.30- 93.40 mm) in males. An another study was conducted by Parija et al [20] in Odisha (South East India) they reported that the mean was 70.50mm (Range 49-84 mm) in females and 69.00 mm (Range 51-74 mm) in males.

When these results were compared with other races, there were racial differences. The Washburn (1948) [7] was conducted a study amongst White American and Negroes population. His study found that the mean value of pubic length was 77.90 mm in Females and 73.80 mm in males of White American's [7] while 73.50 mm in females and 69.20 mm in males of Negroes [7]. Further another study was conducted by Washburn [17] in 1949 in the population of Bantu and Bushman race. Where he found that the mean value of pubic length was 73.20 mm in females and 66.20 mm in males of Bantu race and it was found 66.80 mm in females and 60.40 mm in males of Bushman race.

Davivongs (1963) [6] was conducted a study in Australian Aborigines and found that the mean of Pubic length was 69.20 mm in female and 63.30 mm in males, which is comparable to the measurement value of present study. Urhobo males were having pubic length as 78.51±12.4mm, whereas in their females pubic length was 92.39±7.08 mm. Itsekiri population had the mean values for pubic length, as 82.20±10.62 mm in males, and in females mean pubic length was 92.05±6.36 mm.

Pubis was significantly longer in females as compared with males in the North Indian population. It can be observed from the Table 1 and 4 that when compared between the two sexes, pubic length is always more in females as compared to males in all the races. However, amongst different races, it was observed that the maximum in French & Belgian and minimum in Bushman [17]. It was also observed that the East Indian values are closest to the South East Indian population, which may be due to similar ethnicity; comparable values were reported among other races like Australian Aborigines [6], Bushman [17] and American Negroes [7] races (Table 4).

Ischium was significantly longer in males as compared to females in the North Indian population (Table 1). As it is evident in Table 4, the height of Ischium is universally more in males than in females in all the races. The findings of the present study are comparable with the races of Bantu [17] and Australian Aborigines [6].

The Washburn (1948), [6] who first put forward the view that the Ischial's height is proportional to the overall body size and reflects robusticity of male skeleton. Later, Leuteneggar (1970) [22] demonstrated a significant correlation between Ischial length and body size. Recently working further on the same subject, Rissech & Malgosa (2007) [23] not only supported the earlier workers, but also revealed that the significant sexual dimorphism in Ischial height appears at the age of 20 years due to longer growth period in males i.e. 25 years as compared with 20 years for females.

In our study, the mean length of Ischial bone was 86.60± 0.59 mm (Range 71.00-100.00 mm) in males & 78.20± 0.71 mm (Range 71.00-86.00 mm) in females. This justifies the dimorphic character and showed that the Ischial length is more in male than in female. The similar observation was found as having a mean value of 73.10 ± 0.78 (Range 60.20 – 87.70 mm) in female and 80.70±0.57 mm (Range (70.40 - 94.00 mm) in male in the study done by Sachdeva et al [14] in Punjab (North India). An another study was done by Parija et al [20] in Odisha (South East India) they reported that the mean length of Ischial bone was 69.00 mm (Range 59.00- 80.00 mm) in females and 71.00 mm (Range 61.0 -81.0 mm) in males; these findings are closely match with the results of the present study.

Washburn (1948) [7] in his study found, the mean value of Ischial length was 78.30 mm in white American Females and 88.40mm in males. In case of Negroes he got these values as 77.50 mm in females and 86.60 mm in males. Similar study he had conducted in 1949 [17] in another population; he observed that in the Bantu race the mean of Ischial length was 74.80 mm in females and 80.30 mm in

males. The Urhobo males were having mean Ischial length of 85.58±11.6mm and their females were having it as 81.97±12.00mm. Itsekiri males were found to have Ischial length 83.84±10.82mm and females were found to have Ischial length 85.03±14.59mm. Male of South Nigerians were having Ischial length mean of 85.03mm and females were having Ischial length mean 79.52 mm. Further evidence that human populations vary in sexual dimorphism in the pelvis as a whole can be found by looking at the Ischiopubic index (Table 3). This is a much more consistently defined measurement and shows that the Ischio-pubic index is universally more in females as compared to males. The same was true for present study also where it was significantly more in females (Table 3).

Washburn (1948) [7] named this index as "Washburn Index" and gave the reason for using it for sexual dimorphism that the difference in the length of ischium is roughly proportional to the difference in size but the pubic bone is proportionately longer in females as it is most responsive to female sex hormones. Washburn (1949) [17] claimed 84% male and 100% female American skeletons could be identified by using the ischio-pubic index. He demonstrated that the cut-off between males and females varies from one population to another. Conclusions from these studies most often note that the main population component of pelvic variation is size related; however these studies have not systematically examined population variability in sexual dimorphism in pelvic morphology.

Table 4 shows that in our study Mean Ischio-pubic Index was found to be 76.72± 6.85 (Range 65.71-96.08) in males & 85.87 ± 7.58 (Range 73.48 - 98.42) in females. Here it is evident that the ischio-pubic index is greater in female than in male. The same parameter was found as having mean value of 117.97 ±12.32 SD (Range 92.13-139.18) in female and 98.27 ±7.33 (Range (70.11-122.71) in male in the study done by Sachdeva et al [14] in Punjab (North India)

Study done by Parija et al [20] in Odisha (South East India) these values came as Mean –100.06 (Range 59 - 80) in Female and Mean 85.60 (61.0 - 81.0) in Male; our results match to a great extent with the results found in this study. Pal et al [24] in their study in Madhya Pradesh (Central India) found this index having mean value 100 in females and 89 Males.

Washburn (1948) [7] in his study found these values as - 99.5 in white American Females and 83.6 cm in males. In case of Negroes he got this value as 95.0 in females and 79.9 in males. Again in 1949 he found this parameter in the Bantu race as the mean having 98.1 in Female and -82.5 in male. In Bushman population this index was 83.7 for Males and 100.0 for females. The Davivongs (1963) [6] worked on Aborigines race in Australia and found this Index as 77.98 Male and 92.72 in Females.

Conclusion

Our study results and it's comparison with results of other workers shows that hip bone not shows only dimorphism but it's metric values are population specific also.

References

1. Pekka Saukko, Bernard Knight. Knight's Forensic Pathology. Third Edition; published Hodder Arnold. 2004: 98-130.
2. Krogman WCA, Iscan MY. The human skeleton in forensic medicine, 2nd edn. Thomas, Springfield. 1986.
3. Oladipo GS. The Sub-pubic angle in adult indigenous Nigerians. Tropical journal of medical research. 2006; 10(1): 15-19.
4. Oladipo GS, Ugboma HAA, Suleiman YA. Comparative study of sub-pubic angles in adult Ijaws and Igbo's. Asia J. med. Sci. 2009a; 1(2): 26-29.
5. Schultz AH. The skeleton of the trunk and limbs of higher primates. Human Biol. 1930; 2: 303-438.
6. Davivong V. The pelvic girdle of the AustraIian Aborigines, sex differences, sex determination. AM. J. of Phys. Anthrop. 1963; 21: 443-455.
7. Washburn S. L. Sex differences in pubic bone. Am. J. Phys. Anthrop. 1948; 6:199-207.
8. Udoaka et al Udoaka, A.I., E.J. Olotu and C.E. Ikheloa. Determination of Ischiopubic index in adult Nigerians in Port Harcourt, Rvers State. Port Harcourt Med. J. 2009; 23(3): 318-321.
9. Igbigbi, P.S. and B.C. Msamati. Ischiopubic index in black Malawians. East Afr. Med. J. 2000; 77(9): 514-516.
10. Tague, R.G. Variations in pelvic size between males and females. Am. J. Phys. Anthropol. 1989; 80: 59-71.
11. Ekanem, T., A. Udongwu and S. Singh. Radiographic determination of sex differences in ischiopubic index of a Nigerian population. Int. J. Biol. Anthropol. 2009; 3: 2.
12. G. Sunday Oladipo1, K. C. Anugweje, Emoefe Oghenekevwe Rosemary and C. Uzomba Godwin. Radiologic Study of Ischiopubic Index of Urhobos and Itsekiris of Nigeria. British Journal of Medicine & Medical Research. 2015; 5(9): 1114-1120.

13. Pal GP, Bose S and Choudhary S. Reliability of criteria used for sexing of hip bones. J Anat Soc Ind. 2004; 53(2): 58-60.
14. Kanika Sachdeva, Rajan Kumar Singla, Gurdeep Kalsey. Role of ischio-pubic index in sex identification from innominate bones in north indian population. Int j anat res. 2014; 2(3): 515-20.
15. Seidler H. Sex-diagnosis of isolated oscoxae by discriminant functions. J Human Evol. 1980; 9: 597- 600.
16. Thieme FP. Sex in Negro skeletons. J Forensic Med. 1957; 4(2): 72-84.
17. Washburn SL. Sex differences in the pubic bone of Bantu and Bushman. Am J Phys Anthropol. 194 ; 7: 425-432.
18. Jordaan HVF. The differential development of the hominid pelvis. S Afr Med J. 1976; 50: 744-748.
19. Washburn SL. Skeletal proportions of adult langurs and macaques. Human Biol. 1942; 14: 444-472.
20. Bijaylaxmi Parija, Biswa Bhusan Mohanty, Sitansu Kumar Panda, Divya Agrawal, Ischio Pubic Index, A Reliable Parameter For Sexing Of Human Hipbones. International Journal of Review in Life Sciences. 2(3): 95-97.
21. Orban RS. An evaluation of the sexual dimorphism of the human innominate bone. J Human Evol. 1980; 9: 601-607.
22. Leuteneggar W. Newborn size and pelvicdimensions of Australopithecus. Nature. 1972; 240: 568-569.
23. Rissech C and Malgosa A. Pubis growth study: applicability in sexual age diagnosis. Forensic Sci Int. 2007; 173(2-3): 137-145.
24. Pal GP, Bose S and Choudhary S. Reliability of criteriaused for sexing of hip bones. J AnatSocInd. 2004; 53(2): 58-60.

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Profile of Fatal Poisoning Cases in and Around Rajkot Region: A 3 Years Retrospective Study

K.N. Pipaliya*, V.J. Aghera, M.N. Patel***, R.D. Vaghela**, R.K. Masharu*****

Abstract

Context: Poisoning is the commonest method adopted in India to commit suicide. Pesticide poisoning is an important cause of morbidity and mortality in many countries in the world. *Aims:* Present study was undertaken to evaluate the pattern of poisoning deaths in Rajkot region of Gujarat. *Methods and Material:* Present Retrospective study was conducted from 1st January, 2012 to 31st December, 2014 at department of forensic medicine, PDU govt. medical college, Rajkot. During that period total 7434 autopsies were conducted, out of them 739 cases of fatal poisoning and animal envenomation were selected for study. *Statistical Analysis Used*: Microsoft excel. *Results:* Average incidence rate of death due to poisoning is around 10% in Rajkot region. Organophospharus poisoning (35.99%) was most common followed by Aluminium phosphide poisoning (31.39%) and these findings were observed in individual age group and in male. Incidence rate is higher in male (61.7%) as compared to female (38.3%). Highest numbers of cases were found in age group of 21-30 years (29.63%). *Conclusions:* Organophosphorus insecticide was the prime culprit among all poisons. Trends of this region were revealed and result was comparable with previous studies done in same region.

Keywords: Poisoning; Organophosphorus; Fatal; Rajkot; Retrospective.

Introduction

"All substances are poisons; there is no such thing as a non poison"- Paracelsus. The word poison is evolved from the Latin word potion i.e. to drink for health. But in the due course of time, the definition of poison has changed reversibly to its present form i.e. any substance, in any amount, by any route; if it produces harmful effects (3 Ds – disease, deleterious effect or death) over the body; it will be labeled as poison [1].

Poisoning is the commonest method adopted in India to commit suicide [2]. Pesticide poisoning is an important cause of morbidity and mortality in many countries in the world. It has been estimated that 95% of fatal pesticide poisonings occur in developing countries, many of which are in the Asia-Pacific region.

Agriculture based economies, easy availability of pesticides, poverty related socioeconomic problems, lack of adequate protective clothing, and limited treatment facilities are some of the factors contributing to the high morbidity and mortality [3]. The incidence of insecticide poisoning has steadily increased in recent past and has reached a level where it can be called a social calamity [4].

This kind of study was done in the year 2007 in PDU Govt. medical college & hospital, Rajkot that shows Organophospharus was the leading substance in all among cases. So in our Study, we tried to find out that any changes occurred or not.

Material and Methods

Present Retrospective study was conducted from 1st January, 2012 to 31st December, 2014 at

Authors Affiliation: *Assistant Professor, Department of Forensic Medicine, Pacific Medical College & Hospital, Udaipur 313001, Rajasthan, India. **Tutor, ***Resident Doctor, Department of Forensic Medicine, P. D. U. Government Medical College, Rajkot-360001, Gujarat, India.

Reprints Requests: Krunal N. Pipaliya, Assistant Professor, Department of Forensic Medicine, Pacific Medical College & Hospital, Udaipur - 313001, Rajasthan, India.
E-mail: pipaliya@gmail.com

department of forensic medicine, PDU govt. medical college, Rajkot. During that period 7434 autopsies were conducted, out of them 739 cases (Poisoning cases and animal envenomation cases) were selected for study. This study included all poisoning cases brought to PDU Govt. Medical college & Hospital for post mortem examination.

Cases were selected from suspected cases of poisoning based on relevant history and post-mortem examination, and afterwards confirmed by chemical analysis reports of viscera. Snake bite cases were confirmed by history of relative and post-mortem examination.

Results

Out of total 7434 autopsies, 739 cases (9.94%) of death due to poisoning were selected for the present study. Average incidence rate of death due to poisoning is around 10% in Rajkot region (Table 1).

It is evident from Table 2 that death due to Organophospharus poisoning (35.99%) was most common followed by Aluminium phosphide poisoning (31.39%) and these findings were observed in individual age group (Table 4) and in male (Table 5). In Female, death due to aluminium phosphide poisoning was most common followed by Organophospharus poisoning (Table 5). In all 3 year, incidence rate of poisoning was almost same.

It is evident from Table 3 that highest numbers of cases were found in age group of 21-30 years (29.63%), followed by age group of 31-40 years (26.16%).Incidence rate is higher in male (61.7%) as compared to female (38.3%). Highest numbers of male cases were found in age group of 31-40 years (26.1%) and female of cases were found in age group of 21-30 years (37.10%).

Highest no. of OC, ALP, H_2SO_4, HCl and CO poisoning cases were observed in age group of 21-30 years. Highest no of OP poisoning cases were observed in age group of 31-40 years while highest no. of Snake Bite poisoning cases were observed in age group of 51-60 years (Table 4). Out of all poisoning cases, 87.55% cases were suicidal and rest 12.45% cases were accidental. Accidental poisoning cases include all CO poisoning, all snake bite poisoning, 12 OP poisoning and 6 Corrosive poisoning (HCl & H_2SO_4). Most common route of administration for poisoning cases was ingestion (88.36%) followed by injection (7.44%)(All Snake Bite Cases) and inhalation (4.19%)(All CO poisoning and 12 OP poisoning).

Incidence rate were higher in married person (56.97%) as compared to unmarried person (32.34%) and separated/widow (10.69%). Death due to poisoning were more observed in lower socioeconomic class (68.2%) followed by middle class (30.58%) and upper class (1.22%).Out of 739 cases incidence was more in rural area i.e. 422 cases (57.10%) while 317 cases (42.90%) from urban area. Higher incidence of poisoning cases were found in Farmer & Worker – 277 cases (37.48%), student – 175 cases (23.68%). Followed by housewife- 152 cases (20.57%) followed by Businessman - 71 cases (9.61%) and serviceman - 64 cases (8.66%).

Table 1: Year wise distribution of poison cases

Year	Total Case	Poison Cases
2012	2391	225(9.41%)
2013	2513	266(10.58%)
2014	2530	248(9.80%)
TOTAL	7434	739(9.94%)

Table 2: Year and type of poison wise distribution of poison cases

Type of Poison	YEAR			Total
	2012	2013	2014	
OP	83(36.89%)	95(35.71%)	88(35.48%)	266(35.99%)
OC	30(13.33%)	37(13.91%)	35(14.11%)	102(13.80%)
ALP	67(29.78%)	85(31.95%)	80(32.26%)	232(31.39%)
H_2SO_4	6(2.67%)	7(2.63%)	8(3.23%)	21(2.84%)
HCL	12(5.33%)	15(5.64%)	17(6.85%)	44(5.95%)
CO	9(4%)	6(2.26%)	4(1.61%)	19(2.57%)
SB	18(8%)	21(7.89%)	16(6.45%)	55(7.44%)
TOTAL	225	266	248	739

Table 3: Age group and sex wise distribution of poison cases

Age Group	Male	Female	Total
<=10	13(2.85%)	8(2.83%)	21(2.84%)
11-20	90(19.74%)	50(17.67%)	140(18.94%)
21-30	114(25%)	105(37.10%)	219(29.63%)
31-40	119(26.1%)	30(10.60%)	149(20.16%)
41-50	58(12.72%)	43(15.19%)	101(13.67%)
51-60	43(9.43%)	34(12.01%)	77(10.42%)
61-70	15(3.29%)	10(3.53%)	25(3.38%)
>70	4(0.88%)	3(1.06%)	7(0.94%)
TOTAL	456(61.7%)	283(38.3%)	739

Table 4: Age group and type of poison wise distribution of poisoning cases

Age Group	OP	OC	ALP	H_2SO_4	HCL	CO	SB	TOTAL
<=10	8(3%)	10(9.8%)	0	0	0	0	3(5.45%)	21
11-20	67(25.19%)	20(19.61%)	35(15.09%)	0	8(18.18%)	0	10(18.18%)	140
21-30	50(18.8%)	37(36.27%)	84(36.21%)	11(52.38%)	17(38.64%)	8(42.11%)	12(21.82%)	219
31-40	69(25.94%)	15(14.71%)	52(22.41%)	5(23.81%)	2(4.55%)	6(31.58%)	0	149
41-50	47(17.67%)	5(4.9%)	24(10.34%)	0	15(34.09%)	0	10(18.18%)	101
51-60	22(8.27%)	10(9.8%)	25(10.78%)	0	0	5(26.32%)	15(27.27%)	77
61-70	0	5(4.9%)	10(4.31%)	5(23.81%)	0	0	5(9.09%)	25
>=70	3(1.13%)	0	2(0.86%)	0	2(4.55%)	0	0	7
	266	102	232	21	44	19	55	739

Table 5: Sex and type of poison wise distribution of poisoning cases

Type of Poison	Male	Female	Total
OP	186(40.79%)	80(28.27%)	266(35.99%)
OC	58(12.72%)	44(15.55%)	102(13.80%)
ALP	144(31.57%)	88(31.1%)	232(31.39%)
H_2SO_4	10(2.19%)	11(3.89%)	21(2.84%)
HCL	10(2.19%)	34(12.01%)	44(5.95%)
CO	19(4.17%)	00	19(2.57%)
SB	29(6.36%)	26(9.19%)	55(7.44%)
TOTAL	456	283	739

Discussion

The incidence of poisoning of fatal poisoning in present study was 9.94%, which is comparable with other studies [5-10]. In present study, death due to Organophospharus poisoning (35.99%) was most common followed by Aluminium phosphide poisoning which is same as previous studies.[5,6]It occur due to easy availability of agriculture poison in market.According to the manner of death, majority of death were suicidal (87.55%) followed by accidental (12.45%) [5,9,10].

In the present study, poisoning death cases were higher as (61.7%) in males than females deaths (38.3%) which is comparable with previous studies [5,7-10]. Though all studies were conducted in different parts of India, male predominance was a common and constant feature. In present study, highest numbers of cases were found in age group of 21-30 years (29.63%), which was also observed in previous studies [5-10]. Incidence rate were higher in married person (56.97%) as compared to unmarried person (32.34%) and separated/widow (10.69%) which was also observed in other studies [5,8,10]. It occur because of stress of the modern life style, failure or less percentage in the exams, scolding from parents or teachers, failure in love, family problems etc.

Maximum numbers of poisoning cases were observed in rural area as compare to urban area due to illiteracy or less education, less awareness about poison, less availability of immediate treatment [6,8-10]. Death due to poisoning were more observed in lower socioeconomic class (68.2%) [6,9,10]. In the present study, the incidence of poisoning was higher in agriculture labourer [8,10]. Majority of Indian population is living in rural area and are farmer by occupation. Farmer are mainly depend upon monsoon for growing crops and failure of monsoon leads to failure to grow crops and less income leads to financial crisis which leads to suicide of farmer.

Conclusion

This is concluded from above study that death due

to fatal poisoning responsible for 9.94% cases among total autopsy conducted. Deaths due to OP poisoning (35.99% cases) were most commonly encountered among all fatal poisoning. Males (61.7% cases) were more affected as compared to female. 21-30 years (29.63%) was most affected age group. Among all fatal poisoning case 87.55% cases were suicidal. Most common route of administration for poison was ingestion (88.36% cases). Farmer and workers (37.48% cases) were commonly affected. Trends of this region were revealed and result was comparable with previous studies done.

Abbreviations

OP = Organophospharus

OC = Organochlorine

ALP = Aluminium Phosphide

H_2SO_4 = Hydrosulphuric Acid

HCL = Hydrochloric Acid

SB = Snake Bite

CO = Carbon Monoxide

References

1. Kumar A, Vij K. Trends of poisoning in Chandigarh–A six year autopsy study. Journal of Forensic Medicine and Toxicology. 2001 Jan-June; 18(1): 8-10.
2. Aggarwal P, Handa R, Wali JP. Common poisonings in India. JFMT. 1998 Jan-June; 15(1): 73-74.
3. Fernando R. Pesticide poisoning in the Asia-Pacific region and the role of the regional information network. Clinical toxicology. 1995 Nov; 33(6): 677-682.
4. Nigam M, Jain AK, Dubey BP, Sharma VK. Trends of organophosphorus poisoning in Bhopal region-An autopsy based study. JIAFM. 2004; 26(2): 62-65.
5. S. Chaudhary, Prospective study of Fatal poisoning cases in Rajkot Region.
6. AK Kapoor. An epidemiological study of Aluminium Phosphide poisoning at Allahabad. IIJFMT. 2006; 4(1).
7. JS Dalal et al. Trends – a post mortem study. JIAFM. 1998; 20(2): 27-31.
8. BD Gupta and PC Vaghela. Profile of fatal poisoning in and around Jamnagar. JIAFM. 2005; 27(3): 145-148.
9. Rajani V. Bhagora. Profile Study of Fatal Poisoning Cases Brought for Postmortem Examination at Mortuary of Sir Takhtsinhji General Hospital, Bhavnagar (Gujarat). Int J Res Med. 2015; 4(3): 59-63.
10. Navinkumar M. Varma Study of Profile of Deaths due to Poisoning in Bhavnagar Region JIAFM. 2011; 33(4): 313-318.

Original Article

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Pattern of Scalp Injuries in Relation to Cranio-Cerebral Trauma: An Autopsy Based Study

Sridhara Chary Rangu*, B. Lakshmi Prasanna, Bharath Kumar Reddy***, Nishat Ahmed Sheikh******

Abstract

Background: Motor vehicle crashes are a major cause of fatality all over the world. By 2020 motor vehicle injury is projected to become the third leading contributor to the global burden of disease in the world. Motor cyclists are about 25 times more likely than car occupants to die in Road Traffic Accidents. *Aim and Objective:* To Compare the scalp injuries with cranial and cerebral injuries, i.e., to know how many percent of cases of scalp injuries are associated with skull and brain injuries. *Study Design:* Cross sectional Prospective. *Place of Study:* Osmania General Hospital Mortuary Hyderabad. *Duration of Study:* From 2010 to 2012. *Material and Method:* The subjects for the study were all cases of head injury due to blunt trauma whether admitted to the hospital or not, brought for medico legal autopsy during this period. Information was gathered from the relatives of the deceased or accompanying persons, police personnel, police inquest, hospital records and postmortem findings. *Observation and Discussion:* In 400 cases of head injury cases, 82% of victims are males and 18% victims are females, 88 cases remained unidentified i.e., a whipping 22 % of 400 cases. In Age group of 31-40, almost 70% of the fatalities of the 75 cases fell in under 35 year age group. The incidence in vehicular accidents is 208 of which 170 are males and 38 females. The majority of the vehicles driven by the victims were motor cycles 123 cases. 364 of the 400 cases (91%) scalp injuries co-existed along with bony and cerebral injuries. It is mentioned that external injuries may or may not be present in all cases of head injury. The view that wounds of the scalp due to blunt force must be looked upon as potentially serious no matter how they are produced.Scalp injuries are usually the result of direct impact but may not be apparent in inflicted head injuries. *Conclusion:* The subject of "scalp injury and cranio-cerebral trauma" has assumed paramount importance in recent times owing to the enormous mechanization of various aspects of life. By compiling the records of these traumas at national levelor international level can underline risk factors involved in these accidents, will be extremely helpful in the policy building and making the decisions for health promotion and health building at national or international level.

Keywords: Scalp Injury; Cranio-Cerebral Trauma; Road Traffic Accidents.

Introduction

Cranio-cerebral injuries (also known as head injuries), one of the most important regional injuries, were known to human beings since time immemorial. "Head Injury" as defined by National Advisory Neurological diseases and Stroke Council, is "a morbid state resulting from gross or subtle structural changes in the scalp, Skull and/or contents of skull, produced by mechanical forces" [1].

With the dawn of independence and launching of the development plans, India is now passing through a process of tremendous industrial revolution drawing the rural population into urban areas. Not only the urban roads have become congested with pedestrians, but the movement of goods in the plain period has made the roads unsafe. Modern craze mad race for great speed have made the situation worse. Accidental injuries have progressively and alarmingly increased with

Authors Affiliation: *Assistant Professor of Forensic Medicine, Government Medical College Nizamabad, Telangana State. **Professor, ***Assistant Professor of Forensic Medicine, Kamineni Academy of Medical Sciences and Research Center, L. B. Nagar, Hyderabad. ****Professor of Forensic Medicine, People's College of Medical Sciences and Research Center, Bhopal.

Reprints Requests: Nishat Ahmed Sheikh, Professor, Department of Forensic Medicine, People's college of Medical sciences & Research Centre, People's University Bhanpur, Bhopal, Madhya Pradesh 462037.
E-mail: drnishatsheikh@gmail.com

modernization in transport and industry[2]. With the advancement of mechanization in agriculture and other walks of life the accidental injuries in general and "head injury" in particular are bound to become a major problem in India as in the west. Additionally, craniocerebral injury is a source of major disability and psychological burden, especially in the younger and reproductive age group. Thus head injury forms an important aspect of both clinical and forensic work. From a medico legal point of view, it is essential to determine whether death occurred due to head injury or its complications, and whether any resultant intracranial lesions were due to natural or unnatural causes [3].

Aim and Objectives

Aim and Objectives of this study was to Compare the scalp injuries with cranial and cerebral injuries, i.e., to know how many percent of cases of scalp injuries are associated with skull and brain injuries.

Material and Method

The study was conducted at the postmortem centre of Osmania General Hospital Hyderabad from 2010 to 2012.The subjects for the study were all cases of head injury due to blunt trauma whether admitted to the hospital or not, brought for medico legal autopsy during this period. Information was gathered from the relatives of the deceased or accompanying persons, police personnel, police inquest, hospital records and postmortem findings. History of the incidents was studied in detail and a complete meticulous medico legal autopsy was conducted on each of these victims. When indicated, histo-pathological examination of stained sections of organs/tissues and chemical analysis of routine viscera and blood preserved at medico legal autopsy were done and the results were analyzed.All the data were reduced to tables, graphs and subsequently subjected to computer aided statistically analysis.

Observation and Discussion

The detailed postmortem examination study was conducted on 400 bodies 2 died of scalp injuries in relation to cranio-cerebral trauma. Of the 400 cases 224 patients were admitted in the hospital and received medical attention, the remaining 176 cases expired before being admitted into the hospital or before medical aid could arise at accident site. Among the dead 88 cases remained unidentified i.e., a whipping 22% of 400 cases. This percentage is baffling by any standards, this in spite of all efforts at postmortem to identifying by providing salient clues to the investigating authorities. The conclusion drawn regarding this disproportionately high amount cases going unidentified in accidental death cases when compared in the overall number of unknown cases which form only a small percentage of around 3% can be attributed to, delay in procedure initiation, Inability to adopt scientific methods, Fear of incurring expenditure, Status of the diseased (poor in appearance by examination of cloths and personal traits & belongings), Migrant population etc.

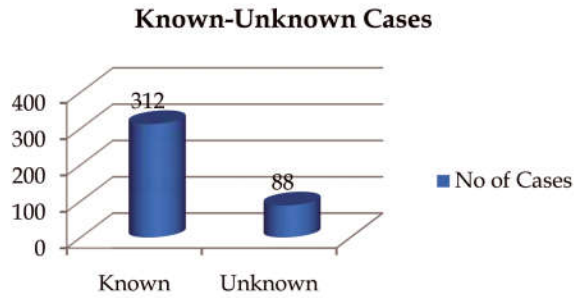

Fig. 1: Showing distribution of Known and Unknown cases

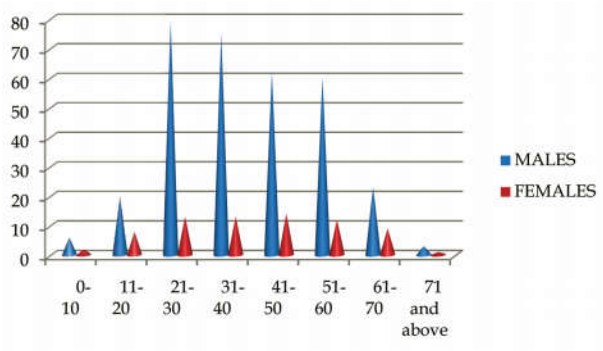

Fig. 2: Showing the sex and age group relation.

In 400 cases of head injury cases, 82% of victims are males and 18% victims are females. The facts brought out are that young adult males are the most susceptible to deaths by way of accidents [4]. The age range where most number of deaths occurred was 21 – 30 years and 31 – 40 years among males, while in females the age group of 21-60 years revealed almost similar number casualties. The men of 21-30 and 31-40 age groups reported 79 and 75 deaths respectively. In-detail analysis of the age group of 31-40, almost 70% of the fatalities of the 75 cases fell in under 35 year age group. This signifies that younger individuals in males are full of enthusiasm, bubbling with excess energy, full of zeal and zest and not averse of taking undue risks. This attitude explains the manner in which male deaths occurred

by way of self-accidents, while undertaking stunt games, speed racing, adventure sports, etc. it means that many males by themselves have become a source of self-elimination [5]. In comparison, the female gender deaths resulted purely by way of traffic accidents, while they were riding pillion or when they became victims of others rashness.

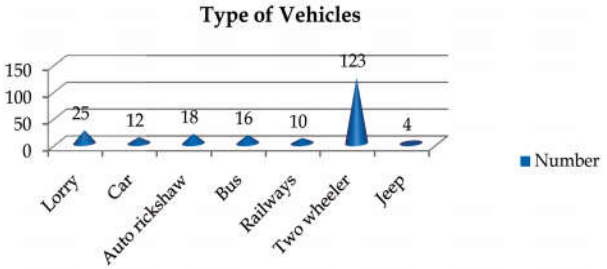

Fig. 3: Showing types of Vehicles in accidental deaths.

Out of 400 cases, 48 cases are the total number of deaths from fall from height.39 males and 9 females were involved. The incidence of falls from males to females is 16:4. The incidence in vehicular accidents is 208 of which 170 are males and 38 females. Vehicular accidents in which motor cycle are the main agencies causing the accidents. The next highest is Lorries, auto rickshaw, cars, railways. This can be explained on the basis of relative number of vehicles passing in a particular area. Contributory factors to the severity of head injuries are the speed and the mass of the vehicles. The majority of the vehicles driven by the victims were motor cycles 123 cases. In a study by Harnam Sigh et al it constituted 36.6% [6]. In the study by MartinusRitcher cars were the major collision opponents [7].

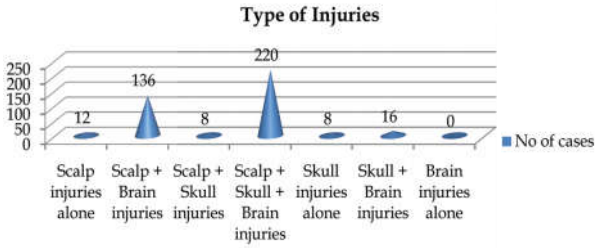

Fig. 4: Showing type of injuries

Scalp injury in association with skull and brain lesion, it was noticed conclusively that in 364 of the 400 cases (91%) scalp injuries co-existed along with bony and cerebral injuries. Scalp injury alone – this is explained that the injury to the head was not the actual cause of deaths. Only a very small percentage of deaths (3%) occurred due to injuries to various vital organs of which scalp injury was minor cause. Skull injuries alone – this again is a misnomer in a fraction of cases where major reason was nothing but transmitted injuries were found in the base of the skull and the force was transmitted from the extremities or from the neck and cervical region. Skull and Brain Injuries, the injuries also were in reality cause due to transmitted force as proposed in the earlier discussion. Brain Injury alone, this is also a very important and significant as there were no cases of brain injury alone. Gradwohl and Camps & Purchase[8] have mentioned that external injuries may or may not be present in all cases of head injury. Simpson[9] is of the view that wounds of the scalp due to blunt force must be looked upon as potentially serious no matter how they are produced. These statements hold well in the present study also.

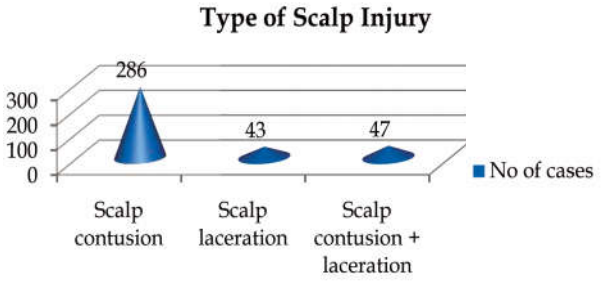

Fig. 5: Showing type of scalp injuries

The injuries listed in these particular statements are contusions, lacerations and combination of both. It lacks in that it could not demonstrate whether the aforesaid injuries are external or internal. It is also necessary to mention here that the table did not through any light on other possible manifestations of injuries viz. swelling, deformity. Contusions of the scalp are better detected by touch than sight. Scalp injuries are usually the result of direct impact but may not be apparent in inflicted head injuries. Study conducted in Delhi by Tyagi et.al. [10] reported scalp injuries to be present in 76%, while Gupta et. al. [11] reported 89% of scalp laceration. These findings are consistent with this study.

Table 1: Showing Scalp Injuries in relation to Cranial Traum. P = 0.0001373

		Scalp Injuries	
Skull Injuries		Present	Absent
	Present	228	24
	Absent	148	0

Table 2: Showing Scalp Injuries in relation to Cerebral Trauma. P = 0.00007112

		Scalp Injuries	
		Present	Absent
Cerebral Injuries	Present	356	16
	Absent	20	8

Deaths due to brain injuries are statistically more than scalp injuries. The Table 1 & 2 which reflects the categorization of injuries over scalp in relation to the brain. These tables have been constructed to derive results based on 'p' factor. It has become quite obvious on examination of these tables that death results only when there is an injury to skull and/ or brain in addition to scalp injury. skull injuries or brain injuries are sufficient to cause death but it is more or less unlikely for a scalp injury to result in death except in cases wherea severe avulsed laceration of the scalp which can produce death either due to severe hemorrhage or neurogenic shock, When an injury is a large laceration or a cut which involves all the five layers of the scalp resulting in severe uncontrolled bleeding leading to death on account of hemorrhagic shock.

Conclusion

The subject of "scalp injury and cranio-cerebral trauma" has assumed paramount importance in recent times owing to the enormous mechanization of various aspects of life, increasing instances of brutal assault and innumerable and variegated accidents in the air, in water and so on. The consequence of injury to the brain is of very great diversity and complexity and they offer many veering diagnostic problems to the clinicians and contribute often thought provoking necropsy material to the forensic pathologist. By compiling the records of these traumas at national level or international level can underline risk factors involved in these accidents, will be extremely helpful in the policy building and making the decisions for health promotion and health building at national or international level.

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Conflict of Interest

The author declares no conflict of interest in the present study

Author Disclosures

Authors have no conflict of interest. This study was a part of departmental research activities of Forensic Medicine at Kamineni Academy of Medical Sciences and Research Center, Hyderabad.

Ethical Consideration

Clearance from the Institutional Ethical committee was obtained in advance.

References

1. Tedeschi CG, Eckert WG &Tedeschi LG. In "Forensic Medicine: A study in trauma and environmental hazards, Vol. I, Mechanical Trauma "section 1, Mechanical Injury: Chapter 3: Head injury . 1977, Philadelphia, WB Saunders Co: 30.
2. Munro D. Cranio-cerebral injuries. In: Gordon I, Shapiro HA, Berson SD. editors. Forensic Medicine A Guide to Principles. 3rd ed. Oxford University Press: Churchil Livingstone. 1998; 252.
3. Eke N, Etebu EN, Nwosu SO. Road traffi c Accidents mortalities in Port Harcourt, Nigeria. Anil Agarwal's Internet Journal of Forensic Medicine and Toxicology. 2000; 1: 1-6.
4. Goyal M. The correlation of CT scan and operative findings in cases of head trauma, JIAFM. 2003; 25(4): 125-1 32.
5. Gosh PK. Epidemiological study of victims of vehicular accidents in Delhi, JIMA. 1992; 90: 309-12.
6. Harnam Singh, A.D Aggarwal. Fatal road traff accident in motor cyclists not wearing helmets. J Punjab Academy of Forensic Medicine Toxicology. 2011; 11(1): 9-11.
7. MartiusRitcher, DietmarOtte, UUwe Lehmann et al. Head injury mechanisms in helmet protected motor cyclists: Prospective multicentre study. Journal of Trauma, Injury, infection, and Critical care. 2001; 51: 949-958.
8. Gradwhol RBH Forensic aspects of Trauma to the CNS & its membranes. In: Legal Medicine, Moresby

Co. St. Louis. 1954; 363- 401.

9. Simpson Keith. Regional Injury: Taylor's Principles and Practice of Medical Jurisprudence.12th Ed. London: J. & A. Churchill Ltd; 1965; 230-262.
10. Tyagi AK, Sharma GK, Kumar B. Craniocerebral damage by blunt force impact. Journal of Indian Academy of Forensic Medicine. 1986; 1: 24-39.
11. Gupta S, Roychowdhury UB, Deb PK, Moitra R, Chhetri D. Demographic study of fatal Cranio-cerebral road traffi c injuries in North Bengal region. Indmedica. 2007; 7(1): 01-03.

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Estimation of stature from Foot length in Middle Gujarat Population

Pankaj Prajapati*, Pratik Patel*, Nisarg Modi, Bhargav Oza**, Dixit Patel*****

Abstract

Estimation of height from measurement of various body parts is of particular interest to many anthropologists, anatomist and forensic scientist for its importance in medico-legal cases. Our aim was to investigate the relationship between personal stature and footlength & to derive a regression formula to predict the height of an individual using foot length. The present study was conducted on 200 apparently healthy students (100 males and 100 females)studying in various places of Middle Gujarat Region between 18 -25 years of ages. All these measurements were done by using standard anthropometric instruments and standard anthropometric techniques. Data was analysed separately for male and female. Estimation of stature using regression analysis using foot length gives the correlation coefficient for both sexes. It is concluded that linear regression analysis is goodfor estimating accurate stature.

Keywords: Stature; Foot Length; Regression Analysis; Correlation Coefficient.

Introduction

The determination of stature is amajor step in the identification of dismembered remains. Anthropometric techniques are commonlyused by anthropologist and adopted by medical scientist to estimate body size for the purpose ofidentification. Many studies have been carried out to estimate stature by taking measurements of long bones and radiographic materials [1].

Height is fundamental for assessinggrowth and nutrition, calculating body surfacearea, and predicting pulmonary function during childhood.

There are studies, in which anattempt has been made to establish the correlation between stature and foot length.This study extends the findings of previous studies by exploring datathat is height, and foot length, using linear regression models. These formulaeare applicable to that population from whichthe data has been taken.

Material & Method

Samples for the study consisted of consecutive asymptomatic, apparently healthy 200 (Males=100 and Females=100) students of Middle Gujarat regions. Their nutritional and socioeconomic statuses were not assessed. The age range was between 18-25 yrs. A slow decline in the height isknown to occur as the age advances andtherefore older subjects were not studied [2].

The subjects were studied for Stature and Foot length. All the measurements are taken using standard anthropometric instruments in centimetre to thenearest millimetre according to techniques describedby Vallois [2].

Height of the individual was measured in standingerect anatomical position with standing height measuring instrument. Foot lengthwas considered as the maximum lengthbetween the most prominent posterior point of theheel and the tip of hallux and the tip of the secondtoe if it is larger than the hallux.

The data was analysed using Microsoft excel methods used were regression analysis.

Authors Affiliation: *Assistant Professor,**Post-Graduate Student,***Tutor, Department of Forensic Medicine and Toxicology, Government Medical College, Vadodara.

Reprints Requests: Pankaj Prajapati, Assistant Professor, Department of Forensic Medicine and Toxicology, Government Medical College, Vadodara -390001 Gujarat, India.

E-mail: drpankaj_7@yahoo.co.in

Observation and Result

Table 1 indicates that

a. Mean height of the males to be 169.0 cm with a standard deviation of +/- 11.0 cm. Mean height of females has been found to be 158.0 cm with a standard deviation of +/- 8.0 cm.

b. Mean foot length of the males of the left side to be 23.5 cm with a standard deviation of +/- 1.2 cm whereas mean foot length of right side of males has been found to be 23.6 cm with standard deviation of +/- 1.3 cm. Mean foot length of female of left side has been found to be 21.1 cm with a standard deviation of +/- 1.0 cm whereas the mean foot length of right side was observed to be 21.2 cm with a standard deviation of +/- 1.0 cm.

Table 1: Measurement of Total Height and Length of Feet in Males and Females

Measurements	Male		Female	
	Mean value (cm)	Standard Deviation (+/- cm)	Mean value (cm)	Standard Deviation (+/- cm)
Total Height	169.0	11.0	158.0	8.0
Length of right foot	23.6	1.3	21.2	1.0
Length of left foot	23.5	1.2	21.1	1.0

Table 2: Correlation coefficients and regression equations for estimation of stature from length of foots

Subjects	Side	Correlation Coefficient (r)	Regression Equation
Male	Right foot	0.9331	7.0980x + 0.9890
	Left foot	0.9085	7.2086x -0.6922
Female	Right foot	0.8873	7.3808x + 0.2998
	Left foot	0.8977	7.3976x + 0.6446

Table 3: Shows comparison between correlation coefficient and regression equations as derived in studies of different ethnic groups in India

Studies done In different ethnic Groups	Correlation Coefficient (Male)	Correlation Coefficient (Female)	Regression Equation To measure stature in Males	Regression Equation to measure stature in Females
Khanpurkar S. et al.[3]	0.645	0.702	90.0+ 3.2FL	72.8 + 3.7 FL
Narde AL et al.[4]	NA	NA	6.2921+ / - 0.06 (R)	6.4497 + / - 0.13 (R)
			6.2786 + / - 0.07 (L)	6.4324 + / - 0.13 (L)
Chikhalkar B et al.[5]	0.6102	NA	79.7237 + 3.6506 FL	NA
Brenda MA Rohren[6]	0.840	NA	0.1647x - 3.024	NA
Dayananda R. et al.[7]	0.636	NA	69.346 + 3.663 FL	NA
Babu RS et al.[8]	0.583(R)	0.66 (R)	82.83 + 3.468 (R)	73.523 + 3.615 (R)
	0.585 (L)	0.653 (L)	80.955 + 3.547 (L)	79.83 + 3.349 (L)
Jakhar JK et al.[9]	0.527(R)	0.697 (R)	86.620 + 3.414 (R)	73.132 + 3.721 (R)
	0.525 (L)	0.719(L)	80.671 + 3.648 (L)	65.194 + 4.068 (L)
Rani M et al.[10]	0.808 (R)	0.808 (R)	98.320 + 3.050 (R)	90.207 + 3.374 (R)
	0.731 (L)	0.809 (L)	97.279 + 3.080 (L)	91.109 + 3.309 (L)
Khairulmazidah M et al.[11]	0.697 (R)	0.645 (R)	84.663 + 3.321 (R)	86.554 + 3.115 (R)
	0.659 (L)	0.662 (L)	92.819 + 2.972 (L)	84.325 + 3.214 (L)
Singh A. et al.[12]	0.497	0.213	1.4x+ 134.2	2.771x + 94.65
Present study	0.933(R)	0.887 (R)	7.098x + 0.989 (R)	7.381x + 0.299 (R)
	0.908 (L)	0.898 (L)	7.209x -0.692 (L)	7.398x + 0.645 (L)

Table 2 indicates that

a) In Males, correlation coefficient (r) of right foot is about 0.9331 and Regression Equation is 7.0980x + 0.9890 while of left foot, correlation coefficient (r) is 0.9085 and Regression Equation is 7.2086x -0.6922.

b) In Females, correlation coefficient (r) of right foot is about 0.8873 and Regression Equation is 7.3808x + 0.2998 while of left foot, correlation coefficient (r) is 0.8977 and Regression Equation is 7.3976x + 0.6446.

Discussion

All the human beings occupyingthis globe belong to the same species i.e. *Homosapiens*. No two

individuals are exactly alike inall their measurable traits, even genetically identical twins (monozygotic) differ in somerespects. These traits tend to undergo change invarying degrees from birth to death, in health and disease, and since skeletal development isinfluenced by a number of factors producing differences in skeletal proportions between different geographical areas, it is desirable tohave some means of giving quantitativeexpression to variations which such traits exhibit. Anthropometry constitutes that means, as it is thetechnique of expressing quantitatively the formof the human body. In other words, anthropometry means the measurement of human beings, whether living or dead or on skeletal material.

The Table 3 clearly shows variations regression equations in different ethnic groups of India.

Sanli SG et al. (2005) [13] stated that the multiple linear regression model isbest fitted than simple linear regression model for estimating height from foot and hand length. The R value was 0.928 while R2 value was0.861.

Krishnan K (2007) [1] concluded that the dimensions of hands and feet can provide good reliability in estimation of stature. It was observed that the multiple regression equations reveal lower values of Standard Error of Estimate (SEE) than the values given by linear regression equations. Interpretations suggest that the multiple regression equations are better indicators of stature estimation.

The results obtained inour study correlates with the study of Khanpurkar S. et al. (2012) [3].

The results of the study of Brenda MA Rohren [6] of 40 subjects indicated a higher positive correlation between footlength and stature than for shoe length and stature. He recommended that preference be given to foot lengthmeasurements in estimating stature whenever possible.

A study of Jakhar JK et al. [9] shown that foot length in males and females show highest correlation with stature and minimum standard error in estimation of stature. So the foot length provided the highest reliability and accuracy in estimating stature. The left foot length gives better prediction of stature than the right foot length.

In the study of Rani M et al. [10] both left and right foot measurements have been given due consideration and inboth males as well as females. Linear regression equations were derived for estimation of stature reliably and accurately that would be of immense value in the field ofcrime detection. Stature, foot length and foot breadth are positively and significantly correlated with each other ($p<0.01$). The higher correlation coefficient between stature and foot length over that of stature and foot breadth points to the fact that foot length, rather thanfoot breadth, is more accurate in estimating stature.

Singh A. et al. [12] concluded that both arm-spanand foot length can be used in estimation of theheight of both males and females. It was also found that estimating heightby using arm-span as well as foot length showed less deviation in females as compared to males.

Conclusion

It is concluded that males have greater mean value of stature as compared to that of females. It was also observed that there is direct relationship between foot lengths with the stature in both sexes. These regression equations and multiplication factors are specific for this region only because of geographical variations in the morphology of different population group. Estimation of statureusing simple linear regression equation by uses single parameter i.e., foot length is good but multiple linear regression analysis is better over simple linear regression analysis for estimating accurate stature.

References

1. Kewal Krishan. Anthropometry in Forensic Medicine and Forensic Science-'Forensic Anthropometry. The Internet Journal of Forensic Science™ ISSN: 1540-2622. 2007; 2(1): 42-46.
2. Vallois HV. Anthropometric techniques. Curr Anthropol. 1965; 6: 127-44.
3. Khanpurkar S & Radke A. Estimation of stature from the measurement of foot length, hand length and head length in Maharashtra region. IJBAMR. 2012; 1(2): 77-85.
4. Narde AL, Dongre AP. Body Height Estimation Based on Foot Length and Foot Breadth, J Indian Acad Forensic Med. July-September 2013; 35(3): 245-248.
5. Chikhalkar B.G., Mangaonkar A.A., Nanandkar S.D., Peddawad R.G. Estimation of Stature from Measurements of Long Bones, Hand and Foot Dimensions, J Indian Acad Forensic Med. 2010; 32(4): 329-331.
6. Brenda MA Rohren. Estimation of Stature from Foot and Shoe Length: Applications in Forensic Science, Nebraska Wesleyan University.
7. Dayananda R, Umesh B, Kiran J. Estimation of Stature from Dimensions of Foot, International Journal of Medical Toxicology and Forensic

Medicine. 2014; 4(1): 1-5.

8. Babu RS, Deepika V, Potturi BR, Estimation of Stature From Foot Length, IJPBS. 2013 Jul-Sep; 3(3): 266-270.
9. Jakhar JK, Pal V, Paliwal PK.Estimation of Height from Measurements of Foot Length in Haryana Region, J Indian Acad Forensic Med. 32(3): 231-233.
10. Rani M, Tyagi AK, Ranga VK, Rani Y, Murari A, Stature estimates from foot dimensions, J Punjab Acad Forensic Med Toxicol. 2011; 11(1): 26-30
11. Khairulmazidah M, Nurul Nadiah AB, Rumiza AR, Stature Estimation Using Foot and Shoeprint Length of Malaysian Population, International Scholarly and Scientific Research & Innovation. 2013; 7(7): 103-106.
12. Singh A, Kumar A, Chavali KH, Harish D., Use of arm-span and foot length for estimation of height of the person, J Punjab Acad Forensic Med Toxicol. 2012; 12(2): 87-91.
13. Sanli SG et al, Stature estimation based on hand length and foot length, Clin Anat. 2005 Nov; 18(8): 589-96.

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Estimation of Personal Height From the Percutaneous Length of Ulna in Maharashtra Region (Regression Analysis)

Pawar Sudhir E.*, B.R. Zambare, Lingaswamy Veeramalla*****

Abstract

Aims and objective: An effort was made to formulate a linear regression equation for prediction of personal height from the length of an ulna bone. *Material and Methods:* The present study was carried out on 326 (males 166 and females160) medical and paramedical students of PDVVPF's medical college, Ahmednagar, Maharashtra (age 18 to 25 years). The parameters measured are height and the length of right and left ulna. *Observations:* They were recorded in tabulated form and analysed statistically for mean, standard deviation, standard error, correlation coefficient (r), regression constant (a), regression coefficient (b) and standard error of estimation to formulate the linear regression formula. *Results:* The correlation coefficient (r) for male was 0.76 ($p < 0.01$) and 0.74 ($p<0.01$) for right and left ulna. The correlation coefficient (r) for female was 0.67 ($p<0.01$) and 0.66 ($p<0.01$) for right and left ulna. Considering both sex together it was 0.84 ($p<0.01$) for right and left ulna. The mean ulna length is higher in males than females. *Conclusion:* There is a definite correlation between length of ulna and height of an individual. The regression formula proposed in study will be useful for clinicians, anatomist, anthropologist and forensic experts.

Keywords: Linear Regression; Height; Ulna; Correlation Coefficient (r).

Introduction

The growth is a vital process measured by measuring the height of a person. The estimation of height by measurement of various long bones has been attempted by various authors. Pearson k.et al [1] introduced first time the correlation calculus for prediction of height from measuring various long bones. Height itself is a sum of certain long bones and an appendages of body parts.so they show certain relationship with total strature [2]. So the prediction of height from different parts of skeleton by anthropometric analysis is an area of interest to anatomist, anthropologist and forensic experts [3]. The main aim of taking help of anthropometric study in forensic science is to help the law enforcement agencies in achieving "personal identity" in case of an unknown human remains [4]. Also establishing identity of an individual from mutilated, decomposed and amputated body fragments has become important in present era due to natural or manmade disasters. It is important for both legal and humanitarian reasons .But the relationship between height and long bones differs according to race, age, sex and also influenced by environmental and genetic factors [4].

Pan N [5] worked on cadavers to derive relation between total height and length of ulna bone. Telekka et al. [6] also worked on the long bones of limbs and expressed his opinion that each racial group need a separate formula for estimation of stature. After that many workers worked on cadavers and living to give different formulae for prediction of height from length of long bones.

The ulna is a long bone which lies on medial side of forearm. It has easily identifiable surface landmarks which make the measurements more comfortably in compromised posture. Both ends are placed superficially. So ulna is often used long bone to estimate body height. Accordingly here also efforts are taken to derive linear regression formula to

Authors Affiliation: *Professor, **Professor and Head, ***Assistant Professor, Department of Anatomy, P.D.V.V.P.F's Medical college, Ahmednagar, Maharashtra.

Reprints Requests: Pawar Sudhir E., Professor, Department of Anatomy, Pad. Dr. Vithalrao Vikhe Patil Foundation's Medical college ,Vilad Ghat ,Ahmednagar, Maharashtra. Pin 414111.

E-mail: drsudhiranatomy@yahoo.com

predict height from the length of ulna in males and females in Maharashtra region.

Materials and Methods

The present study was carried out on 326 healthy medical and paramedical students belonging to various regions of Maharashtra studying in PDVVPF'S Medical institute, Ahmednagar, Maharashtra over the period of two years. Out of total 326 subjects, male subjects were 166 and female subjects were 160 in number. Their ages ranged between 18 to 25 years. Subjects having old fractures, any significant disease, orthopaedic deformity, metabolic or developmental disorders which can affect general or bony growth were excluded from study. For every subject the height and length of right and left ulna were recorded. Measurements were always taken at a fixed time, between 3pm to 5pm to eliminate discrepancies of diurnal variation

Prior to the commencement of this study, the necessary permissions were taken from the institutional ethics committee. Informed consents were taken from each individual before including in the study.

The vertex to heel height was measured for each subject with them in standing erect posture with bare foot and head oriented in Frankfurt's plane with height measuring instruments.(Fig. 1) The height was recorded in centimetre. The length of ulna was measured with the help of anthropometric measuring tape from tip of olecranon process to tip of styloid process with elbow flexed (Fig. 2). Measurements of length of right and left ulna were taken separately for calculation.

Fig. 1: Figure showing measurement of height in erect posture

Fig. 2: Figure showing measurement of length of Ulna

The obtained data were used to statistical analysis for calculation of mean, standard deviation, standard error, correlation coefficient (r), regression constant i.e. intercept (a), regression coefficient i.e. slope (b) and t test applied for correlation coefficient to test the statistical significance. The relationship between the changes of dependant variable (say, y) and an independent variable (say, x) was ascertained by simple linear regression, with the Regression coefficient (b), where the model of regression equation was $y = a + bX$(where a= y intercept, when x =0). As in every equation a 95% confidence interval (which was equal to 1.96 standard deviation) was accepted and the standard error of regression (STE) was calculated. The final equation model was $y = a + b X \pm(1.96 \times STE)$

Results

The observations were recoded separately for Rt. and Lt. Ulna for each sex. Then they were tabulated and analysed separately with help of computer in Microsoft Windows XP Professional with Microsoft Excel 2010 using its standard statistical formulae.

Table 1 shows that mean height for male subject is 169.21 ±6.56 cm and mean of length of Right and Left ulna is 28.13 ± 1.61 and 27.81 ±1.60 cm respectively. It also shows that range for height for male is from 146 to 187cm, while range for length of Rt. and Lt. ulna is 23 to 32cm and 24 to 32cm respectively.

In the same way Table 2 shows values for Female subjects. The Mean height for female is 155.58 ± 6.01 cm. The Mean of length of Rt. and Lt. ulna is 25.68 ±1.36 cm and 25.25 ±1.26 cm respectively. While the

range of height is 143 to 177 cm. The range for length of Rt. and Lt. ulna is 22 to 30cm and 22 to 29.5cm respectively.

While the Table 3 shows values when both sex are considered together. The Mean of height is 162.52 ± 9.27cm and it ranges from 143 to 187 cm. While the

Table 1: Male Subjects: n=166

Parameters	Mean	S.D.	Range
Height (cm)	169.21	6.56	146-187
Length of Rt. Ulna(cm)	28.13	1.61	23-32
Length of Lt. Ulna (cm)	27.81	1.60	24-32

Table 2: Female Subjects: n=160

Parameters	Mean	S.D.	Range
Height (cm)	155.58	6.01	143-177
Length of Rt. Ulna(cm)	25.68	1.36	22-30
Length of Lt. Ulna (cm)	25.25	1.26	22-29.5

Table 3: For both sex together: n=326

Parameters	Mean	S.D.	Range
Height (cm)	162.52	9.27	143-187
Length of Rt. Ulna(cm)	26.93	1.93	22-32
Length of Lt. Ulna (cm)	26.56	1.93	22-32

Table 4: Comparison of length of Rt. Ulna and Lt. Ulna:

Subjects	Length of Rt. Ulna(cm)	Length of Lt. Ulna(cm)	P value	t value
Male	28.13	27.81	0.936	1.012
Female	25.68	25.25	0.336	1.65

Table 5: Correlation of Height with length of ulna in Male and Female subject:

Subject	Correlation coefficient (r)		Coefficient of Determination (r^2)		P Value
	Rt.	Lt.	Rt.	Lt.	
Male	0.76	0.74	0.57	0.54	P < 0.01
Female	0.67	0.66	0.44	0.43	P < 0.01
Both sexes together	0.84	0.84	0.71	0.71	P < 0.01

Table 6: Regression equation for Height with length of ulna in Male and Female:

Subject	Side	Regression Equation
Male	Rt. Side	Y = 82 + 3.09 x Rt. ulna length (cm) ±8.29
	Lt. side	Y = 84.74 + 3.03 x Lt. ulna length(cm) ± 8.60
Female	Rt. Side	Y = 79.16 + 2.97x Rt. ulna length(cm) ± 8.70
	Lt. Side	Y = 75.26 + 3.17 x Lt. ulna length(cm) ± 8.70
Both sex together	Rt. Side	Y = 53.20 + 4.05 x Rt. ulna length(cm) ±9.60
	Lt. Side	Y = 54.31 + 4.07x Lt. ulna length(cm)±9.64

Mean of length of Rt. ulna and Lt. ulna is 26.93 ±1.93cm and 26.56 ±1.93 cm respectively. The range of length of Rt. and Lt. Ulna is from 22 to 32 cm.

The Table 4 shows that comparison between the lengths of right and left ulna among male and female is statistically insignificant as p value is > 0.01. So we can say that there is no proper relation in between them.

The Table 5 shows that there is a positive correlation between the Height and the length of right and left ulna. The correlation coefficient (r) for male is 0.76 and 0.74 for Rt. and Lt. side respectively. The P value is < 0.01, which is statistically significant. Similarly 'r' value for Female is 0.67 and 0.66 for Rt. and Lt. side respectively, which is also statistically significant (P<0.01). It is also statistically significant when both sex are considered together.

While the Table 6 shows the regression equations for male and female subjects and for both sex considered together. It is based on Y = a + b X ± standard error of regression. Where 'a' is regression constant, 'b' is regression coefficient and 'X' is length of Ulna.

Discussion

The present study consists of finding correlation of Personal height with the length of right and Left

ulna. The prediction of height of unknown individual from incomplete and decomposed skeletal remains is very important in point of forensic experts and anthropologists. It is also vital in determining the identity of an unknown individual.

Therefore formula which is based on length of ulna is an alternative to determine the height under such circumstances. The ulna has easily identifiable subcutaneous landmarks which make it comfortable to measure its length. If we know one parameter then with regression equation we can find out other factor that is height. Anjali Prasad et al [15] in their study report that average height of adult males within a population is significantly higher than that of adult female. The results obtained from our study are also in favour of the same statement.

Various workers like Allbrook D [8], Athwal M.C [9], Lal and Lala [10],Trotter M [12], Jadhav HR [13] and Saxena SK [14] have shown significant positive correlation between the stature and length of ulna bone as well as other long bones and different parts of body. The Correlation coefficient (r) obtained from our study matches very well with the previous studies done by Allbrook D [8], Mondal MK [3] and Anjali P. et al. [15] and Avantika B. et al. [16].

Allbrook D [8] formulated the regression equation for estimation of height from the length of ulna as

Stature = 88.94 + 3.06 x length of ulna ±4.4 (SE)

While, Athwale MC [9] after studying over 100 Maharashtrian adult males age range of 25 -30 derived regression formula like

stature = 56.97 +3.96 x length of ulna(cm) ±3.64

Thummar B. et al [11] derived regression equation for determination of height from length of right ulna and Left ulna in Gujarat population as follow for males

Y1 = 81.11 +3.11 x length of right ulna(cm)

Y2 = 65.76 + 3.66 x length of left ulna(cm)

Mondal MK et al [3] studied in west Bengal female population and derived regression equation as

Y = 45.89 + 4.39 x length of left ulna (cm) ±7.03

Y = 58.72 + 3.89 x length of right ulna(cm) ± 9.17

Ilayperuma I.et al [7] also studied in Srilankan population and proved positive correlation between height and length of ulna in them and derived regression equation for their population.

While Anjali P.et al [15] studied in Marathwada region of Maharashtra on 250 subjects and derived regression formula like

For male Y = 93.45 +2.92 x length of ulna (cm)

For female Y = 113.89 +2.37 x length of ulna (cm)

For both sex together Y = 132.43 +1.49 x length of ulna (cm)

The present study also shows positive correlation between height and length of ulna, which is statistically significant as p value is < 0.01. Table 6 shows the regression equations derived from present study for male, female and when both sex as together.

Conclusion

The Correlation coefficient between The height and length of ulna is statistically significant indicating a strong relationship between these two parameters. Hence we conclude that the length of ulna provides reliable platform for prediction of height of an unknown individual. The Regression equations derived from the present study can be applied successfully for estimation of personal height in Maharashtra region. This Fact will be of practical use in medico legal investigations as well as in anthropometry so more useful for Anthropologist and Forensic Medicine Experts.

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References

1. Pearson K. A mathematical contribution to the theory of evolution. On the reconstruction of the stature of the prehistoric races. Philos. Trans R Soc. London; series A. 1889; 192: 169 – 244.
2. Patel SM, Shah GV and Patel SV. Estimation of height from measurements of foot length in Gujarat region. J. Anat. Soc. India. 2007; 56(1): 25-27.
3. Mondal MK, Jana TK, Das J, Biswas S. Use of Length of Ulna For Estimation of Stature in Burdwan District and Adjacent Areas Of West Bengal. J. Anat. Soc. India. 2009; 58(1): 16-18.
4. Krishan K. Anthropometry in Forensic Medicine and forensic Science-'Forensic Anthropometry'. The Internet Journal of Forensic Science. 2007; 2(1).
5. Pan N. Estimation of the height from difference long bones of Bengalis. J. Anat. Soc. India. 1924; 58: 3.74.

6 Telekka A. The prediction of the human stature from the long bones.Acta Anatomica.1950; (9): 103 -11

7 Illayperuma I, Nanayakkara G. Palahepitiya N. A Model For the Estimation of Personal Stature from Length of Forearm. Int. J. Morphol. 2010; 28(4) 1081-1086.

8. Allbrook, D. "The estimation of stature in British and East African males based on thetibial and ulnar bone lengths", Journal of forensic Medicin. 1961; 8: 15-27.

9. Athawale MC. Anthropological study of height from length of forearm bones. A study of one hundred Maharashtrian male adults of ages between twenty five and thirty years. American Journal of Physical Anthropology. 1963; 21: 105-12

10. Lal,C.S. and Lala J.K. "Estimation of height from tibial and ulnar lengths in North Bihar" Journal of Indian Medical Essentials. 1972; 58: 4.

11. Thummar B, Patel Z, Patel S, Rathod SP. Measurement of Ulnar Length for estimation of Stature in Gujarat. NJIRM. 2011; 2(2): 36- 40.

12. Trotter M and Gleser GC. Estimation of stature from long bones of American Whites and Negroes. Am. J. Phys. Anthropol .1952; 10: 463–514.

13. Jadhav HR and Shah GV. Determination of personal height from length of head in Gujarat region. Journal of Anatomical Society of India. 2004; 53(1) 20-21.

14. Saxena SK, Jeyasingh P, Gupta AK and Gupta CD. The estimation of stature from head-length. Journal of Anatomical Society of India. 1981; 30: 78-79.

15. Anjali P,BhagvatVB,PorwalS,Joshi DS Estimation of Human stature from length of ulna in Marathwada Region of Maharashtra. Int J Bio Med Res. 2012; 3(4): 2337-2341

16. AvantikaB,ShrikrishnaNB,RajivSC,Vineet KG. Estimation of stature from length of ulna in Maharashtra population.International Journal of Medical science and public health. 2015; 4(1): 65- 68.

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Assessment of Medico-Legal Knowledge among Interns and Residents at Vikhe Patil Institute of Medical Sciences

Sandeep S. Kadu*, Ranjit M. Tandle, Sarita Gurjar*****

Abstract

Forensic Medicine and Toxicology is an indispensable part of medical education. It deals not only with medico-legal autopsy, but also enlightens medical ethics in medical students. Medical Council of India has reduced the strength of qualified teaching staff required for under-graduate teaching which has deteriorated the quality and importance of subject in giving justice to medical education as well as criminal justice. The arising public cognizance about medical field, conduct of medical professionals and changing doctor-patient relationship has affected medical practice.

The present study is aimed to assess the knowledge and attitude of medical interns and post-graduate students of Padmashree Dr Vithalrao Vikhe Patil Foundation's Medical College, Ahmednagar towards ethical and legal aspects of medical practice. This is cross sectional, questionnaire based study conducted at Padmashree Dr Vithalrao Vikhe Patil Foundation's Medical College, Ahmednagar from 1st January 2016 to 30th June 2016. Total 101 students volunteered for this study. It was found that most of the students failed to answer questions about negligence, autopsy, viscera preservation and duration of keeping medico-legal records. Hence, one month internship should be mandatory in Forensic Medicine and Toxicology and Forensic Medicine teaching staff should be restored to boost up knowledge of students about their ethical and medico-legal responsibilities during practice of medicine.

Keywords: Consent; Medico-Legal Knowledge; Medical Negligence; Record Keeping.

Introduction

Forensic medicine and toxicology is an important subject in medical science. Jurisprudence deals with legal aspects of practice of medicine which are often neglected by registered medical practitioners who then have to face charges of medical negligence. In medical practice, professionalism connotes not only knowledge and skill but also character, especially compassion and ethics [1]. Commercialization of modern medical practice and growing public awareness about the conduct of medical practitioners has affected the practice of medicine and escalated cases of medical litigation by unsatisfied patients [2].

The training period is critical time for interns and post-graduates. During this period transition from student to physician takes place with better understanding to learn medico-legal work [3-4]. For proper training of medico-legal examination, the casualty must be attached to and supervised by the Forensic Medicine department and posting of interns and postgraduates in Forensic Medicine should be made compulsory [5]. It should be realized by all doctors that they have to deal with medico-legal cases throughout their carrier irrespective of the faculty they choose. So having knowledge about the subject is very important while working in hospital or in private clinic. Also the medical ethics and various acts related to medical practice should be emphasized in the undergraduate and postgraduate levels [6].

To avoid litigations, medical practitioners need to familiarize themselves with the regulation and laws that concern their practice as ignorance of law is no

Authors Affiliation: *Professor, **Associate Professor, ***Second Year MBBS Student, Department of Forensic Medicine, PDVVPF's Medical College, Ahmednagar.

Reprints Requests: Sandeep S. Kadu, Professor, Department of Forensic Medicine, PDVVPF's Medical College, Ahmednagar – 414111 Maharashtra
E-mail: dr.sandeepkadu@gmail.com

excuse for violating it. Keeping this in mind, the present study was carried out to assess the knowledge of interns and residents regarding medico-legal problems and to make them aware about law and liabilities related to medical practice.

Material and Methods

A questionnaire based cross-sectional study was conducted in Padmashri Dr Vithalrao Vikhe Patil Foundations Medical College, Ahmednagar, Maharashtra, India during period of 6 months (January 2016 to June 2016) after Institutional Ethics Committee's approval. The study was carried out in total 101 students (70 interns and 31 residents). They were explained the purpose of study after which they voluntarily participated. They were informed about the confidentiality of the information collected so as to get more reliable answers from them. A self-administered questionnaire containing 20 items relating to knowledge and attitudes of medical ethics and Forensic Medicine was designed and pre-tested. The collected data was tabulated and analyzed statistically with Microsoft excel.

Observations

No.	Questions	Rightly answered by interns	Rightly answered by residents
1	How long do you have to keep IPD records of medico-legal case?	36(51.4%)	5(16%)
2	What is the minimum age to give consent for major operation?	54(77.1%)	19(61.3%)
3	Not attending a patient during emergency is a punishable act?	66(94.2%)	27(87%)
4	Refusing to treat a HIV positive patient is an offence?	40(51.1%)	25(80.6%)
5	If a nurse misplaced a gauge piece in the surgical site which was then sutured, who will be held responsible?	16(22.8%)	10(32.2%)
6	According to Section 174 crpc, who is the authority to decide medico legal autopsy?	11(15.7%)	9(29%)
7	Does consent of patient's relative required for Clinical autopsy?	48(68.5%)	25(80.6%)
8	Which preservative is used for chemical analysis of routine viscera?	21(30%)	7(22.5%)
9	For MTP whose consent is required?	35(50%)	20(64.5%)
10	Does fall in bathroom constitutes MLC?	31(44.2%)	23(74.2%)
11	Who should issue death certificate?	11(15.7%)	4(12.9%)
12	Which type of injury is dislocation of tooth?	45(64.2%)	19(61.2%)
13	According to 375 IPC only touching of penis or any object to any part of female body constitutes rape?	51(72.8%)	29(93.5%)
14	"RED CROSS" (+) emblem is the right of the doctors.	37(52.8%)	23(74.2%)
15	Are you aware of WHO format of Death Certificate and ICD codes?	56(80%)	23(74.2%)
16	Do you think consent and proper documentation can be a strong defense againstcharge of negligence?	62(88.5%)	21(67.7%)
17	Is postmortem examination is needed in all cases of sudden, unnatural death?	56(80%)	26(83.8%)
18	What is the purpose of doing Postmortem examination?	60(85.7%)	29(93.5%)
19	Whether postmortem examination causes disfigurement and disrespect to humanbody?	44(62.8%)	20(64.5%)
20	Interested in specializing in Forensic Medicine. If not, reasons for Not Specializing.	Y- 4(5.7%)	Y- 0
	A) Not interested in Forensic Medicine	A- 07(10%)	A-08(25.8%)
	B) Interested in other specialties	B- 12(17.1%)	B- 02(6.4%)
	C) Not lucrative, Scope in India is minimal D) No reasons	C- 32(45.7%)	C- 18(58%)
		D- 15(21.4%)	D- 3(9.6%)

Discussion

In our study, survey of 101 (70 interns and 31 residents) students was done at PDVVPF's Medical College, Ahmednagar. All voluntarily participated students answered 20 questionnaires as mentioned in above table.

In this present study, regarding knowledge of medico-legal documents and record keeping, very few were aware about duration of record keeping in medico-legal cases, format of death certificate and its issuing authority. However, majority of participants were aware of International Classification of Diseases (ICD) and believed that proper documentation can help in defending charge of negligence. Our study does not coincide with the study by Makhani et al [7] and Jasuma J Rai et al [8]. Under Article 51A(h) of the Constitution of India, there is moral obligation on the doctor, and a legal duty, to maintain and preserve medical, medico-legal and legal documents in the interest of social and professional justice [9]. The issue of medical record keeping has been addressed in the Medical Council of India Regulations 2002 guidelines answering

many questions regarding medical records which states that doctor should maintain indoor records in a standard pro forma for 3 years from commencement of treatment [10].

Majority of participants were aware of various aspects of informed consent like, age of consent in respect to major operation and medical termination of pregnancy. Our findings coincide with the study by Heywood R. et al [11]. Thorough knowledge about the informed, expressed consent is a sound defense against medico-legal cases. Considering the knowledge about doctor's duty in emergency and towards HIV positive patient, most of the students are mindful about it. Many of the students were cognizant about the criteria for labeling medico-legal case and grievous hurt. They also acknowledged the recent amendments in S. 375 of Indian penal Code in relation to rape.

Autopsy helps in establishing the cause and manner of death in both clinical and forensic cases. Autopsies also help clinicians to confirm diagnosis, as well as the identification of new and re-emerging diseases, and thus they are important in both protecting the public health and improving the accuracy of vital statistics [12]. In present study, majority of students failed to answer about the deciding authority for conducting medico-legal autopsy. They were also not aware about preservative used for viscera to be sent for chemical analysis. Many participants answered correctly about aims and objectives of medico-legal autopsy, but 41.8% of them believed that autopsy causes dis-figuration and disrespect to the deceased which is not the fact.

Majority of students failed to answer questions related to medical negligence and allied aspects. This indicates limited understanding of students about negligence and law and more efforts should be made to sensitize them about law and liabilities related to their practice.

The majority of interns was not interested in specializing in Forensic Medicine (94.3%) because they believe that Forensic medicine, as a career option, is not lucrative and has very limited scope in India. The reason put forward was limited job opportunities due to staff reduction done in teaching faculty in this subject. The findings of our study are in congruence with study by Nihal Ahmed et al [13] and Ekanem and Akhibe [14].

Conclusion

The present study is a sincere attempt to assess the knowledge of medical interns and residents about informed consent, record keeping, medico-legal cases, negligence and medico-legal autopsy. The participants were aware about record keeping, informed consent and aims and objectives of medico-legal autopsy, but lacking in details about medico-legal negligence, viscera preservation in autopsy and death certificate. The Clinical Forensic Medicine branch is gaining importance day by day considering negligence cases and other litigations arising during practice. Hence, curriculum regarding horizontal and vertical integration of this branch shall be done in curriculum and sufficient Forensic Medicine staff shall be recruited to handle and teach medico-legal cases at casualty.

Conflict of Interest

Nil

Ethical Clearance

Taken from Institutional Ethical Committee.

Source of Funding

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References

1. Moser RH. A few thoughts about professionalism (editorial). South Med J. 2000; 93: 1132-3.
2. Dr.Shreemanta Kumar Dash. Medical Ethics, Duties & Medical Negligence Awareness among the Practitioners in a Teaching Medical College, Hospital-A Survey, JIAFM. 2010 April-June; 32(2): 153-156.
3. Khandekar Indrajit, Tirpude Bipinchandra, Murkey Pankaj, Pawar Vishwajeet. Development of Clinical Forensic Medicine in India: A need of time. J Indian Acad Forensic Med. 2012; 32(1): 85-90.
4. Mayeda Mayumi, Takase Kozo. Need for enforcement of ethic ledged Education an analysis of the survey of postgraduate clinical trainees. BMC Medical Ethics. 2005; 6: 8.
5. Sharma BR, Harish D, Chavali KH. Teaching, training and practice of Forensic Medicine in India: An overview. JIAFM. 2005; 27(4): 247-51.
6. Selvaraj Kokila, Sivaprakassam P, Nelson SB, Kumar Midhum. Perception of interns and postgraduates towards medical ethics education. Int J Curr Microbiol App Sci. 2013; 2(9): 198-203.
7. Makhani C.S., Petkar M. R., Chavan K.D., T.V. Rao, Indian Journal of Forensic Medicine and Pathology. 2011; 4(4): 151-155.

8. Jasuma J Rai et al Knowledge and awreness among interns and residents about medical law and negligence in medical college in Vadodara- A questionnaire study. Journal of Dental and medical sciences. 2013 Jan-Feb; 3(4): 32-38.
9. Astekar M, Saawarn S, Ramesh G, Saawarn N., Maintaining dental records: Are we ready for forensic needs?, J Forensic Dent Sci. 2011; 3: 52-7.
10. Indian Medical Council (Professional Conduct, Etiquette and Ethics) Regulations, 2002.
11. Heywood R., Macaskill A. And Williams K., Medical students' perceptions of informed consent: legal reflections on clinical education, Journal of professional negligence. 2007; 23(3): 151-164.
12. Lundberg GD. Low-tech autopsies in the era of high-tech medicine: continued value for quality assurance and patient safety. JAMA. 1998 Oct 14; 280(14): 1273-4.
13. Nihal Ahmad et al- Attitude and knowledge of medical students on practical aspects of forensic medicine J of Evidence based medicine and health care. 2015 July 6; 2(27): 4002-08.
14. Ekanem VJ, Akhigbe KO. Attitudes of Nigerian medical students to autopsy. Turk J Med Sci. 2006; 36: 51-6.

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Study of Presenting Complaints and Survival Time in Cases of Sudden Death

Akhilesh K. Pathak*, Pankaj H. Barai, J.S. Tanna*****

Abstract

Sudden death is a major cause of mortality in adults and older individuals and the medicolegal autopsy in such cases is common to rule out any unnatural cause. This autopsy based study was undertaken to analyze the presenting complaints of the patients at the time of hospitalization and to calculate the survival time, so the appropriate treatment can be offered to the patients to reduce the morbidity and mortality. It was a prospective, longitudinal cohort study done in cases of sudden deaths, which were brought to us for autopsy examination during the one year period. In our study sudden unconsciousness (32.59%) were the most common presentation of the victims in casualty, followed by uneasiness (22.76%) and acute chest pain (17.4%). At the time of the onset of symptoms, the majority of the victims (41.96%) were engaged in their daily routine work followed by the victims who were resting (37.50%). The cases were also analyzed according to the duration of survival of the victim after the onset of symptoms and we found that the 53.55% victims died almost immediately within one hour of the appearance of symptoms and brought dead to the hospital while 18.75% victims could survive a duration of 1-6 hours followed by the victims who survived 6-24 hours (13.40%) after the onset of symptoms. This study highlights the importance of identification of the victims of sudden cardiac arrest by recognizing their presenting complaints and immediate and timely providing basic and advanced life support with rapid transportation can reduce the mortality and morbidity.

Keywords: Cardiac Death; Sudden Death; Presenting Complaints; Autopsy; Natural Death.

Introduction

Sudden and unexpected death occurring within 24 hours of the onset of the symptoms in a person who is not known to be suffering from any disease, injury or poisoning. In the majority of these cases, the individuals are apparently healthy and died suddenly and unpredictably due to unknown reason and hence the medicolegal autopsies are performed to determine the exact cause of death and to rule out any unnatural manner. Numerous studies on sudden death and its various aspects have been reported by various authors [1-5], but the issues related to the presenting complaints of the victim and survival period has been less discussed. Hence, the present study was undertaken to analyze the presenting complaints of the victim at the time of hospitalization and to calculate the survival time, so the mortality can be reduced by offering them appropriate medical help during the precious time of life.

Material & Methods

This prospective and longitudinal cohort study was conducted during the period of one year from 1st March 2013 to 28th February 2014 after taking the permission from the Institutional Ethics Committee. The sample size for this study belongs to the population of Vadodara city irrespective of age, sex, religion and caste and all the cases belonged to the category of sudden death (deaths occurring within

Authors Affiliation: *Associate Professor, **Ex. Associate Professor, ***Assistant Professor, Department of Forensic Medicine & Toxicology, S.S.G. Hospital & Medical College, Baroda, Gujarat, India.

Reprints Requests: Akhilesh K. Pathak, Associate Professor, Department of Forensic Medicine & Toxicology, S.S.G. Hospital & Medical College, Vadodara -390001, Gujarat, India.
E-mail: dr.akhilesh_pathak@yahoo.co.in

24hr from the onset of signs and symptoms) were taken into the consideration. Detailed history regarding the circumstances of death with special reference to chief complaints and time of appearance of symptoms was taken from the near relatives and investigating officer and clinical records of the casualty department. A detailed medico legal autopsy was performed in each case and the routine viscera for histopathology examination were sent to know the exact cause of death and toxicological analysis were carried out to rule out any poisoning. After receiving the reports of analysis data were analyzed and the conclusion was drawn.

Results

During the one year period of this study, total 2240 medico-legal autopsies were performed and the incidence of sudden death was 10% (224 cases). Table-1 shows the distribution of sudden deaths, according to the complaint presented at the time of admission in hospital and it was observed that in about one third of cases (32.59%), the victims presented with sudden unconsciousness followed by uneasiness in 22.76% cases and acute chest pain with sweating in 17.4% cases. In 14.3% cases, presenting complaints could not be ascertained due to unavailability of the proper history and clinical data. Table 2 is showing distribution of sudden death cases, according to the activity of deceased in which he/she was involved at the time of onset of symptoms and we found that the 41.96% victims were engaged in their daily routine work while 37.50% victims were at rest and only 3.57% were doing some strenuous activity or sleeping (7.59%) or travelling (4.91%). Table-3 showing distribution of cases according to their duration of survival after the onset of symptoms and it shows that 14.30% victims were found dead on the scene, 53.55% victims were either brought dead to the hospital or died within 1 hour of their admission, while the rest 18.75% victims survived for a period of 1-6 hours and 13.40% survived for a period of 6-24 hours in hospital with medical help.

Table 1: Distribution of sudden deaths, according to the complaint presented

Presenting Complaints	No. of Cases	%
Sudden Unconsciousness	73	32.59%
Uneasiness in Chest	51	22.76%
Acute Chest Pain with sweating	39	21.42%
Vomiting and diarrhea	15	6.7%
Vertigo/ Convulsion	5	2.23%
No Preceding Symptoms	32	14.3%
Total	224	100%

Table 2: Distribution of Sudden deaths, according to activity of deceased at the time of onset of symptoms

Activity	No. of cases	%
Not known	10	4.47%
Rest	84	37.5%
Routine Activity	94	41.96%
Strenuous Activity	8	3.57%
Sleeping	17	7.59%
Travelling	11	4.91%
Total	224	100%

Table 3: Distribution of Sudden deaths, according to duration of survival after onset of symptoms

Survival Period after Onset of symptoms	No. of cases	%
Found Dead	41	14.30%
Brought dead / < 1 hr	111	53.55%
Up to 6 hrs	42	18.75%
Up to 24 hrs	30	13.40%
Total	224	100%

Discussion

Sudden death by definition, cannot be diagnosed as it has already happened. In the developed countries majority of the cases the cause of sudden deaths is either due to fatal arrhythmias or acute myocardial infarction or rarely may be due to intracranial hemorrhage/massive stroke (cerebrovascular accident), massive pulmonary embolism or acute aortic catastrophe [6]. In the present study, we have tried to find out the major presenting complaints of the victim of sudden death and duration of survival of the victim so the appropriate medical help can be provided to them in a time sensitive manner whenever possible. Though the studies have reported in which there is no preceding symptoms before sudden death [7,8]. In this study sudden unconsciousness, uneasiness in the chest, acute chest pain with sweating, vomiting-diarrhea and vertigo/convulsions were observed in the form of presenting complaints and in the majority of the victims the presenting complaint was either the sudden unconsciousness (32.59%) or uneasiness (22.76%) in the chest due to dysnoea. There were no preceding symptoms in 14.3% cases before sudden death. Table-1 shows that even a healthy individual with minor complaints like uneasiness, chest pain and vomiting should be taken seriously and carefully monitored to rule out the cardiac arrythemias and rapid transport to the nearest cardiac center with supportive treatment by a trained medical team is paramount to reduce the morbidity and mortality in such cases.[9] Oxygen saturation and cardiac monitoring in such cases is of an immense importance at this stage. Jones and Slovis[10] have reported the

pitfalls in the evaluation of myocardial ischemia and explained the possibility of missing the diagnosis in younger patients and woman with atypical symptoms. Although vigorous exercise can trigger sudden cardiac death and acute myocardial infarction[11] but in this study, we observed that only 3.57% victims were engaged in some strenuous activity and the majority was engaged either in their daily routine work or resting at the time of onset. Braggion-Santos et al [12] have found in their autopsy based study on sudden cardiac death in Brazil that more than half of the deaths occurred at home (53.3%) followed by the deaths occurred in emergency rooms (37.8%). It is worth noting that 8.2% of all events occurred in public places and six men died (0.7%) during physical activity practice (mean age 35 years). Duration of survival of the patient after the onset of symptoms shows that the two third of the victims (67.85%) in this study were either found dead or brought dead to the casualty department, while 18.75% victims survived a period of 1-6 hours and 13.40% survived up to 24 hours duration. In the Maastricht study [7], 80% of the cardiac arrests occurred at home and 40% were unattended and hence we should be able to recognize the warning symptoms of cardiac arrest to provide basic and advanced life support to the victims by emergency service providers. Recently much attention has been given over the use of public access defibrillation by the nonphysicians through a widely distributed automated external defibrillators [13], which should be available at all common places where cardiac arrest can occur. Recognition of the presenting complaints of the patients and immediate transportation through a well equipped ambulance with trained medical staff in these cases can help to reduce the mortality. Training of cardio pulmonary resuscitation and basic knowledge to recognize the alarming symptoms should be given to common peoples especially at school levels can improve the statistics of mortality and morbidity in cases of sudden and unexpected death.

Conclusion

This study highlights the importance of identification of the victims of sudden cardiac arrest by recognizing their presenting complaints and immediate and timely providing basic and advanced life support with rapid transportation to reduce the mortality and morbidity.

Conflict of Interest

None.

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Nil.

References

1. Zanjad NP, Nanadkar SD. Study of Sudden Unexpected Deaths In Medico-Legal Autopsies. JIAFM. 2006; 28(1): 27-30.
2. Rao DS, Yadhukul. Sudden and unexpected natural deaths-A four-year autopsy review JPAFMAT. 2008; 8(2): 20-24.
3. Gervacio G, Lim M, Reganit P, Encinas M, Macapugay L, Palmero J, et al. A case control study on autopsy findings in sudden unexplained nocturnal death syndrome. The Heart Asia. 2014; 6: 11-16.
4. Nisha M, Sethi B, Gupta S, Duhan A, Singh S, Sen R. Histomorphological spectrum of various cardiac changes in sudden death: an autopsy study. Iranian J of Pathol. 2011; 6(4): 179-86.
5. Gupta S, Panchal R, Sondarva D. An Approach to Sudden Natural Deaths in Medicolegal Autopsies at Karamsad, Gujarat. JIAFM 2011;33(1): 30-32.
6. Lardaro T, McKinney J, Brywczynski J, Slovis C. Five Common Causes of Sudden Unexpected Death Every EMS Provider Should Know. J Emerg Med Services. 2015; 40(1): 1-6.http://www.jems.com/articles/print/volume-40/issue-1/features/five-common-causes-sudden-unexpected-dea.html [Accessed on June 5, 2016].
7. de Vreede Swagemakers JJM, Gorgels APM, Dubois-Arbouw WI, van Ree JW, Daemen MJAP, Houben LGE, Wellens HJJ. Out-of-hospital cardiac arrest in the 1990's: a population-based study in the Maastricht area on incidence, characteristics and survival. J Am Coll Cardiol. 1997; 30: 1500-05.
8. Kerber RE, Becker LB, Bourland JD, Cummins RO, Hallstrom AP, Michos MB et al. Automatic external defibrillators for public access defibrillation: recommendations for specifying and reporting arrhythmia analysis algorithm performance, incorporating new wave forms, and enhancing safety. Circulation. 1997; 95: 1677-82.
9. O'Gara PT, Kushner FG, Ascheim DD, et al. 2013 ACCF/AHA guideline for the management of ST-elevation myocardial infarction: A report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. J Am Coll Cardiol. 2013; 61(4): e78–e140.

10. Jones ID, Slovis CM. Pitfalls in evaluation the low-risk chest pain patient. Emerg Med Clin North Am. 2010; 28(1):183–201.

11. Mittleman MA, Maclure M, Tofler GH, Sherwood JB, Goldberg RJ, Muller JE, Determinants of Myocardial Infarction Onset Study Investigators. Triggering of acute myocardial infarction by heavy physical exertion: protection against triggering by regular exertion. N Engl J Med. 1993; 329: 1677-83.

12. Braggion-Santos MF, Volpe GJ, Pazin-Filho A, Maciel BC, Marin-Neto JA, Schmidt A. Sudden Cardiac Death in Brazil: A Community-Based Autopsy Series (2006-2010). Arq Bras Cardiol. 2015 Feb; 104(2): 120-27.

13. Nichol G, Hallstrom AP, Kerber R, Moss AJ, Ornato JP, Palmer D, Riegel B, Smith S, Weisfeldt ML. American Heart Association Report on the Second Public Access Defibrillation Conference, April 17–19, 1997. Circulation. 1998; 97: 1309-14.

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Age Determination from Epiphyseal Union of Bones at Shoulder Jointin Boys of Central India

B. Tirpude*, V. Surwade, P. Murkey*, P. Wankhade***, S. Meena******

Abstract

There is no statistical data to establish variation in epiphyseal fusion in Boys in central India population. This significant oversight can lead to exclusion of persons of interest in a forensic investigation. Epiphyseal fusion of proximal end of humerus in ninety males were analysed on radiological basis to assess the range of variation of epiphyseal fusion at each age. In the study the X ray films of the subjects were divided into three groups on the basis of degree of fusion. Firstly, those which were showing No Epiphyseal Fusion (N), secondly those showing Partial Union (PC), and thirdly those showing Complete Fusion (C). Observations made were compared with the previous studies.

Keywords: Epiphyseal Union; Shoulder Joint; Proximal End of Humerus.

Introduction

Epiphysis of the bones unites at the particular age which are remarkably constant for aparticular epiphysis and this is helpful in age determination. In law the crime and punishment isentirely based on criminal responsibility and this in turn depend on the age of a person. Age is helpful in identification of an individual which in turn is helpful in both civil and criminal cases. It has been also stated that the study of epiphyseal union of bones is considered a reasonably accurate and accepted method for age determination by the lawcourts all over the world. As per Modi's textbook, owing to variation in climatic, dietetic, hereditary and other factors affecting the people of the different states of India, it cannot be reasonably expected to formulate a uniform standard for the determination of the age of the unionof epiphyses for the whole of India. Union of epiphysis in cartilaginous bones takes place later in the males by about 2 years than in females except in case of skull sutures where obliteration sets in little later and proceeds more slowly in females than in males and under tropical conditions ossification is observed earlier than in temperate areas. Reddy KSN(2009) stated that the bones of human skeleton develop from a number of ossification centers.

At eleventh to twelth week of intrauterine life, there are 806 centers of ossification, at birth thereare about 450. The adult human skeleton carries only 206 bones. Mehta Homi S (1963) observedthat it has been approved by research in our country that the epiphysio-diaphysial union in Indianoccurs about a year or two in advance of the age at which that occurs in Europeans. Jit and Kulkarni revealed that Precocity of epiphyseal union has been attributed to racial and climatic factors. This difference could possibly be due to inadequate material or recording of incorrect agesof the subjects.By taking into consideration the radiological assessment in central India the studywill be of help in further understanding the details of precise assessment of age in central Indian population.

Aims and Objectives

1. To estimate age from epiphyseal fusions at shoulder joint in Male subjects.
2. To asses age specific difference in epiphyseal fusion at shoulder Joint in all subjects.

Authors Affiliation: *Professor & Head, *** Assistant Professor , **** Post Graduate Student, Department of Forensic Medicine, Mahatma Gandhi Institute of Medical Sciences, Sewagram, Wardha (MS) 442102. **Assistant Professor, R. D. Gardi Medical College, Surasa, Ujjain, M.P.

Reprints Requests: B.H. Tirpude, Professor & Head, Department of Forensic Medicine, Mahatma Gandhi Institute of Medical Sciences, Sewagram- 442102, Maharastra.
E-mail: drtoshalwankhade@gmail.com

3. To assess and evaluate the difference in the epiphyseal fusion at shoulder Joint in Central part of the India with other parts of India on the basis of previous studies.

Material and Methods

The study was carried out with the objective to assess the general skeletal maturity of subjects in Central India. Total ninety (90)males were taken in this study from age ranging from thirteen to twenty one years (13-21).

The individuals were selected from the following sources:

1. Individuals admitted in Hospital for treatment purpose.
2. Patients coming to the hospital for routine check-ups.
3. Student coming to the hospital for Medical check-ups.

The individual chosen for the study were evaluated and confirmed for the following:

1. They were born to parent native of Central India and lived here since birth.
2. They have authentic documentation of their date of birth. (Birth certificate, School leaving certificate, Hospital records, School records)
3. Individuals involved in study were predominately right handed.

Exclusion Criteria

1. The subjects should not have any bony deformity or pathology, congenital malformation, nutritional deficiency, endocrinal disorders, history of chronic drug intake (e.g.) anti-epileptic drugs, steroids and chronic illness thus affecting the skeletal growth and development of the individual.
2. Those who have no valid Date of Birth certificates.

Procedure of Radiography

After taking the written consent the thorough physical examination and radiological evaluation was done. X-Rays were taken with the help of X-Ray machine in the Department.

Minimum shots were taken to expose the joints involved in study and minimum and appropriate voltage settings of X-Ray machine were applied so as to avoid unnecessary radiation exposure ofthe subjects to get the desired qualities of X-Rays. All the radiological procedure was undertakenaccording to the prescribed standards. Skeletal maturity was evaluated according to the Jits andKulkarni's classification of four stages, Appearance, Non fusion, Partial fusion, and complete fusion("NF", "PF", "CF" respectively).

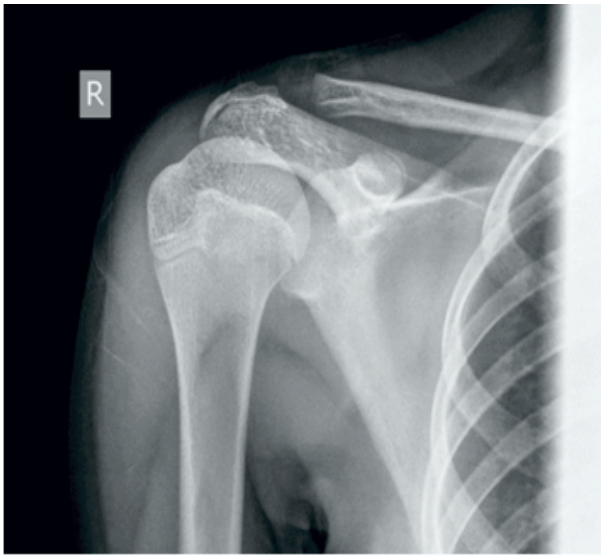
X-Rays showing clear gap between the epiphyseal and diaphysial, showing saw tooth like Appearance end were designated as "Non-fusion" (NF) X-rays. The X-rays showing a line replacingthe hiatus between the epiphyseal and diaphysial ends and not showing saw tooth like appearance were designated as "Partial Fusion" (PF) X-rays. X-Rays showing the same bony architecture in the diaphysis and epiphysis and showing scar of the previous stage were designated as "CompleteFusion" (CF).The master chart was prepared and tabulated as per code number given above. It was classified, analysed and compared with known standards. Data analysis was done EPI Info software. At the end conclusions were drawn which were compared with available results of various previous studies.

Result

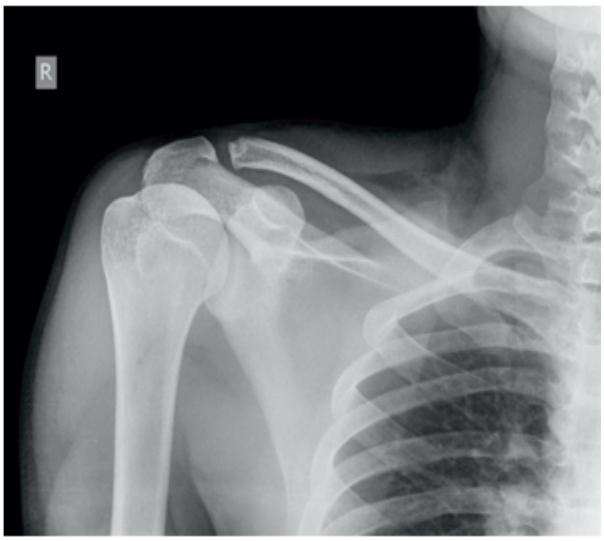
Proximal end of Humerus in males shows partial fusion in 2 (2.22%) in 14-15 years of age group. 3 (3.33%) in 15-16 years age group. 8 (8.88%) cases and 3 (3.33%) cases in 16-17 years and 17-18years of age group respectively.

Proximal end of Humerus in males was

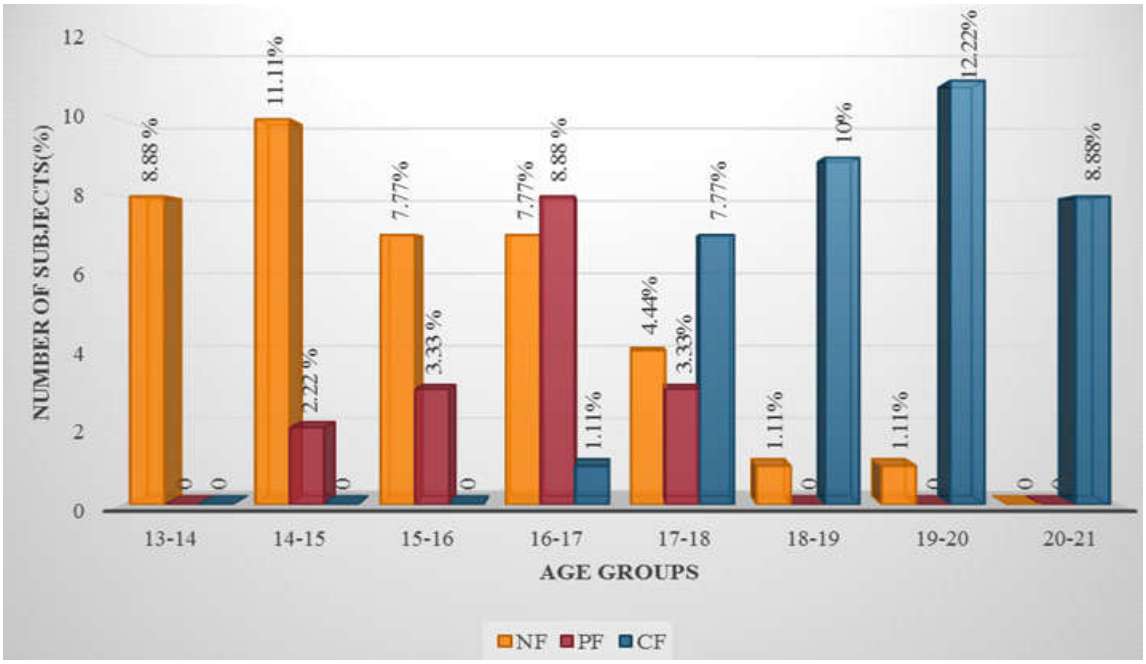
Photograph 1: AP View of shoulder shows Non- fusion of proximal end of Humerus



Photograph 2: AP View of shoulder shows partial fusion of Proximal end of Humerus



Photograph 3: AP View of shoulder shows complete fusion of Proximal end of Humerus



Graph 1: Trend of fusion at proximal end of humerus in male subjects

Table 1: Percentage of fusion in cases in males

Age in years	NF	PF	CF	Total
13-14	8(8.88%)	0(0%)	0(0%)	8(8.88%)
14-15	10(11.11%)	2(2.22%)	0(0%)	12(13.33%)
15-16	7(7.77%)	3(3.33%)	0(0%)	10(11.11%)
16-17	7(7.77%)	8(8.88%)	1(1.11%)	16(17.77%)
17-18	4(4.44%)	3(3.33%)	7(7.77%)	14(15.55%)
18-19	1(1.11%)	0(0%)	9(10%)	10(11.11%)
19-20	1(1.11%)	0(0%)	11(12.22%)	12(13.33%)
20-21	0(0%)	0(0%)	8(8.88%)	8(8.88%)
Total	38(42.22%)	16(17.77%)	36(40%)	90(100%)
ϰ2-value	78.1019			
p-value	0.000, S, p<0.05			

Table 2: Comparison of age of proximal end of humerus in various regions and races withpresent study

S.N.	Researcher	Region	Age of fusion Male
1)	Paterson (1926)	England	21
2)	Davies and Parson (1927)	England	19-21
3)	Flecker (1932)	Australia	19
4)	Pillai (1936)	Madras	19-20
5)	Galstaun (1937)	Bengal	14-18
6)	Krogman (1960)	USA	20-22
7)	Reddy KSN (1973)	Andhra Pradesh	18-19
8)	Sahana S.N (1986)	Bengal	20
9)	Knight B(1996)	UK	16-23
10)	Saini et al (2005)	Rajasthan	18-19
11)	Agrawal Anil (2006)	Delhi	18
12)	Memon et al (2006-08)	Pakistan	17-18
13)	Cardoso Hugo (2008)	Spain	23
14)	Schaefer M.C.(2008)	Bosnia	20-21
15)	Pimple et al (2013)	Mumbai	18-19
16)	**Present Study**	**Central India**	18-19

completely fused in 1 (1.11%) cases in 16-17years, 7 (7.77%) cases shows complete fusion in 17-18 years and 9 (10%) cases seen in 18-19 years of age group. In 19 (21.1%) cases complete fusion was seen in age group of 19-21 years.

Discussion

It is observed that in the age group of 13-14 years of Males, non-fusion was seen in 8 (8.88%) cases. In the age group of 14-15 years, non-fusion was observed in 10 (11.11%) cases and in 2 (2.22%) cases it shows that, epiphysis being partially fused. In the age group of 15-16 years, 7 (7.77%) cases were non fused and 3 (3.33%) cases were partially fused.

Complete fusion is seen in Age group of 16-17 years, in 1 (1.11%) case. In the age group 17-18 years, it shows that out of total 14 cases, non fusion was observed in 4 (4.44%) cases, partial fusion was observed in 3 (3.33%) cases and in 7 (7.77%) cases, complete fusion was observed in male subjects. It is interesting to note that, the rate of complete fusion is increased in male from age group of 18-19 years and onwards with 9 (10%) cases out of 10 in 18-19 years of age,11 (12.22%) cases out of 12 cases in 19-20 years and 8 (8.88%) cases out of 8 cases in the age group of 20-21 years. Average age of complete fusion of proximal end of Humerus in the male subjects was 18-19 years in present study.

Summary & Conclusion

1. This study was conducted exclusively on the young indigenous population of Central India keeping in mind that very less literature about the age estimation from ossification of shoulder joint is available involving this particular region of India.
2. The ossification at the Shoulder joint in Males is completed in all instances (100%) at the age groups of 17-18 year respectively.
3. By comparing the available literature about ossification of long bones, fusion was delayed one to three years in this study with population of Central India than those parts of Eastern India in the population of Bengal.
4. By comparing the available literature the age of skeletal maturity in males in this region are nearly similar to those in population of Western Maharashtra and Rajasthan.
5. As this study is done in Central India region the application of standards of this study may be considered ideal for application in the region of Central India.
6. Population in Central India is mixed type comprising of various religions and castes, so this study is not applicable to specific caste or religion for estimation of age.
7. Due to changing life style pattern, dietary, climatic, behavioral factors; age of ossification is changing as mentioned in the available literature. So as to evaluate these changes, studies are recommended in every region of India at regular time period for academic and judicial interest.
8. Due to very narrow borderline range of differentiation between various stages of fusion, it is difficult to consider stage of fusion as age indicator.

9. For Radiological study, proper exposure of X-ray, proper positioning while X-ray shooting and proper development of digital X-rays (DX) is necessary.
10. Radiological interpretations are observer dependent so the set standards should be considered under expert guidance to arrive at conclusion in such radiological studies.
11. Along with clinical and dental examination, radiological study plays an important role to arrive at the opinion about the age in medicolegal cases.
12. The opinion about age should always be given in the range. From this study, range of 1-2 years of margin of error can be concluded.
13. For estimation of age relevant joints should be radiologically examined for different centres and opinion should be arrived considering the status of multiple centers.
14. With similar findings we have observed, there is enhancement of belief in the theory that the similarities in geographic-climatic condition, ethnicity, socioeconomic status, dietary habits have the common influence on the fusion of epiphysis with the age.

Limitations of Study

1. Population in Central India is mixed type comprising of various religions and castes so this study is not applicable to specific caste or religion.
2. Dietary, religious, economic, environmental factors are not studied in the present context.
3. As the number of subjects were less, for confirmation of various variations, more studies are required.

References

1. Aggarwal A. Ages of ossification-Personal Identification in Self-Assessment and Review of Forensic Medicine and Toxicology.1sted. Delhi: Jaypee Publishers and Distributers (P) Ltd. 2006; 51-59.
2. Alcazar ML, Alvear J, Muzzo S. Influence of Nutrition on the bone-development in the child. ArchivosLatinoamericanos De Nutrition. 1984; 34 (2): 298-307.
3. Bajaj ID, Bharadwaj OP, Bharadwaj S. Appearance and fusion of important ossification centers - A study in Delhi population. Indian J. Med Res. 1967; 55: 1064–1067.
3. Bargotra RN, Bargotra M and Singh J. The time of fusion of medial epicondyle of Humerus in residents of Jammu And Kashmir State. Paper read at 38th annual conference, 1989 of Anat. Soc. of India. Abstract published in Journal of Anatomical Society of India. 1990; 39: 76.
4. Bokariya P. Effects of dietary habits on epiphyseal fusion. Journal of Ind. Academy of Forensic Med. 2008/2009; 34-37.
5. Camps Francis E. Gradwohl's Legal Medicine 3rd ed. Bristol: John wright and Sons Ltd. 1976; 140-141.
6. Cardoso Hugo FV. Age estimation of adolescent young adult male and female skeletons II, Epiphysial Union at the Upper Limb and scapular Girdle in a modern Portuguese Skeletal sample. American J of Physical Anthropology. 2008; 137: 97-105.
7. Chaurasia BD. Human Anatomy. Regional and applied 2nd edition.1989. CBS Publishers and Distributors. p. 3-11.
8. Davies, DA, Parson FG. The age order of the appearance and union of the normal epiphyses as seen by X-rays. J. Anat. 1927; 62: 58-71.
9. Flecker H. Roentgenographic observations of the times of appearance of epiphysis. J Anat. 1932; 67: 188-164.
10. Flecker H. Anatomical Society of India. 1931 October, Vol.67.
11. Galstaun G. A study of ossification as observed in Indian subject. Ind j Med Res. 1937; 25(1): 267-324.
12. Garn SM, Rohman CG, Bluementhalt. Ossification sequence polymorphism and sexual dimorphism in skeletal development. Am J Physical Anthropology. 1996: 101-115.
13. Gopalan C. Nutritional problems and programs in south East Asia, New Delhi: WHO Regional office for south East Asia.1987.
14. Graham CB. Assessment of bone maturation methods and pitfalls. Radiolclin North America. 1972; 10: 185-202.
15. Haines RW, Mohiuddin A, Okpa FI and Viega-Pires JA. The study of early epiphyseal union in the limb girdles and majot long bones of man. J Anat. 1967; 101(4): 823-831.
16. Hepworth SM. Determination of age in Indians from study of the calcification of the long bones. Ind Med Gaz. 1929; 64: 128.
17. Jit I, Kulkarni M. Time of appearance and fusion of epiphysis at medical end of clavicle. Indian J Med Res. 1976 May; 64(5): 773-82.
18. Knight, Bernard. Age Estimation: In, Forensic Pathology, Edward Arnold, A division of Hodder &Sttoughton London.1996; 109-114- 118.

19. Modi PJ. in chapter Personal Identity in Modi's Medical Jurisprudence and Toxicology, 22nd ed. edited by Mathiharan K and Patnaik AK. New Delhi: Butterworths India. 2005; 263–337.
20. Mehta HS. Age determination-Medical Law and Ethics in India. The Bombay SamacharPvt. Ltd. Mumbai.1963; 335-338 (cited in chapter Personal Identity in Modi's Medical Jurisprudence and Toxicology, 22nd ed. edited by Mathiharan K and Patnaik AK. New Delhi: Butterworths India. 2005; 263–337.
21. Reddy KSN. Identification-Growth in Individual bone, In the Essentials of Forensic Medicine and Toxicology. 29th ed. Hyderabad: K. Suguna Devi. 2009; 64-71.

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Estimation of Stature from Hand Length in Gujarati Population

Dipen M. Dabhi*, Rajendra D. Kharadi, Rahul A.Mehta***, Mahesh M. Trangadia****, Alpesh B Bambhania****, Mehul C. Upadhyay***

Abstract

Background: Identification is the major load in every department of forensic medicine. Stature of an individual is primary data of identification. Identification of an individual from dismembered body parts will help in solving crime as well as in various mass disasters like earth quake, floods and bomb explosion. *Objective*: In this study an attempt is made to estimate stature from hand length. *Study Design*: This is cross sectional descriptive study. *Material and Method*: Stature and Hand length are taken from 100 randomly selected students of M. P. Shah Medical College Jamnagar, out of them 50 were male and 50 were female. They aged between 18-26 years. *Result*: Correlation coefficient and simple linear regression equations are derived to estimate stature from hand length. Hand length in both the sexes exhibit strong and statistically significant relationship.

Keywords: Identification; Stature; Hand Length.

Introduction

Identification is the main objective in every forensic investigation. Age, sex and stature are known as primary data of identification. Stature of an individual is inherent characteristics. Adult height is commonly attained during teens to twenty. There is an established relationship between stature and various body parts like head, trunk, upper and lower extremities. In cases of mass disasters, accidents and at crime scenes we often finds dismembered body parts. Positive identification from such dismembered body parts is a prime challenge. Estimation of stature from such parts will help in narrowing down the list of possible matching persons.

As there is difference in genetic and environmental factors like nutrition, habitat, climate and life style, body proportion of one population varies from other, so different regression equations are needs to be derived for different populations. In this study an attempt is made to statistically analyse the hand measurements and derive regression equations to calculate stature in Gujarati population.

Authors Affiliation: *Tutor, ** Resident Doctor, ***Associate Professor ****Assistant Professor, Department of Forensic Medicine, M. P. Shah Medical College, Jamnagar, Gujarat.

Reprints Requests: Dipen M. Dabhi, Tutor, Department of Forensic Medicine, M. P. Shah Medical College, Jamnagar, Gujarat - 361008.
E-mail:itsdipendabhi@gmail.com

Material and Methods

(A) Subject

Study sample consists of 100 medical students (Males=50, Females=50), ageing more than 18 years of M. P. Shah Medical college, Jamnagar as subjects. Necessary permission from institutional ethical committee was taken. Subjects were fully explained regarding study design and their voluntariness in participation of study. Only healthy subjects without any disease or deformity that affects stature or Hand length participated in the study.

(B) Stature

Stature was measured by stadiometer. Subjects were asked to stand barefooted on platform of stadiometer. Each subjects were asked to stand erect with head in horizontal frank fort plane. Heels of both the foots should be in approximation with each other and head, scapula, back, buttocks and heels should touch the back of the board. Horizontal sliding bar was lowered and stature was recorded in cms to nearest mm.

(C) Hand Length

Hand length is defined as distance between midpoint of distal transverse wrist crease to the most anterior part of middle finger. Hand length was taken from each hand using sliding vernier calliper. Hand length was taken when hand was placed in supine position on flat horizontal surface with thumb abducted and all fingers were adducted and extended. Hand length is measured in cms to nearest mms.

(D) Statistical Analysis

Statistical analysis was performed on measured data using statistical programme for social sciences. Descriptive statistics for both sexes were calculated. Correlation coefficient and Simple linear regression equations between stature and hand length were derived to estimate stature from hand length in both the sexes. Accuracy of each regression equation is determined by SEE (standard error of estimate).

Result

Descriptive statistics of age, stature and hand lengths of both the sexes are shown in Table-1. On comparison, stature and hand length showed statistically significant relationship. Mean height of male was found to be 170.26±6.38 cms and for female 159.36±6.11 cms. All measurements are higher on right side than on left side which may be due to dominant right handed subjects in the study group. Correlation coefficient indicating the strength of association between both the variables was calculated in both the sexes for both hand lengths as shown in Table 2. Correlation coefficient to estimate stature from hand length in both the sexes was found stronger with RHL(Right hand length) >LHL(Left hand length) i.e in male (r=0.683>0.583); in female (r=0.610>0.534). Correlation to estimate stature from hand lengths in both the sexes from both the sides are statistically significant as p-value is <0.001. Simple linear regression equations to estimate stature from hand measurements were derived as shown in Table 3. Separate regression equations were derived so that stature can be calculated if any right or left hand length is present. From derived equations stature in male can be calculated with an accuracy of ±4.98 cms from RHL and ±5.36 cms from LHL, in females it can be calculated with accuracy of ±3.471 cms from RHL and ±4.321 cms from LHL. When mean hand length is used there is no significant difference in actual stature and stature estimated using derived equations (Table 4). At both upper and lower limits actual values of stature differs from calculated values but they were with in limits of SEE (Standard error of estimate).

Discussion

Stature is an inherent characteristic of an individual. It is affected by genetic and environmental factors, so it is necessary to have different equations for estimation of stature in different races. In this study we have found significant correlation between stature and hand lengths in both sexes. Correlation coefficient and regression equations were derived. We have found similar findings in various studies carried out on different races at state, national and international levels, findings of which are tabulated below.

Table 1(A): Descriptive statistics for stature and hand measurements in male

Variables	Minimum	Maximum	Mean	Standard Deviation
Age (yrs)	19	26	22.52	2.2
Stature (cms)	149.72	186.15	170.26	6.38
Right hand length (cms)	14.68	21.58	18.48	1.304
Left hand length (cms)	14261.00	21.04	18.24	1.261

Table 1(B): Descriptive statistics for stature and hand measurements in Females

Variable	Male		Female	
	PCC	P-value	PCC	P-value
RHL	0.680*	<0.001	0.610*	<0.001
LHL	0.583*	<0.001	0.534*	<0.001

*Indicates significant at p-value of 0.001

Table 2: Pearson's correlation coefficient and p-values for estimation of stature from Anthropometric measurement

Variable	Male		Female	
	Linear Regression Equation	SEE	Linear Regression Equation	SEE
RHL	S=110.27+3.2429 x RHL	4.98	S=85.94+4.021 x RHL	3.471
LHL	S=107.477+3.44 x LHL	5.36	S=83.56+4.25 x LHL	4.312

Table 3: Linear regression equations to derive stature from Anthropometric measurements

Variable from which stature is estimated.	Minimum	Maximum	Mean
RHL	157.87	181.48	170.19
LHL	155.04	177.67	169.62
Actual stature	149.72	186.15	170.20

Table 4(A): Comparison of actual stature and stature estimated from hand measurements in males

Variable from which stature is estimated.	Minimum	Maximum	Mean
RHL	142.55	169.94	156.39
LHL	138.75	168.40	156.40
Actual stature	136.00	170.18	156.39

Table 4(B): Comparison of actual stature and stature estimated from hand measurements in Females

Variable from which stature is estimated.	Minimum	Maximum	Mean
RHL	142.55	169.94	156.39
LHL	138.75	168.40	156.40
Actual stature	136.00	170.18	156.39

Table 5: Comparison of results of present study with results of other studies carried out at state, national and international level on different races

Sr. No	Author, Year, Population, Area, Age Group	Sex	Sample size	Regression Equation	SEE	PCC
01	Present study; 2016 Gujarati; Jamnagar; 18-26 years	M	50	S=110.27+3.24xRHL	4.98	0.680
				S=107.47+3.44xLHL	5.36	0.583
		F	50	S=85.94+4.012xRHL	3.47	0.610
				S=83.56+4.25xLHL	4.31	0.534
02	Patel SV, Jethva N;2013; Gujarati;Bhavnagar;18-25 years	M	258	S=76.737+4.917xRHL		0.741
				S=74.797+5.004xLHL		0.762
		F	252	S=72.763+4.865xRHL		0.701
				S=75.030+4.721xLHL		0.678
03	Patel JP, Patel BG; Gujarati; Ahmedabad;18-22 years	M	72	S=125.15+2.69xRHL		0.510
				S=125.67+2.67xLHL		0.504
		F	78	S=110.64+2.95xRHL		0.540
				S=110.69+2.95xLHL		0.542
04	Dr. Sunil[3] 2005,North Indian Students, Delhi 18-22 yrs	M	75	S=86.93+4.25xRHL	4.35	0.7
				S=85.84+4.32xLHL	4.26	0.6
		F	75	S=77.42+4.56xRHL	4.57	0.7
				S=80.94+4.40xLHL	4.63	0.7
05	Jasuja OP[4] 2004,Jat Sikhs, Punjab,18-60 yrs	M	30	S=69.513+5.223xRHL	4.003	0.502
				S=84.742+4.491xLHL		0.452
		F	30	S=130.954+1.612XRHL	5.127	0.529
				S=130.035+1.660xLHL		0.557
06	Pandey N, Ujwal NS[5];2015;Medical students;Mumbai;18-23 years	M	100	S=134.240+1.1996xRHL	4.78	0.383
				S=134.926+1.1954xLHL	5.01	0.367
		F	100	S=94.857+3.681xRHL	5.29	0.573
				S=98.945+3.415xLHL	5.48	0.533
07	IlayPeruma[6], 2009 Medical students, Galle, Sri lanka, 20-23 yrs	M	140	S=103.732+3.493xHL	5.22	0.58
		F	118	S=93.689+3.625xHL	5.75	0.59
08	Adel Kamel[7], Abdel-Malek;1990; Egyptians,Assiut,Upper Egypt	C	T=166	S=34.5+5.77xHL+2.7xHB	5.10	

Conclusion

This study will add in the pool of database to calculate stature from hand length in Gujarati population. There is strong correlation between stature and hand length. Regression equations were derived to estimate stature from Hand length. Similar findings were observed by other authors.

This study will help in medicolegal investigation and to the scientists of various specialities.

Abbreviations

S= Stature,

RHL= Right hand length,

LHL= Left hand length,

M= Male,

F=Female,

C= Common for male and female,

SEE= Standard error of estimate,

PCC= Pearson's correlation coefficient.

References

1. Jethva N, Patel S.V, Patel S.M, Vora R, Parmar G; Estimation of stature from hand length in living subjects of Gujarat region; NJIRM. 2013; (4): 57-60.
2. Patel J.P, Patel B.G, Shah R.K, Bhojak N.R, Desai J.N; Estimation of stature from hand length in Gujarat region; NHL Journal of Medical Science. 2014; 3(1): 41-44.
3. Sunil, DikshitP.C. Aggrawal Anil, Estimation of stature from hand length; JIAFM. 2005; (4): 219-221.
4. Jasuja O.P. and Singh G.; Estimation of Stature from Hand and Phalange Length; JIAFM. 2004; 26(3): 100-106.
5. Pandey N, Ujwal N.S, Estimation of stature from dimensions of hands in medical students; IJSS. 2015; (3): 35-38.
6. Isurani Ilayperuma, Gananda Nanayakkara, Nadeeka Palahepitiya; Prediction of personal stature based on the hand length; GalleMedical Journal. 2009; (1): 15-18.
7. Adel Kamel Abdel-Malek, Afaf Mohamed Ahmed, Sawsan Abd El Aziz El Sharkawi, Nahed Abd El Maksoud Abd El Hamid. Prediction of stature from hand measurements. Forensic Science International 1990 July; 46(3): 181-87.

Original Article

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A Study on the Establishment of Poison Control Centre: A Need for the Region of Warangal

T. Krupal Singh*, Lavanya Kowsil G., Jakkam Surendar*****

Abstract

Background: Poison information centers are those, which provide immediate round the clock toxicity assessment and treatment recommendations for the effective management of poisoning cases. *Objectives*: The objectives of study to evaluate the needs of poison control center and Analytical services in this area. *Material and Methods*: Data was collected by Self- Administered structured questionnaire,Individual interviews, and group discussions in the department. The received data was analyzed according to establish the poison control center in the region. *Results*: A total 683 cases of Poisoning were intentional and 233 cases were unintentional in 2008 and 2009. Out total 916 cases only 450 cases admitted in the hospital. Out of that only 225 cases were diagnosed by using different methods, about 43% cases were diagnosed by history, 32% by clinical symptoms, 16% by detailed physical examination and 9% by laboratory investigation. Remaining 225 case faced problem in diagnosis due to various reasons like in 62% case it is dueto lack of analytical facilities, 21% cases due to no definite group of symptoms and 17% cases due to signs and symptoms mimic with some diseases. Conclusion: The management of poisoning cases requires cooperation between analytical toxicology laboratory services and the physicians (clinical toxicology) dealing with the poisoning cases.

Keywords: Poisoning; Poison Control Centers; Analytical Services; Antidotes.

Introduction

The massive expansion in the availability and use of chemicals, including pharmaceuticals, during the past few decades has led to increasing awareness - on the part not only of the medical profession but also the public and various authorities – of the risks to human health posed by exposure to those chemicals. Moreover, each country has a variety of natural toxins to which its population may be exposed.

Every individual is exposed to toxic chemicals, usually in minute, sub-toxic doses, through environmental and food contamination. In some instances, people may be subjected to massive, or even fatal, exposure through a chemical disaster or in a single accidental or intentional poisoning. Between these two extremes, there exists a wide range of intensity of exposure, which may result in various acute and chronic toxic effects.

Poisoning that involves individual eg. Suicidal, Homicidal , Iatrogenic accidental has certainly the greatest medico-legal significance. Poisoning is a medical emergency and the cases are quickly Rushed to the nearest available hospital. Most of these cases are suicidal or accidental in nature but rarely homicidal. The role of *Forensic Toxicology* is the detection, identification and measurement for poisons in human biological material [1].

It has been estimated that some form of poison directly or indirectly is responsible for more than 1 million illnesses worldwide annually, and this figure could be just the tip of the iceberg since most cases of poisoning actually go unreported , especially in third world countries. The problem is getting worse with time as newer drugs and chemicals are developed in vast numbers. The commonest agents causing

Authors Affiliation: *Associate Professor, Department of Forensic Medicine, Kakatiya Medical College, Warangal, Telangana-506007. **Department of Forensic Medicine, Gandhi Medical College, Secunderabad, Telangana. ***Assistant Professor, Department of Forensic Medicine, ESIC Medical College, Hyderabad,Telangana.

Reprints Requests: Jakkam Surendar, Assistant Professor, Department of Forensic Medicine, ESIC Medical College, Hyderabad, Telangana 500038.
E-mail**:** surenderjakkam@gmail.com

poisoning in India appear to be pesticides (organophosphates, carbamates, chlorinated hydrocarbons, and pyrethroids), sedative drugs, chemicals (corrosive acids and copper sulphate), alcohol, plant toxins (datura, oleander, strychnos, and gastro- intestinal irritants such as castor, croton, calotropis, etc),and household poisons (mostly cleaning agents) [2,3]. Of late aluminium phosphide has begun to emerge as a major player in the toxicological field , particularly in some northern Indian states [4,5]. Acute pesticide poisoning is now an important cause of morbidity and mortality worldwide (Jeyaratnam 1990). In 2006, the World Health Organization (WHO), estimated the global pesticide poisoning at 3 million cases [7] with 220,000 deaths occurring annually .about 99% of these deaths occur in developing countries. More recent studies suggests that the number of deaths may actually be around 300,000 [6]. The incidence of poisoning in India is among the highest in the world and it is estimated that more than 50,000 people die every year from toxic exposure [7]. Underreporting and misclassifi-cation are extremely common and actual numbers could be much higher. Acute poisoning, a common pediatric emergency is one of the important cause of morbidity and mortality in children specially in developing countries. Among the children the common culprits include kerosene, household chemicals, drugs, agricultural pesticides, industrial chemicals garden plants, bites and stings, miscellaneous products [8,9]. The main causes of pediatric poisoning are negligence and ignorance, many deaths and disabling sequelae could very easily be prevented if more attention were given to implementing preventing measures at home.

Snake-Bite is an important and serious medico-legal problemin many parts of the world specially in South Asian Countries. It has been estimated that 5 million snake-bite cases occur world wide every year, causing about 100000 [10] deaths. On an average, nearly 200000 persons fall prey to snake - bite per year in India and 35000-50000 of them die every year [11]. But the data on morbidity and mortality of snake-bite are unreliable due to improper reporting system The snakes most commonly associated with human Mortality in India are Cobra (NAJA najanaja),Krait (BungurusCaeruleus), Russels Viper (ViperaRusseli),and Saw Scaled Viper (Echis Carinitus) [12]. Snake-bite cases are observed in almost all age groups , the majority in males aged 21-50 years, while the male to female ratio being 3:1. A study reported an incidence of 7 to 15% in children less than 10 years [13]. So, there is a need in the existing knowledge regarding the deleterious effects of toxicants and their preventive or therapeutic measures.

Objectives of the Study

The objectives of poison control center varies widely from patientOriented emergency care to preventive care in the society, *24X7* hours poison information services Analytical services – To Provide immediate expert treatment & management advise about household products, pesticides, food poisoning, medicines, plants, bites and stings etc. and Provide training and education sessions to health care professionals, community, and institutions.

Material and Methods

This study was done in 2008 and 2009. The central objective of the study is to elicit the opinion on the need to establish a poison control centre in the region.

Two Main Samples are Selected Namely

Health care professionals (public and private)

Health care consumers (general population including students)

The Sample Size in this Study Included

Teaching hospitals – 3, Nursing homes – 24, Other government hospitals – 7,Government and private practitioners – 225,General population including students – 100

The present study was an explanatory study combining elements of qualitative & quantitative research, which tries to assess the need of establishing a poison control center in the region.

Data was collected by Self- Administered structured questionnaireIndividual interviews. Group discussions in the department. The received data was analyzed according to establish the poison control center in the region.

Results

Reason for Exposure to Poison

Intentional exposure occurred on 683 cases in 2008 and 2009. In this suicidal cases were 532.74(78%), drug abuse cases were 54.64 (8%), misuse cases were 54.64 (8%), unknown cases were 40.98(6%).unintentional cases were 233, out of 43% cases were due to snake bite /scorpion sting, 21% people these were effected by poisoning in the agriculture fields,19% due to contaminated food/

drink, 9% were due to over use of medicine, 6% due to occupational exposure, and 2% people suffered by therapeutic drug use.

Total 916 persons suffered with poisoning in 2008 and 2009, among these males 531.28 in majority(58%) and females were 384.72 (42%).233.64(44%) adult male were suffered with pesticides, 106.2 (20%) were due to unknown poisoning, 95.58 (18%) were due to house hold cleaning substances,42.48 (8%) due to prescribed drugs, 26.55(5%) due to alcohol and 26.55(5%) due to food poisoning.184.8(48%) adult female were suffered with pesticides, 53.9 (14%) were due to unknown poisoning, 69.3 (18%) were due to house hold cleaning substances, 23.1(6%) due to prescribed drugs, 34.65(9%) due to alcohol and 19.25(5%) due to food poisoning. Total 129 children with an average of 4 to 9 years suffered with poisoning in 2008 and 2009.39.99(31%) children were suffered with kerosene, 29.67(23%) were due to drugs/medicine, 28.38 (22%) were due to house hold cleaning substances,14.19 (11%) due to pesticides, 9.03(7%) due to cosmetics and 7.74(6%) due to poisonous plants and seeds. The main reason attributed in this age group was their innovative and exploratory nature and mouthing tendencies [14-15].

In years of 2008 and 2009, total 450 cases admitted in the hospital in this 225 case diagnosed by various methods, 43% cases were diagnosed by history, 32% by clinical symptoms, 16% by detailed physical examination. 9%by laboratory investigation. And in remaining 225 case faced problem in diagnosis, in 62% case it is due to lack of analytical facilities in the living, in 21% cases it is due to no definite group of symptoms and in 17% case it is due to signs and symptoms some disease mimic the poisoning.

Total postmortems conducted in kakatiya medical college Warangal mortuary in 2008 were 1666 in this 509 were due to poisoning. Males were 300.31(59%) and female were 208.68(41%) and in 2009 were 1560 in this 494 were due to poisoning. Males were 281.58(57%) and female were 212.42(43%)

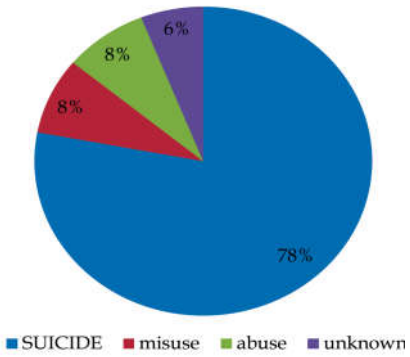

Fig. 1: Intentional Exposure-Year-2008 and 2009

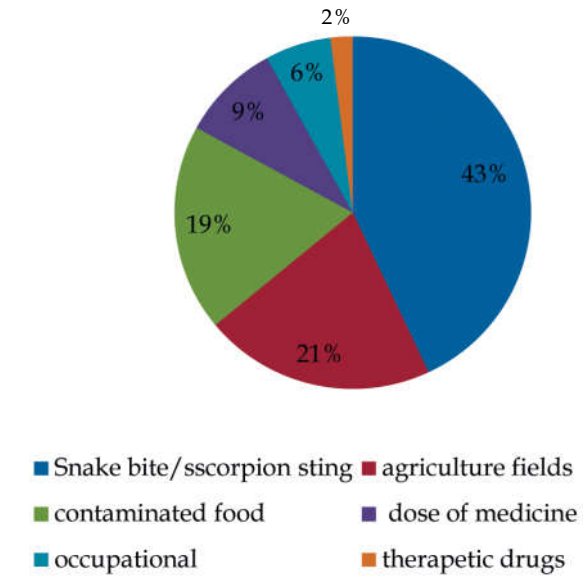

Fig. 2: Un Intentional Exposure-Year-2008 and 2009

Discussions

The aim of this discussion is to draw valid conclusions from the research findings.

The practice of establishing poison control centers is yet to catch on in a big way in India. On one hand, lack of adequate importance is given to the establishment of clinical toxicological analysis services. On the other hand, there is no clear-cut policy by the government despite the report [26] of UNCED (United Nations Conference On Environment And Development) for establishment of poison centers. Prevention and control of poisoning could be made more effectivethrough a number of appropriate actions by National and local authorities. The main drawback in the current scenario prevailing in the country dealing with poison cases in terms of treatment and prevention is the lack of trained dedicated staff required to treat the cases of poisoning. Hence, the morbidity and mortality from poisoning in the country is one of the highest in the world.

The human resources for a poison control centre consist of medical, paramedical personnel and non-medical staff responsible to perform the duties of the centre on a 24 – hours – a - day, 7 – days – a – week basis. The study has found that in the event of poisoning they rush to the nearest or available medical facility, which in most cases lacks the basics to handle such cases.Both the government and the private sectors are on the same footing. Hence, the high incidence of morbidity and mortality in the region. The financial burden on the families of the

victim is much higher as the poisoned person is rushed to the emergency ward / ICU's and exposed to all the paraphernalia of the ICU. Increased poison control centre exposure calls have been associated with reduced emergency department use for unintentional poisoning and appeared to reduce net medical expenditure [16]. Significant data exists that clearly shows that for each dollar invested in the operation of a poison control centre and other poison prevention programs, the return in terms of decreased emergency room visits and other associated health care costs is accentuated many times over.

The above findings strongly favor the establishment of poison control centre in the region.

Conclusion

The present study clearly demonstrated the need to establish a poison control center in the region. The management of poisoning cases requires cooperation between analytical toxicology laboratory services and the physicians (clinical toxicology) dealing with the poisoning cases.

As the outcome of the findings in the earlier chapter revealed the cost of management in terms of treatment of a poisoned patient is high, so also the morbidity and mortality. Thus, the service provided by the Poison information Centre offers considerable direct health benefits by reducing morbidity and mortality from poisoning and enabling the community to make significant savings in health care cost.

Recommendations

Establishing properly equipped and staffed poison control centers would constitute a major step in ameliorating the situation.

Proposed Solution

The data obtained in this study and the retrospective study data strongly recommend the Establishment of Poison Control Centre in the region.

1. The objectives of the poison control centre would vary widely from *patientoriented emergency care to preventive care* in the society.
2. Implementation of the Poison Control Centre Enhancement and Awareness Law will further the ability of poison centers to improve the care of poisoned patients and reach the overall goal of reducing illness, injury and death due to poisoning.
3. A typical regional poison centre should ideally be located within or closely associated with a hospital. Location within a hospital has the advantage of providing ready access to a network of medical disciplines that will support and enhance the work of the centre.
4. A regional poison centre serves the population of approximately 4 million people, and handles about 35000 human exposure cases every year.
5. The poison centre should utilize the software package.TOXINZ from new Zealand which has information on thousands ofpoisonous substances encountered worldwide.
6. Access to INTOX and CHEMINFO of the WHO.
7. These packages enable the centre to answer any query on poisons or poisonings in a matter of seconds via email or phone or fax. Both health care providers and public can contact the poison control centre for any queries (free of charge) relating to poisons, poisoning (acute or chronic) drug overdose, drug adverse effects, drug abuse and food poisoning.
8. The poison centre should function round the clock i.e. 24x7 hours, 7 days a week, 365 days a year.
9. The poison centreprovides the following services. the poison control centre should have contact with other poison centers, both nationally and internationally. This helps in exchange of case data and kniwledge.
10. A poison information centre needs a multi-disciplinty team. The team may include physicians,psychiatrist, nurses, analysts, pharmacists and others.specific areas should be there to keep all basic and advanced instuments like UV and Visible spectroscopy, Fourier transform infrared spectroscope (FTIR), High Performance Thin Layer Chromatography (HPTLC), Gas Liquid Chromatography (GLC), High Performance Liquid Chromatography (HPLC) Gas Chromatography–Mass Spectroscopy (GC–MS), Liquid Chromatography – Mass Spectroscopy (LC-MS), Flame Ionization Atomic Absorption Spectrometry, Inductive Coupled Plasma Source Spectrometry.
11. The regional poison centre should also take the responsibility of education in the following way.Books, journals, and other published literature are indispensable for the work of a poison information centre.
12. Poison information centers should be officially recognized by government authorities.

13. They should have independent status, stability and neutrality to enable them to carry out their functions effectively.
14. The legal status of a centre should enable it to maintain confidentiality of the data it handles.
15. The main source of financial support is a government responsibility. Other sources of funding may be acceptable if they are available and if the autonomy of the centre is guaranteed.

Having such facilities available at least on a regional level that can be shared by several hospitals of that region could go a long way in bringing down the high mortality in poison cases by better access to latest information on diagnosis and management.

References

1. Oliver SS, Forensic Toxicology, Forensic Medicine for Lawyers byJK Mason. 2nd edition ELBS publication. 1988; 276 –84.
2. Batra AK, Keoliya AN, Jadhav GU – Poisoning an unnatural cause of morbidity and mortality in rural India. J Assoc Physicians India. 2003; 51: 955-9.
3. Siwach SB, Gupta A – The profile of acute poisonings in Haryana – Rohtak study. J Assoc Physicians India. 1995: 43: 756-9.
4. Siwach SB – Recent trends in the management of acute aluminium phosphide poisoning. Postgrad Med. 1997; 11: 411-3.
5. Multani AS, Bal BS, Singh SP , Singh TP , Surinder S, Shivcharan – Spectrum of acute poisoning in medical emergencies – a prospective study [Abstr]. J Assoc Physicians India. 2003; 51: 1199–200.
6. Buckleyet al 2004; Gunnel &Eddleston 2003.
7. Aggarwal P, Handa R, Wali JP - Common poisonings in India.J Forensic Med Toxicol. 1998; 15: 73-9.
8. Vaswani V, Patil VD – spectrum of childhood poisoning; a Belgaum experience. J Forensic Med Toxicol. 1998; 15: 50-2
9. Singh LR, Momonchand A, Singh PI – Pattern of accidental poisoning in children. J Indian Acad Forensic Med. 2001; 23: 69-71.
10. Mathew JL, Gera t. Ophitoxaemia (venomous snake bite).
11. David AW. Guidelines for the clinical management of snake bites in the SE Asia, New Delhi. 2005; 1-62
12. WhiHaker R. Common Indian snakes. A field guide. New delhi .McMillan India limited. 2001.
13. Paul VK, Chawla D, V Jatana V. Animal and insect bites. 4thed. In Singh M. editor, Medical emergencies in children. New Delhi: sagar publications. 2007; 624-83.
14. Kamanyre R, Karalliedde L. oraganophosphates toxicity and occupational exposure, occupational medicine. 2004: 54: 69-75.
15. AtkinJ.ln : Lesinjer Km (ed). Safe and effective use of crop protection products in developing countries walling fork, UK: GABI Publishing. 2002.
16. Edward Z, Ted M; paul J, Toby L; Jeffrey C, Elandrian S, Monique's; the impact of poison control centers on poison related insits to ED's- united states, 2003; American journal of emergency medicine. 2008; 26(3): 310-315.

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Pattern of Injury among Motorized Two Wheeler Road Traffic Accidents: An Autopsy Based Study

Perugu Vanishri*, Nishat Ahmed Sheikh**

Abstract

Background: Deaths due to road traffic accidents are one of the common forms of unnatural death and its history is as old as the invention of the wheel. Two wheeler riders are more vulnerable to sustain injuries as the external shell of the vehicle is absent to protect them as compared to light motor and heavy motor vehicles. Lost balance during two wheeler accidents further increases the risk of injury. *Study Design:* It's a cross sectional Prospective study. *Place of Study:* At Mortuary of Department of Forensic Medicine, Gandhi Medical College Secunderabad. *Material and Method:* The present study was done in mortuary of Department of Forensic Medicine, Gandhi Medical College Secunderabad. The collected data was entered in Microsoft Excel. Coding of the variables was done. SPSS version 11.5 was used for analysis. *Observation and Discussion:* Deaths due to accidents which were subjected to post mortem examination at Gandhi Medical College, Secunderabad are 1710 over a period of year. Among them deaths due to two wheeler accidents were 576 (33.68%). Males deaths are more and they accounted to 515 (89.41%) and females 61 (10.59%). 287 males (49.83%) and 4 females (0.69%) were riding the vehicle, male to female ratio is 8.44: 1. Deaths in the age group of 21 to 30 years tolled as many as 164 lives (28.47%). Late night accidents (i.e. from 9 pm to 3 am) are commonly seen in the present study, 129 persons (22.40%) died on the spot, and another 124 person (21.53%) could survive up to more than 6 hours, but died within 24 hours of the accident. Maximum number of two wheeler accidents during late evening is because the traffic density is high during this time and is coupled with the poor infrastructure and fall in traffic discipline. *Conclusion:* A total of 576 victims of two-wheeler road traffic accident in this part of world were studied. The study highlights the need of compulsory implementation of helmet wearing for motorcyclist and necessitates the need for taking urgent steps for establishing ambulance services and provision of pre-hospital care & trauma services to reduce mortality and morbidity.

Keywords: Road Traffic Accidents; Motorcyclist; Autopsy; Injury.

Introduction

Birth and death are two extremes of the life and death is the ultimate truth. But unnatural death is known for its immense striking power and is always a surprise. Deaths due to road traffic accidents are one of the common forms of unnatural death and its history is as old as the invention of the wheel [1]. Road traffic accident (RTA) is one of the major preventable public health problems and is on the rise which can be attributed to increase in the number of vehicles, lifestyle changes and risky attitudes.

Accidents occur not only due to ignorance but also due to carelessness, thoughtlessness and over confidence. Human, vehicular and environmental factors play role before, during and after a Road Traffic Accidents [2]. As per World Health Organization, "accident" means an event, independent of human will, caused by an outside force acting suddenly leading to bodily or mental injury. Roads and vehicles which are for making life comfortable and faster, can result in miserable life when one meet a road traffic accident. The problem is so severe that, by 2020, it is projected that road

Authors Affiliation: *Assistant Professor, Dept. of Forensic Medicine, Gandhi Medical College Secunderabad. **Professor, Dept. of Forensic Medicine, People's College of Medical Sciences and Research Center, Bhopal.

Reprints Requests: Nishat Ahmed Sheikh, Professor, Dept. of Forensic Medicine, People's College of Medical sciences & Research Centre, People's University, Bhanpur, Bhopal, Madhya Pradesh 462037 India.
E-mail: drnishatsheikh@gmail.com

traffic disability-adjusted life years (DALYs) lost will move from being the 9th leading cause of disability-adjusted life years lost to the 3rd leading cause in the world and will be 2nd leading cause in developing countries [3].

Motor cyclists are about 25 times more risk than passenger car occupants to die because of road traffic accidents. About more than 25% of the global traffic accidental deaths occur in South East Asia region [4]. Two wheeler riders are more vulnerable to sustain injuries as the external shell of the vehicle is absent to protect them as compared to light motor and heavy motor vehicles. Lost balance during two wheeler accidents further increases the risk of injury [5,6].

The problem of Road Traffic Accidents is compounded by the fact that, the age groups primarily involved in Road Traffic Accidents belong to the most productive age group of 15-40 years. Developing countries, such as India face the double burden of already existent communicable diseases and increasing burden of non-communicable diseases including Road Traffic Accidents. Understanding a problem is one of the first steps towards averting the problem. Present study on fatal Two wheel road traffic accidents has been undertaken to analyze this most important yet the most neglected aspect of human sufferings. It is an effort to elucidate the multi-factorial causations leading to the rise in everyday fatal two wheel road traffic injuries.

Aims and Objectives

To study the pattern of injuries in a victim of road traffic accident, who died of two wheeler accident, the factors which hampered the protection of helmet and caused the death and enlist the factors which are responsible for causation of accident and death in twin cities.

Material and Method

The present study was made on those dead bodies which were subjected to Post-mortem examinations in the mortuary of Department of Forensic Medicine, Gandhi Medical College, Secunderabad, from November 2008 to October 2009. A detailed Proforma for the purpose of recording socio-demographic profile of victims, epidemiological data, pattern and severity of injuries sustained, cranial trauma and other relevant data etc was prepared for the purpose of filling observations of the present study. Accidental details obtained the medico-legal records, police inquest, statements from witnesses/relatives and injury record from the examining doctor and the experts dealing with the injury. 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, proportions, bar and line diagrams. Sufficient permissions and consents were procured and clearance from the Institutional Ethical committee was obtained in advance.

Inclusion Criteria

The dead bodies with a history of death due to accident from a two wheeler, both riders and pillion riders died in the two wheeler accidents, all age groups from both sexes were selected for this study, and deaths which occurred without treatment or after the treatment for injuries were also selected

Exclusion Criteria

Deaths occurring from accidents by other vehicles were excluded from the study.

Observations and Discussion

Man invented wheels accidentally and ever since then he has been doing accidents. This man made hazard is becoming a pandemic in spite of improvement in the safety rules, quality of the vehicles, conditions of the road etc. The catastrophic outcome of this hazard has not spared people of any age group or any geographical region whether rural or urban. As per Figure 1, Total numbers of deaths due to accidents which were subjected to post mortem examination at Gandhi Medical College, Secunderabad are 1710 over a period of year. Among them deaths due to two wheeler accidents are 576 (33.68%).

As per Figure 2, there is not much seasonal variation of accidents during the calendar year. However accidents are less in number in the months of April, July, October and November in comparison with rest of the months.

Males deaths are more and they accounted to 515 (89.41%) and females 61 (10.59%). The male to female ratio is 8.44 : 1. Male preponderance almost in consistence with the study reported [7,8].

Deaths in the age group of 21 to 30 years tolled as many as 164 lives (28.47%); in the age group of 31 to 40 years 122 (21.18%) deaths occurred. Next age

group is 11 to 20 years in which 94 deaths (16.32%) occurred; in the age group of 41 to 50 years 83 deaths (14.41%) occurred. If we look at the graph the peak is rising towards 21 to 30 years age group both in males and females and falling afterwards. This is in accordance with the studies done, reports that age group between 20-30 years, were commonest, observed that age group of 0-9 years were more

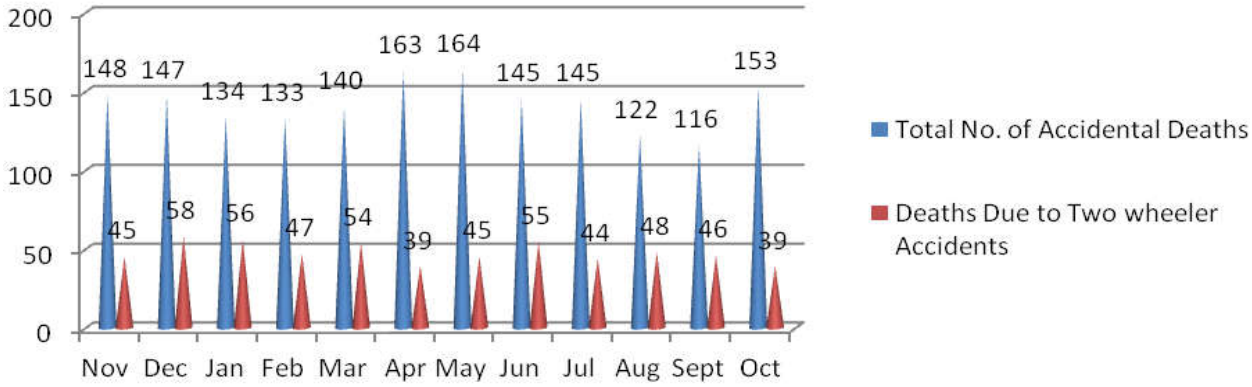

Fig. 1: Comparison of total no. of accidental deaths of the two wheeler accidental deaths

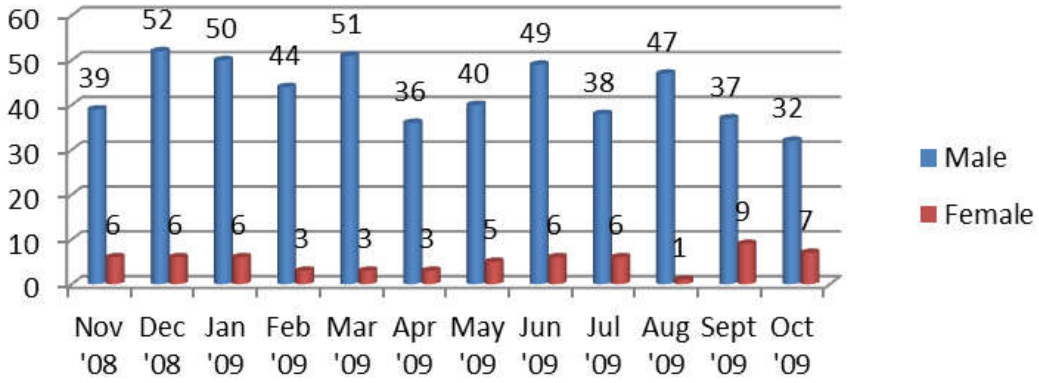

Fig. 2: Monthly distribution of Two wheeler accidental deaths

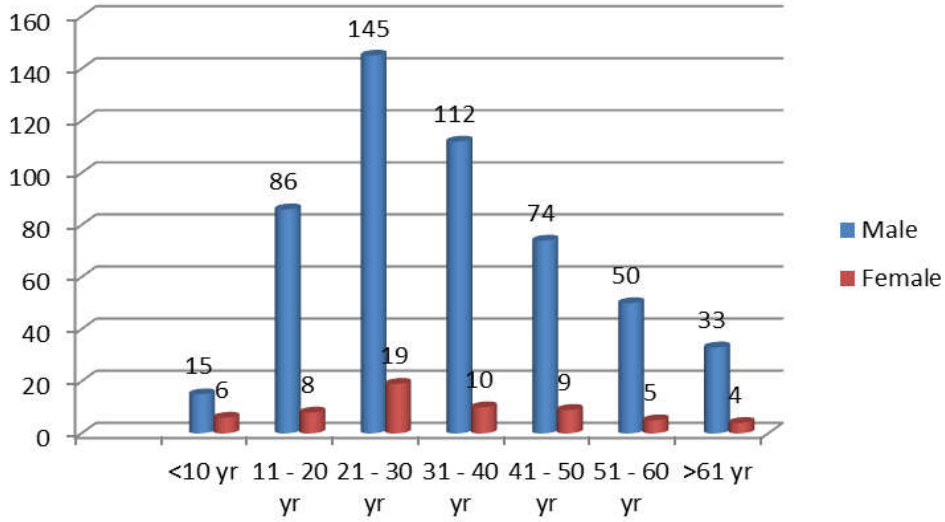

Fig. 3: Age and Sex distribution of the Victims

commonly involved. It does not agree with the study done by Agarwal and Agarwal[9].

As per Fig No 4, among both sexes, urban males are 56.5%; Sub-urban males are 28.35% and rural males are 15.15%. Similarly among females urban

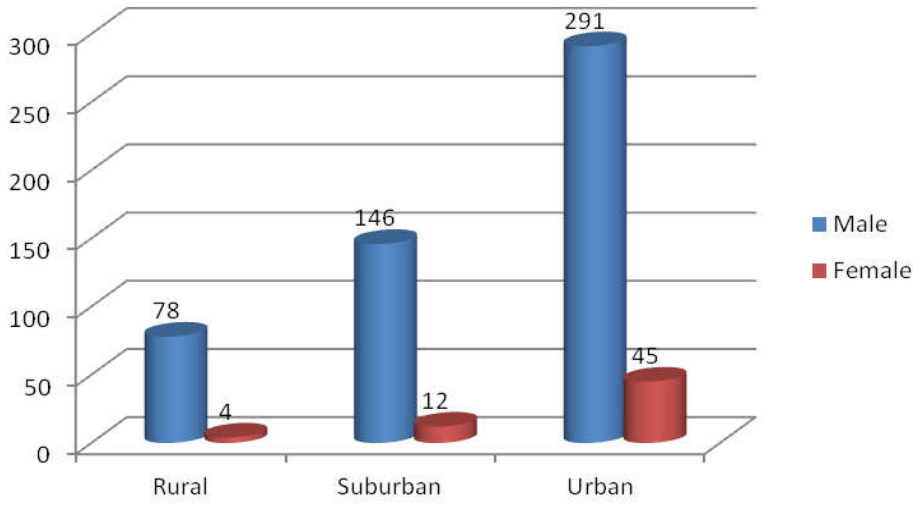

Fig. 4: Habitat of the victim

people are 73.77%, sub-urban people are 19.67%, rural females are 6.56%. This is due to the increase in the urban and suburban population due to rapid urbanization.

It is found that people from middle socio economic status are involved in more number from both sexes i.e. 293 (286+13) which amounts to 51.91%. People from high socio economic strata which amounts to 7.99%. 29 were from low socio economic status which accounted to 5.03%. In 202 cases the information about their socio economic status is not available.

Socioeconomic status is well known to be a risk factor for injury generally, and road traffic injury is no exception as exemplified above. Studies have

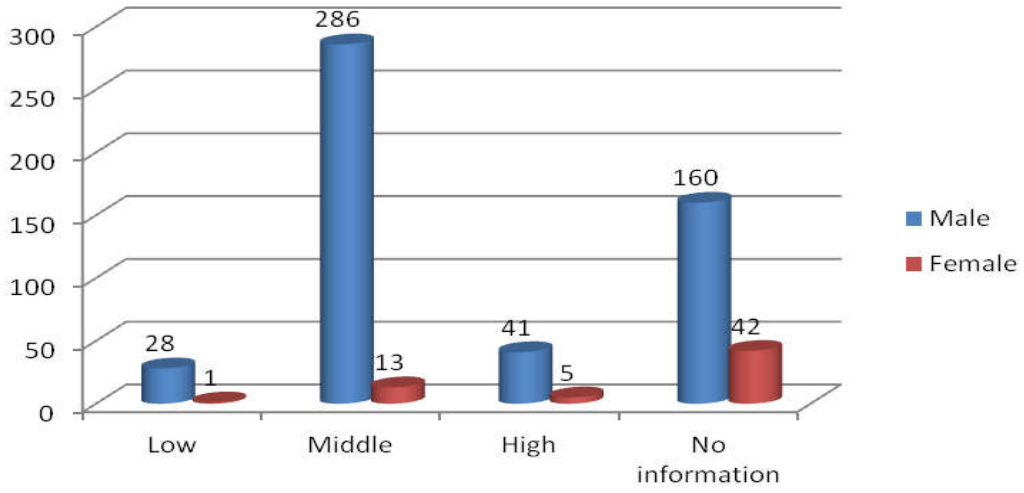

Fig. 5: Socio economic status

found that individuals from disadvantaged socioeconomic groups or living in poorer areas are at greatest risk of being killed or injured as a result of a road traffic crash, even in high-income countries (Roberts I, Power C., 1996)[10].

The deceased is not always the rider of the vehicle. In the present study 287 males (49.83%) and 4 females (0.69%) were riding the vehicle. Rest the people were 285 (49.48%) were pillion riders. Generally pedestrians have the highest numbers of road traffic deaths and in this study that has similar

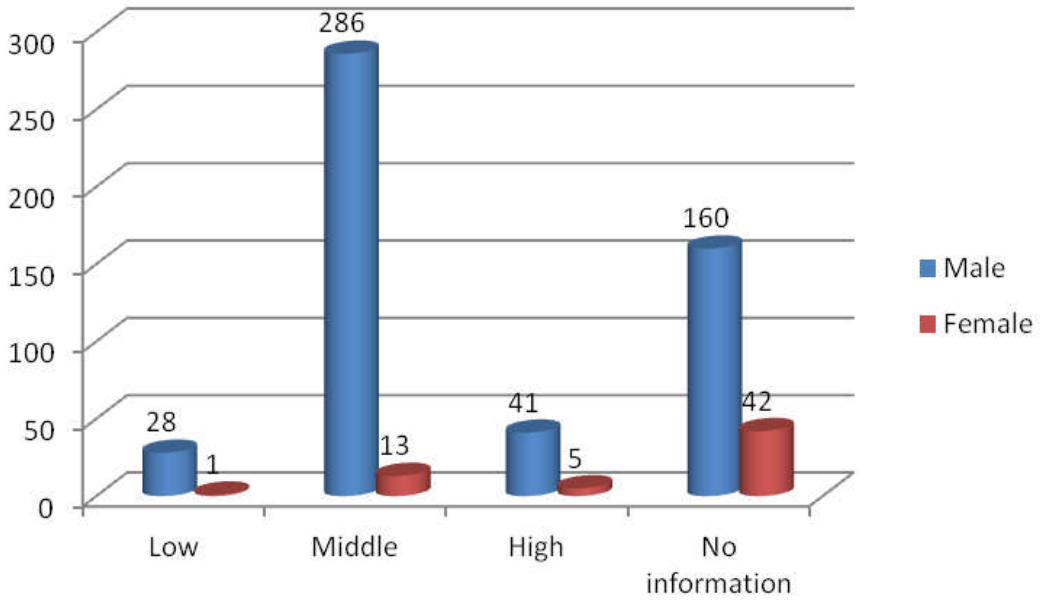

Fig. 6: Position of the victim over the two wheeler

findings to that of another report[11, 12]. When considering all vehicular disruptive collision types, it is clear that more emphasis of passenger preparedness and the enforcement of the national passenger and driver related laws need to be greatly improved.

Late night accidents (i.e. from 9 pm to 3 am) are commonly seen in the present study as there were 232 fatal accidents (40.28%) occurred in this period. The morning times (i.e. from 6 am to 12 noon) where 136 deaths occurred (23.61%) among the all accidents occurring in that period. In early nights i.e. from 6 pm to 9 pm there were 66 fatal accidents (11.46%) resulted in the deaths are seen. During the day time i.e. From 3 pm to 6 pm a total of 65 fatal accidents (11.28%) and from 12 noon to 3 pm a total 61 fatal accidents (10.59%). The least dangerous period was found to be from 3 am to 6 am wherein only 16 deaths (2.78%) resulted from the accidents occurred during this period.

Thus, the risk of injuries due to road traffic accidents was more during morning and evening peak hours. Late evening hours too were more risky due to less traffic on roads allowing over speeding

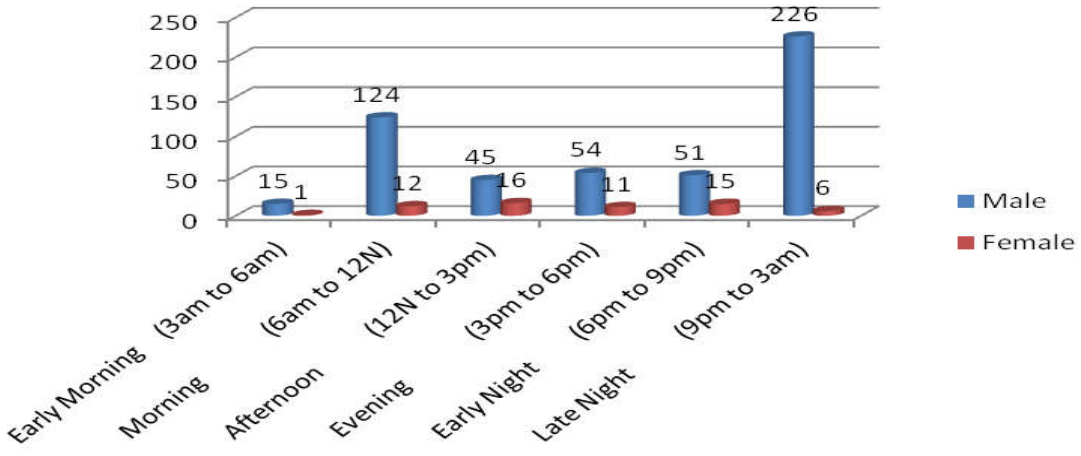

Fig. 7: Time of Accident

leading to fatal accidents. Rise in traffic accidents since afternoon till late night hours were also found in studies of Jain A et al, (2008) [13], Menon A et al [14] (2008). Maximum number of two wheeler accidents during late evening is because the traffic density is high during this time and is coupled with the poor infrastructure and fall in traffic discipline.

Out of the deaths occurred of two wheeler motor vehicle accidents, 129 persons (22.40%) died on the spot, and another 124 person (21.53%) could survive up to more than 6 hours, but died within 24 hours of the accident. Another 94 persons (16.32%) died with 6 hours of their accident. 89 persons (15.45%) died just before their hospitalisation. 56 persons (9.72%) survived for more than one week after their accident and succumbed to the injuries. 50 persons (8.68%)

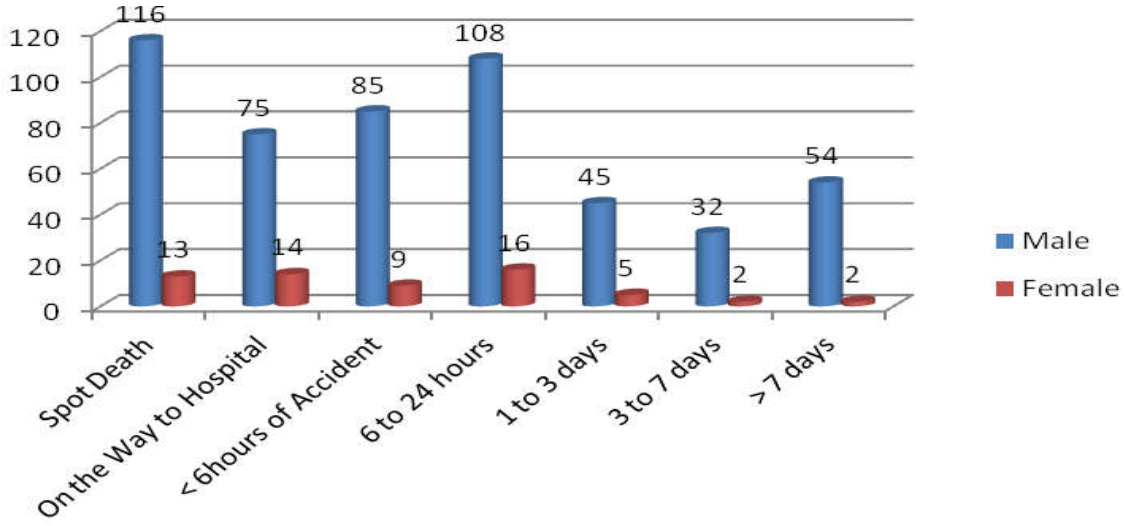

Fig. 8: Period of survival after accident

could survive more than one day but died within 3 days of their accident, another 34 persons (5.90%) could survive more than 3 days but died with one week of their accident. There is a need for better systematic coordination between all levels of medical care inclusive of intensive care, radiology, physiotherapy etc. in response to the occurrence of a post-crash seriously injured individual.

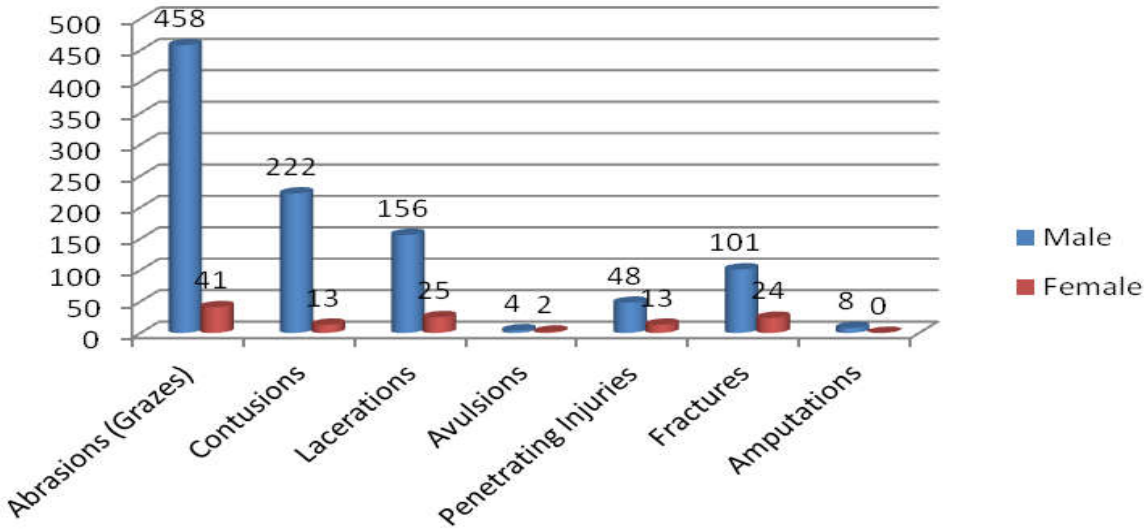

Fig. 9: Injuries spread over the body

The most frequently seen injuries are grazed abrasions in 499 (86.66%) cases of all. Followed by the contusions in 255 cases (44.27%), lacerations in 181 cases (31.42%) and fractures in 125 cases (21.70%). In 61 cases (10.59%) penetrating injuries are also seen. In 8 cases (1.39%) amputations of the limbs occurred. It is also observed that in 6 cases (1.04%) only avulsion injuries are seen which indicate the run over after the accident.

The upper limbs received most of the injuries and 303 cases (52.60%) they received different injuries mentioned above. Chest received next to upper limbs and in 256 cases (44.44%) it had variety of injuries. In 180 cases abdomen (31.25%), in 172 cases lower limbs (29.86%), in 143 cases head and neck (24.83%) received injuries.

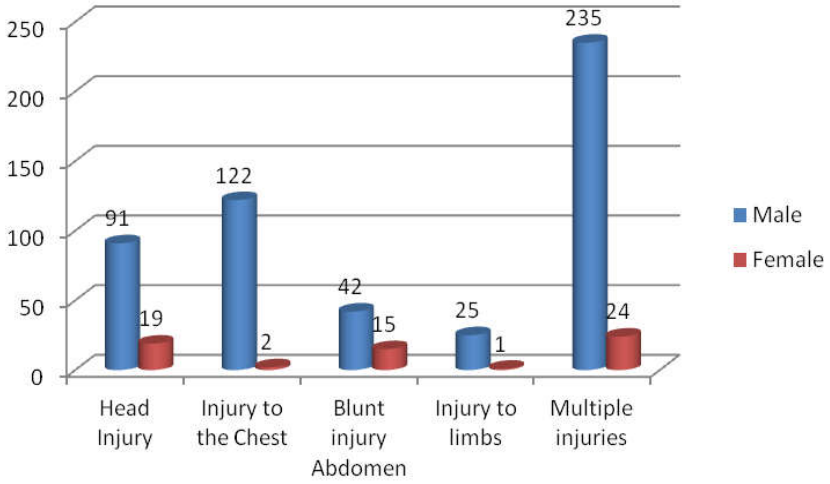

Fig. 10: Cause of death

Though different parts of the body are injured the cause of death was opined as due to multiple injuries in 259 cases (44.97%). Chest injury was declared as cause of death in 124 cases (21.53%). Head injury was the cause of death in 110 cases (19.10%). In 57 cases the blunt injury abdomen (9.90%) was given as cause of death. Isolated injuries to the limbs are also given as cause of death in 26 cases (4.50%).

Conclusion

Civilization has brought many miseries to the mankind. The greatest of all these miseries is the mounting tragic toll of road traffic accident deaths. The traffic accidents pose a problem to whole world. This may be due to bad roads, lack of road driving sense and lack of knowledge of traffic rules. There is abundant literature on various aspects of traffic accidents and their prevention.

A total of 576 victims of two-wheeler road traffic accident in this part of world were studied. The whole data was analyzed for pattern and distribution 0f injuries in cases of two wheeler road accidents and cause of death. This may be due to lack of road driving sense and lack of knowledge of traffic rules. The majority of the cases in our study were young in their productive age group and male predominance was seen. Pedestrians are at risk while commuting. The severity of head injury is an important predictor for prognosis. The mortality is directly related to head injury.

Presence of multiple injuries in our study is in accordance with the fact that multiple injuries are a rule in road traffic accidents. The study highlights the need of compulsory implementation of helmet wearing for motorcyclist and necessitates the need for taking urgent steps for establishing ambulance services and provision of pre-hospital care & trauma services to reduce mortality and morbidity. Use of heavy vehicles should be barred from the busy streets during evening hours and speed limits be enforced on them. Furthermore, law agencies needs to implement the traffic rules very strictly. The road safety and traffic rules awareness at all levels of society should be strengthened and directed at the high risk groups with more emphasis placed on the human errors and enforcement of current national traffic laws.

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Conflict of Interest

The author declares no conflict of interest in the present study.

Author Disclosures

Authors have no conflict of interest. This study was a part of departmental research activities of Forensic Medicine at Gandhi Medical College Secunderabad.

Ethical Consideration

Clearance from the Institutional Ethical committee was obtained in advance.

References

1. Michael John Son et al. Cranio-facial Trauma Injured Motorcyclists-The Impart of Helmet Usage. Journal of Trauma, 1995; 38(6): 876-6.
2. Singh R, Singh HK, Gupta SC, Kumar Y. Pattern, Severity and Circumstances of Injuries Sustained in Road Traffic Accidents: A Tertiary Care Hospital-Based Study. Indian J Community Med. 2014; 39(1): 30- 4.
3. Joshi AK, Joshi C, and Singh M, Singh V. Road traffic accidents in hilly regions of northern India: What has to be done? World J Emergency Med. 2014; 5(2): 112-5.
4. Global burden of disease: 2004 update. Geneva, World Health Organization, 2008. (http://www.who.int/healthinfo/global_burden_disease/GBDreport_2004update_AnnexeA.pdf). Accessed on 22 November 2010.
5. Traffic safety facts, 2009 Data. National highway traffic safety. U.S department of transportation. October 2011. Available at, http://wwwnrd.nhtsa.dot.gov/Pubs/811389.pdf. Accessed 20 December 2011.
6. Park JE, Park K. Textbook of preventive and social medicine. 18th edition Jabalpur, India. M/S Banarsidas Bhanot. 2005; 323-326.
7. Bereka Bruce et al. Outcome Following Severe Head Injuries in Children. Journal of Neurosurgery.1978; 48: 679-688.
8. Edward L. Hanna et al. Motor Vehicle Crashes in New-York State. Journal of Trauma. 2001; 50: 1117-1124.
9. Agarwal S and Agarwal SN. Fatal road Accidents An analysis of sixty four Autopsied cases. Journal of the Indian Academy of Forensic Sciences. 1967; 6(1): 26-32.
10. Roberts I, Power C. Does the decline in child injury death rates vary by social class? British Medical Journal.1996; 313: 784–786.
11. Shruthi P, Venkatesh VT, Viswakanth B, Ramesh B, Sujatha PL. Dominic IR. Analysis of Fatal Road Traffic Accidents in a Metropolitan City of South India. J Indian Acad Forensic Med. 2013; 35: 4.
12. Centers for Disease Control and Prevention (CDC). Medical expenditures attributable to injuries—United States, 2000. MMWR Morb Mortal Wkly Rep.2004; 53: 1-4.
13. Jain et al. Two wheeler accidents on Indian roads – a study from Mangalore, India, Journal of Forensic and Legal Medicine. 2009; 16: 130–133.
14. Menon A et al. Pattern of fatal head injuries due to vehicular accidents in Mangalore, Journal of Forensic and Legal Medicine. 2008; 15: 75–77.

Original Article

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Pathological Findings of Liver in Autopsy with Emphasis on Incidentally Detected Lesions

Sapna Patel*, Rajalaxmi B.R.*, Manjunath G.V.**

Abstract

Introduction: To study the spectrum of histopathological changes in liver with an emphasis on the rare incidental lesions of liver in autopsies. *Methods:* A retrospective study of medicolegal autopsies for six years was conducted in the Department of Pathology, JSS Medical College, Mysuru, Karnataka. The gross and microscopic findings of liver specimens were taken into consideration to establish the presence of liver diseases and also to find out the types of liver diseases in relation to the age and sex of the cases. *Results:* The present study consists of a series of 284 autopsy cases from JSS Hospital, Mysuru, conducted over a period of six years. A total of 121 liver specimens sent were studied, out of which 16(13.2%) were normal and 8(6.6%) were autolysed. Histopathological lesions were seen in 97(80.1%) liver specimens, out of which 46(47.4%) showed fatty change, 9(9.3%) cases showed chronic venous congestion along with 8(8.2%) cases of cirrhosis, 3(3.1%) cases of hepatitis and 8(8.2%) cases of interesting fortuitous findings comprising of Dubin Johnson syndrome, von Meyenburg complex, large bile duct obstruction, metastatic deposits of carcinoma of cervix, neuroendocrine tumor, vaso-occlusive sickle cell crisis, amebic liver abscess and tuberculosis with coexistent fatty change. *Conclusion*: Fatty change of liver was the commonest incidental pathologic finding of liver with the commonest age group for liver disease being 41-60 years. This study has contributed a handful of findings to the pool of rare liver lesions in pathology emphasising the indispensible contribution of autopsy to the knowledge of pathology.

Keywords: Autopsy; Dubin Johnson Syndrome; Incidental; Vaso Occlusive Sickle Cell Crisis; Von Meyenberg Complex.

Introduction

The autopsy study aids to the knowledge of pathology by unveiling the rare lesions which are a source of learning from a pathologist's perspective. Autopsy studies serve as invaluable substrates for the study of natural evolution of certain diseases and also provide an insight into the true prevalence of diseases or lesions [1]. Quite rightly liver is, called as "The custodian of milieu interior" and is vulnerable to a variety of metabolic, toxic, microbial and circulatory insults [2]. The disease can be primary or secondary to cardiac de-compensation, alcoholism or extra hepatic infections. Most of the chronic liver diseases are only diagnosed at autopsy as they do not cause any functional derangement and remain asymptomatic [2].

Liver is the commonest internal organ sent for histopathologic study in autopsies as it reflects the changes secondary to hemodynamic changes, drugs , toxins or infections and helps ascertain the cause of death and also the mechanism of death. These findings have an immense academic value and hence this article serves as an eye opener into the spectrum of histopathological findings of liver in autopsies and also the incidental liver lesions which go unnoticed when a person was alive.

Materials and Methods

A retrospective study of medicolegal autopsies for six years from 2008-2013 was conducted in the Department of Pathology, JSS Medical College, Mysuru, Karnataka. Liver specimens were received either as a part of examination of multiple viscera, or

Authors Affiliation: *Assistant Professor, **Professor and Head, Dept. of Forensic Medicine, JSS Medical College, JSS University, Mysuru, Karnataka, India.

Reprints Requests: Sapna Patel M.C., #100, V Main Road, Beside Rly Bridge, Yadavagiri, Mysore-570020, Karnataka, India.
E-mail: drsapnaharish@gmail.com

only liver was sent for pathological examination in 10% formalin. Representative bits were processed in a routine manner. All sections were stained with haematoxylin and eosin (H & E) stain and special stains were used as and when required. The gross and microscopic findings of liver specimens were taken into consideration to establish the presence of liver diseases and also to find out the types of liver diseases in relation to the age and sex of the cases.

Results

The present study consists of a series of 284 autopsy cases from JSS Hospital, Mysuru, conducted over a period of six years. A total of 121 liver specimens sent were studied, out of which 16(13.2%) were normal and 8(6.6%) were autolysed. Histopathological lesions were seen in 97(80.1%) liver specimens (Table 3) , out of which 46(47.4%) showed fatty change, 9(9.3%) cases showed chronic venous congestion along with 8(8.2%) cases of cirrhosis, 3(3.1%) cases of hepatitis and eight cases (8.2%) of interesting fortuitous findings (Table 4) comprising of two cases of metastatic neoplasms one from squamous cell carcinoma of cervix and the second was metastaic neuroendocrine tumor, remainder were non-neoplastic lesions one each of Dubin Johnson syndrome, von Meyenburg complex, large bile duct obstruction, vaso-occlusive sickle cell crisis, amebic liver abscess and tuberculosis with coexistent fatty change.

The study comprised of 60 specimens from males (61.%) and 37(38.1%) from females (Table 2), age group ranging from 19 years to 81 years (Table 1). Causes of death were road traffic accident (RTA) in 61 cases, poisoning in 13 and hanging in 11 cases. There were 3 cases each of burns and myocardial infarction, 2 cases each of drowning and unidentified bodies. Cause of death was not established in 2 cases.

Dubin Johnson Syndrome was diagnosed postmortem in a 25 year old male after death from hanging. Pieces of liver with blackish discoloration displayed hepatocytes with abundant grey brown cytoplasmic pigment along with grade 1 micro and macrovesicular steatosis (Figure 1A). The pigment

Table 1: Spectrum of lesions noted at autopsy

Sl. No.	Histopathological finding	No of cases
1	Atherosclerosis	55
2	Fatty liver	40
3	Pulmonary edema	26
4	ATN	25
5	Pneumonia	8
6	Tuberculosis	7
7	Cirrhosis	6
8	Neoplastic lesions	5
9	Infarction intestine	4
10	Erosive gastritis	3
11	Pancreatitis	2
12	Meningitis	2
13	Uterus-leiomyoma	2
14	Cvc spleen	1
15	Autolysed	16
	Total	202

Table 2: Gender distribution of autopsy cases

Gender	No of cases
Male	162
Female	107
Total	269

Table 3: Age distribution of autopsy cases

Age group	No of cases
0-20	6
21-40	131
41-60	107
61-80	18
>80	7
Total	269

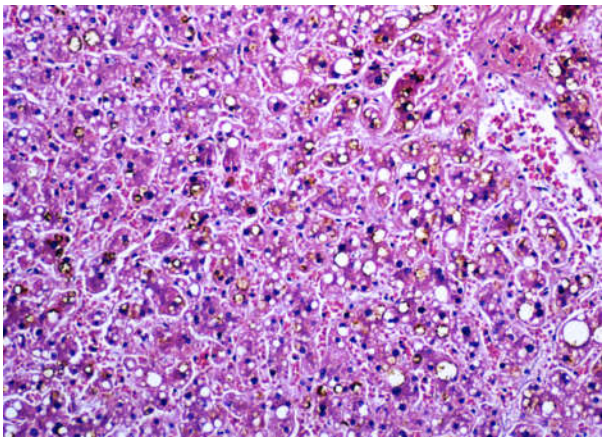

Fig. 1A: Liver displaying features of Dubin Johnson syndrome. H&E, x100

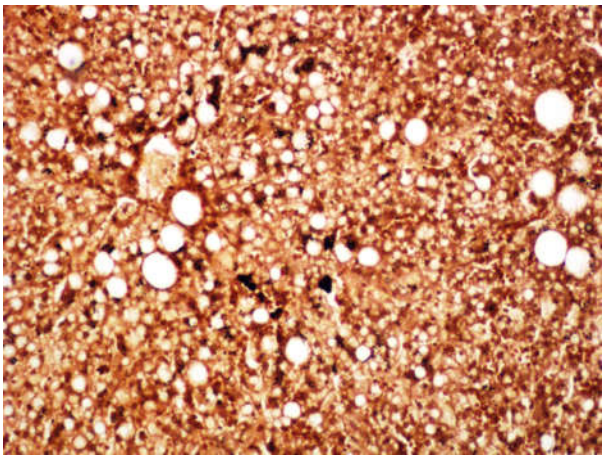

Fig. 1B: Hepatocytes with brown pigment. Masson Fontana, x100

Table 4: Incidental findings in autopsy

Sl. No.	Age/Sex	History / indication of autopsy	Histopathological findings
1	68/M	Snake bite	Tumor to tumor metastases –gastric adenocarcinoma mets into oncocytoma of kidney
2	40/M	Massive hemoptysis	Lungs-Tuberculosis Kidney-Clear cell RCC Liver-cirrhosis
3	38/M	OP poisoning	Kidney-Multilocular Cystic Renal Cell Carcinoma(MCRCC)
4	45/M	RTA	Adult polycystic kidney disease
5	25/M	Hanging	Dubin-Jhonson Syndrome
6	40/M	RTA	Bile duct hamartoma
7	30/M	Poisoning	Large bile duct obstruction
8	35/M	RTA	Liver-carcinoid
9	45/F	RTA	Amebic liver abscess
10	52/M	Massive hemoptysis	Lungs-Tuberculosis
11	39/M	RTA	Lungs-Tuberculosis Liver- Tuberculosis with fatty change
12	23/M	RTA	Sickle cell anaemia with vaso-occlusive crisis
13	38/F	Unidentified body	Thyroid-follicular adenoma

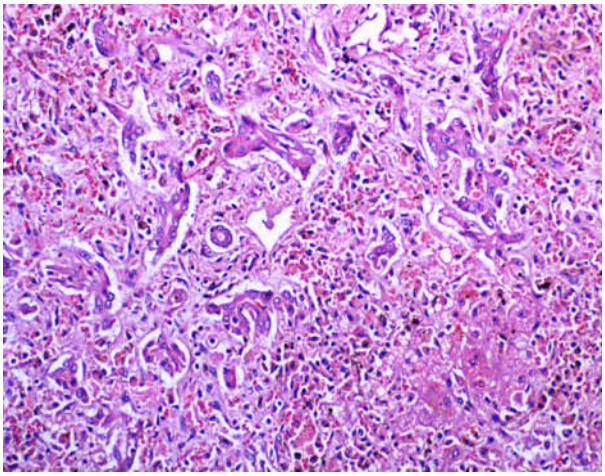

Fig. 1C: Liver displaying features of von Meyenburg complex. H&E, x100

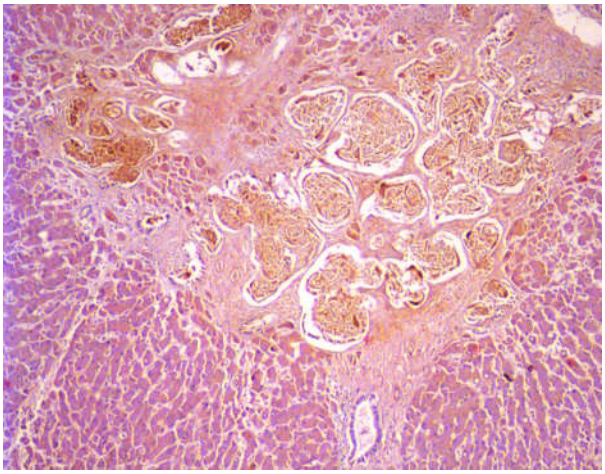

Fig. 1D: Liver displaying features of Large bile duct obstruction. H&E, x100

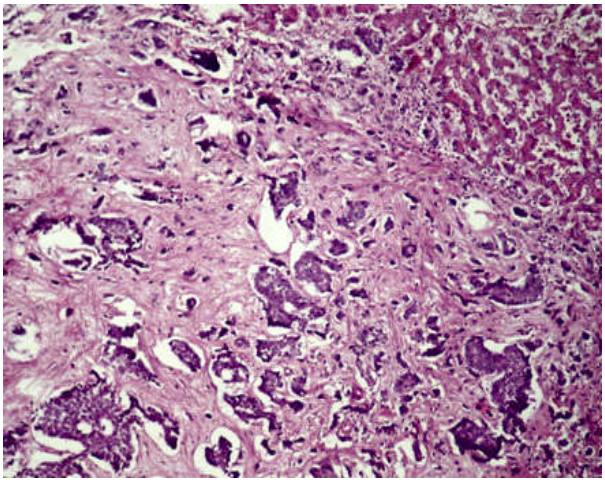

Fig. 2A: Specimen of liver showing multiple grey white nodules

Fig. 2B: Nests and trabeculae of neuroendocrine cells amidst hepatocytes. H&E, x100)

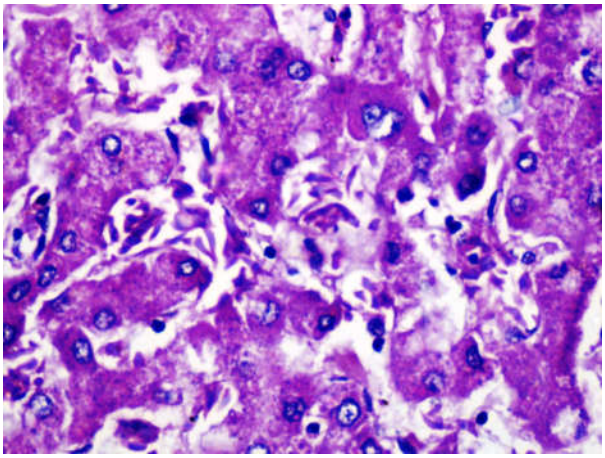

Fig. 2C: Hepatic sinusoids filled with sickled rbc's. H&E, x400

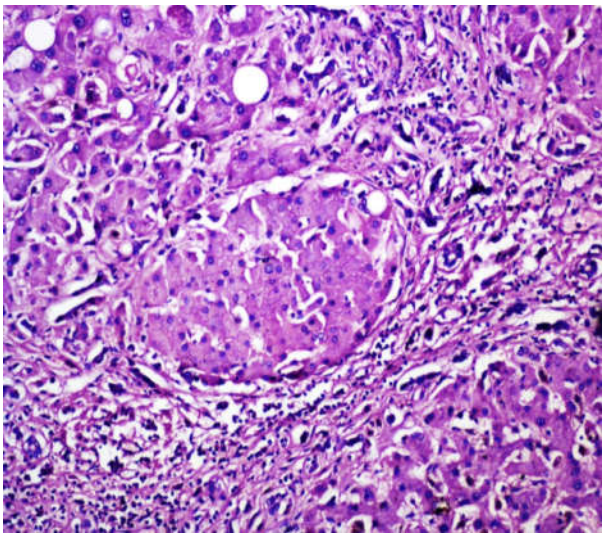

Fig. 2D: Hepatic parenchymal nodules separated by fibrosis-Cirrhosis. H&E, x200

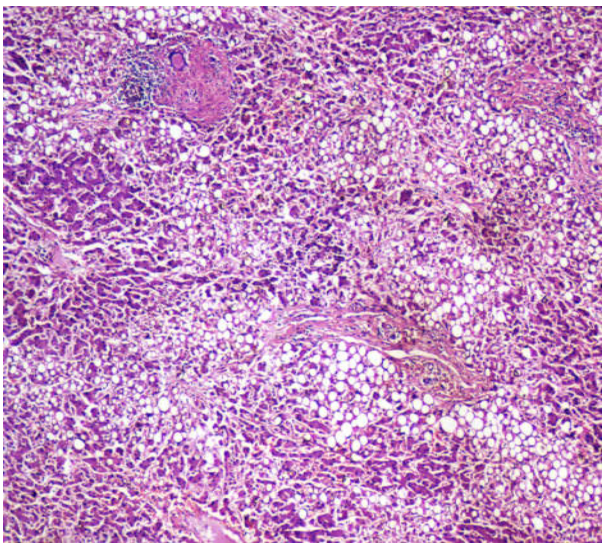

Fig. 3A: Liver displaying epithelioid granuloma and fatty change. H&E, x100

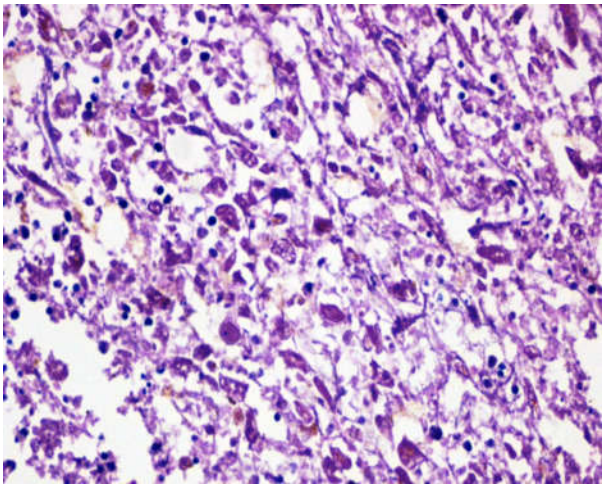

Fig. 3B: Trophozoites of Entamoeba Histolytica. H&E, x200

was not stained with Perl's Prussian blue while Masson Fontana stain confirmed the brown granular pigment in hepatocytes (Figure 1B).

A case of subcapsular bile duct hamartomas (von Meyenburg's complexes) was found in a patient aged 40 years after death in a road traffic accident who also had emphysematous changes in the lungs (Figure 1C). The changes in hepatic architecture secondary to large bile duct obstruction were noted in a 30 year old male after suicidal death from poison consumption, who had a past clinical history of obstructive jaundice and microscopy revealed bile duct proliferation with perivenular bilirubinostasis accompanied by portal tract edema and inflammation, suggestive of changes due to large bile duct obstruction (Figure 1D).

Among the neoplastic lesions of liver, two metastatic neoplasms in liver were discovered. A case of carcinoma cervix with metastatic deposits in lung, brain and liver in a 38 year old female and the other was metastatic carcinoid in a specimen of liver displaying multiple grey white nodules, largest measuring 2x1.8cms, suggestive of metastatic deposits (Figure 2A & 2B).

A postmortem diagnosis of vaso-occlusive Sickle cell crisis was made in a 23 year old male who died in road traffic accident. The patient had intracerebral bleed, collapsed lungs and hemorrhagic contusion of liver, where the cause of death was attributed to cardiorespiratory arrest. On histopathology, multiple sections from lung showed macrophages and blood vessels filled with sickled erythrocytes among areas of consolidation, liver displayed congested sinusoids filled with sickled erythrocytes (Figure 2C) and brain had large areas of edema displaying congested cerebral blood vessels packed with sickled erythrocytes.

Among the eight cases of cirrhosis, a rare coexistence of cirrhosis of liver, clear cell carcinoma of kidney and pulmonary tuberculosis was incidentally detected in a 40 year old male after death from massive hemetemesis where the lungs showed cavitatory lesions with caseating granulomas and Langhan's giant cells, liver was nodular and on microscopy, displayed cirrhotic parenchymal nodules with bridging septae, characteristic of macronodular cirrhosis (Figure 2D) and the lower pole of right kidney harbored clear cell renal carcinoma. A case of extrapulmonary tuberculosis involving liver with coexistent fatty change (Figure 3A) was incidentally seen in a 39 year old male.

Among the inflammatory conditions, an undiagnosed abscess showed multiple trophozoites of Entamoeba Histolytica in a friable specimen of liver with dark coloured pus (Figure 3B).

Discussion

In concurrence with the findings of several workers, liver diseases predominated in males in the present study (61.9%) and this may be attributed to the fact that men indulge themselves more to alcohol and smoking as compared to women (38.1%) [2,3,4,5].

The commonest age group affected in the present study was between 41-60 years concurrent with the other studies by R Thamil Selvi with the age group of 50-70 years [3], Devi PM with result of 41-50 years [2] and Alagarsamy J in their study inferred 4^{th} and 6^{th} decades as the commonest age group affected in liver disease [5].

Most of the chronic liver diseases even in advanced stages may cause no prominent clinical signs and symptoms and are diagnosed only during autopsy [2,3]. The spectrum of lesions that are reported in a series of autopsy findings of liver are fatty change, venous congestion, cirrhosis of liver, malignancy, hepatitis and chronic abscess, fatty change being the predominant finding [4]. Another autopsy study of fifty cases of liver specimens reported fatty change, venous congestion, cirrhosis of liver, neoplasm and hepatitis with chronic venous congestion being the predominant finding [5]. The spectrum of pathologic changes in our series is similar to these studies with an addition of rare cases such as Dubin Johnson syndrome, von Meyenburg complexes, large bile duct obstruction, vaso-occlusive sickle cell crisis and extrapulmonary tuberculosis of liver into the pool of interesting lesions of liver.

R. Thamil Selvi and colleagues studied 120 cases and fatty change was the commonest finding in 26.9% followed by congestion (16.7%), hepatitis (13.9%), cirrhosis & abscess (7.4%) and malignancy (1.9%) [3]. Bal MS et al. in their study inferred fatty change being the predominant pathologic finding [4]. The findings in our study are comparable to these studies with fatty liver being the commonest lesion in contrast to a study by Devi PM and colleagues where cirrhosis was the commonest finding in 25% of the total cases [2]. In our study, cirrhosis had a lower incidence of 8.2%. Alagarsamy J in their study of 50 cases found congestion as the commonest finding in 26% cases and fatty change in 20% of cases as the second most common finding, whereas in our study congestion was the second commonest pathologic finding seen in 9.3% of cases [5].

The commonest pathological change observed in our study was fatty change with both micro and macrovesicular steatosis. The causes of hepatic steatosis can be attributed to alcohol abuse or Nonalcoholic fatty liver disease (NAFLD). Alcohol is implicated in more than 50% of liver related deaths in the United States and complications of alcoholism contribute to a quarter of million deaths annually [2]. Alcoholic liver disease is presently the most common chronic liver disease in western and developing countries like India. Alcohol abuse generally leads to three pathologically distinct liver diseases viz. fatty liver, hepatitis and alcoholic cirrhosis. One or all of the three can occur at the same time and in the same patient. Nonalcoholic fatty liver disease (NAFLD) includes a spectrum of liver diseases, ranging from simple steatosis to steatohepatitis, advanced fibrosis and cirrhosis [2,3].

In most of the cases of Dubin Johnson syndrome, patients have asymptomatic hyperbilirubinemia with well preserved hepatic functions. Although patients present with hyperbilirubinemia or cholelithiasis, our patient had an asymptomatic course which was undiagnosed before death [6]. Bile duct hamartomas (von Meyenburg's complexes) of the liver are usually detected at laparotomy or autopsy as an incidental finding as in our study and are usually multiple [7,8]. The changes in liver architecture in cases of obstructive jaundice secondary to large bile obstruction can be studied usually in postmortem examination as a liver biopsy is rarely indicated in such cases , contributing to the study of natural evolution of such diseases and the pathomechanism.

Bal MS and colleagues found 3% cases of metastatic tumors in their study [4], with a slightly lower rate of 2.1% in our study. The study by R.Thamil Selvi and colleagues is comparable to our study

with a rate of 1.9% malignant tumors [3]. Our study had 2 metastatic neoplasms in liver, one from squamous cell carcinoma of cervix and the other was metastaic carcinoid. Carcinoids being the most common gastrointestinal endocrine tumors, metastases frequently involve liver. Primary hepatic carcnoids are solitary in contrast to metastaic carcinoids [9]. Most hepatic carcinoids are metastatic rather than primary with multiple nodules in the liver similar to our case [9,10].

The case of vaso-occlusive sickle cell crisis was a rare finding in our study, as the clinical profile of sickle cell anemia patients is reported to be less severe in India compared to that of African countries and is characterized by delayed presentation, pauci symptomatic cases, less frequency of vaso occlusive crisis and low mortality. Therefore, most of the patients remain undiagnosed similar to our case [11]. The strongest factor in sickle cell trait (SCT) patients implicating intravascular sickling with tissue injury and even death is hypoxia leading to intravascular sickling [11,12,13]. In our case, the road traffic accident with resultant bleeding leading to hypoxia probably triggered intravascular sickling and vaso-occlusive crisis contributing to the catastrophic events leading to death.

Our study found a case of extra- pulmonary tuberculosis with fatty change and pulmonary foci of tubercular lesions. Tuberculosis (TB) remains a major respiratory cause of morbidity and mortality worldwide and has been identified as a 'global emergency' by the WHO [14]. Many cases of tuberculosis remain undiagnosed and are diagnosed only at autopsy [5]. In a study of tuberculous lesions at autopsy, 8.7% cases of active tuberculosis were found, of which 90% had pulmonary tuberculosis, 10% suffered from military tuberculosis and 30% had extra-pulmonary tuberculosis. The lungs were the most frequently affected organ [16]. The rare coexistence of cirrhosis of liver, clear cell carcinoma of kidney and pulmonary tuberculosis was incidentally detected in a 40 year old male after death from massive hemetemesis, which would have not been diagnosed during the person's life time. Such detection of rare cases contributes to the true prevalence of some of the diseases in pathology.

Conclusion

We conclude from our study that fatty change of liver was the commonest incidental pathologic finding of liver with the commonest age group for liver disease being 41-60 years. The study also emphasizes the various incidental liver lesions which otherwise would have been unnoticed during a person's life. Autopsy studies help in the detection of unexpected findings significant enough to have changed patient management had they been recognized before death contributing to the knowledge of liver pathology. Despite the growing complexity and dependence on newer diagnostic methodologies, the traditional role of histopathology in autopsy remains as important as it has been in the past.

References

1. Gezelius C, Eriksson A. Neoplastic disease in a medicolegal autopsy material. A retrospective study in northern Sweden. Z Rechtsmed. 1988;101(2):115-30.
2. Devi M, Myrthong BG, Meera, Nabachandra H. Pathological Findings of Liver in Autopsy Cases. A Study at Imphal. J Indian Acad Forensic Med. 2013; 35(3):206-10.
3. Selvi RT, Selvam V, Subramaniam PM. Silent Liver Disease In and Around of Salem Population: An Autopsy Study. Journal of Clinical and Diagnostic Research. 2012; 6(2): 207-210.
4. Bal MS, Singh SP, Bodal VK, Oberoi SS, Surinder K. Patholigical findings in liver autopsy.J Indian Acad Forensic Med. 2004; 26(2): 55-7.
5. Alagarsamy J, Muthureddy Y, Yadav NSR. Incidentally Discovered Liver Diseases-An Autopsy Study of Fifty Cases. International Journal of Science and Research (IJSR). 2014; 3(5): 1330-32
6. Kuo IM, Wang SY, Yu MC, Chen TC, Wang F, Jan YY. Dubin-Johnson Syndrome with Cholelithiasis: Report of a Case. Formos J Surg. 2010; 43: 99-103.
7. Wei SC, Huang GT,] et al. Bile duct hamartomas. A report of two cases. J ClinGastroenterol. 1997 Dec; 25(4): 608-11.
8. Hettinger M, Klotz M, Bolay L, Weber P. Multiple bile duct hamartomas of the liver – A rare differential diagnosis to liver metastasis. Ultraschall Med. 2005 Apr; 26(2): 150-3.
9. Nikfarjam M, Muralidharan V, Christophi C. "Primary hepatic carcinoid tumours". HPB: Official Journal of the International Hepato Pancreato Biliary Association. 2004; 6(1): 13–17.
10. Ihse I, Lindell G, Tibblin S. Neuroendocrine tumors metastatic to the liver. In: Holzheimer RG, Mannick JA, editors. Surgical Treatment: Evidence-Based and Problem-Oriented. Munich: Zuckschwerdt. 2001.
11. Sahoo N, Mishra S, Patnaik KK, Mohanty SN.The Post-Mortem Diagnosis of Vaso occlusive Crisis in Sickle Cell Disease in a Previously Undiagnosed

Sickle Cell Disease Of An Asymptomatic Adult – A Case Report. Sch. Acad. J. Biosci. 2015; 3(12): 1030-1032.

12. Sapna P, Suchitha S, Pramod Kumar GN, Manjunath GV. Post-mortem diagnosis of vaso-occlusive sickle cell crisis-A case report.Ind J Forensic Med Pathol. 2012; 5(4): 31-36.
13. Davies SC, Luce PJ, Win AA, Riorden JP. Acute chest syndrome in sickle cell disease. Lancet. 1984; 1: 36-38.
14. Rastogi P, Kanchan T, Menezes RG. Sudden unexpected deaths due to tuberculosis: An autopsy based study. Journal of Forensic Medicine & Toxicology. 2011; 28(2): 81-5.
15. Garg M, Aggarwal AD, Singh S, Kataria SP. Tuberculous lesions at autopsy. J Indian Acad Forensic Med. 2011; 33: 116-9.
16. Sangma MM, Devi TM, Sarangthem B, Keisham S, Devi PM. Prevalence of tuberculosis: A study in forensic autopsies. J Med Soc. 2014; 28: 162-5.

Original Article

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Reliability of Sternal Index in Determination of Sex in Rajkot Region: A Prospective Study

S.D. Bhuva*, M.T. Vijapura, H.M. Mangal***, S.G. Momin****, M.N. Patel*****, R.K. Mashru******

Abstract

For medicolegal studies, examination of human skeleton has obviously an utmost importance for the identification purpose. The experts are always facing a problem in identifying whether skeleton remains are of human being or not as well in estimating correct age, sex and stature of the specimen available. Sternum as an individual parameter for the determination of sex was first studied in 1788 by Wenzel. Sternal index, also known as manubrio-corpus index is an important and frequently studied parameter from this point of view. The present study is an attempt to know the reliability of sternal index in the differentiation of sex. The study of 100 cases was conducted at mortuary of P.D.U. Hospital and Medical College, Rajkot during the period of 6th January 2010 to 20th August, 2011. The materials for the study consist of sternum bones obtained from the cadavers brought for the post-mortem examination, after taking necessary consent from the relatives and police. Mean *sternal index* in males was 52.39 mm with SD of 7.70 while that of female cases was 60.12 mm with SD of 8.63. Sternal index in both sex had overlapping zone in the range of 39.33-73.51 mm. Observations of all male cases were falling in this range while 6.90% of female cases were falling outside this range.

Keywords: Identification; Sternum; Sternal Index.

Introduction

The experts are always facing a problem in identifying whether skeleton remains are of human being or not as well in estimating correct age, sex and stature of the specimen available. According to krogman, if the entire skeleton is available for examination, sexing of the adult skeleton can be done with 100% both skull and pelvis are accuracy, with the help of skull up to 90%, with the help of pelvis up to 95%, with the help of the long bones up to 80%, and when available then up to 98% [1].

Sternum as an individual parameter for the determination of sex was first studied in 1788 by Wenzel [2]. He described the difference in ratio between the length of manubrium and body of sternum in both sexes. The study opened vast avenues for Feigal (1837) [3], Hyrtl (1788) [4], Dwight (1881) [5] Strauch (1881) [6] which was followed by Patermollar (1890) [7] and Paterson (1905) [8]. All these workers studied the old parameters of sternum and also tried some new optometric parameters, but could not establish any new parameter.

Stature provides one aspect of an individual's physiognomy, and its determination is one of the important initial steps during forensic analysis of skeleton remains [9]. Stature may be estimated by means of various anthropometric measurement of the skeleton. Such estimation is based on the relations between skeleton elements and stature [10]. It is an established fact that stature bears a direct relation to the length of various bones. The examination of long bones provides the most accurate stature estimation potential. However, long bones may not be present in every instance, necessitating the possible use of other skeleton elements such as sternum when present [11-13]. Telkka opined that racial or ethnic group would need different studies to be done over sternum to derive specific result applicable to that

Authors Affiliation: *Assistant Professor, ***Professor & Head, *****3rd Year Resident ******2nd Year Resident, Department of Forensic Medicine, **Resident Doctor, Psychiatri Dept, P. D. U. Government Medical College, Rajkot-360001, Gujarat, India.****Assistant Professor, Department of Forensic Medicine, B.J. Medical College, Ahmedabad.

Reprints Requests: Shailesh Dhanjibhai Bhuva, Assistant Professor, Department of Forensic Medicine, P. D. U. Government Medical College, Rajkot-360001, Gujarat, India.

E-mail: shailbhuva@gmail.com

particular racial or ethnic group as racial or ethnic variations arise in different geographic regions [14].

The present study is an attempt to study the sternum in the purview of existing parameter for sex. The result achieved by the existing parameter and those achieved by this study are tabulated and graphically plotted for study. All the measurements and the indices are statistically exercised for the accuracy and reliability for the future use.

Material and Methods

The present study of 100 cases was conducted at mortuary of P.D.U. Hospital and Medical College, Rajkot during the period of 6th January 2010 to 20th August, 2011.

For the present study of 100 cases, Sternum bones obtained from the cadavers brought for the post-mortem examination at Rajkot after taking necessary consent from the relatives and police. The bodies that were decomposed, charred, mutilated and with physical anomalies affecting the study were excluded from the study.

The body was placed in supine position on a flat, hard surfaced autopsy table, with the knee and hip joints extended, and the neck and feet in neutral position. The cadaveric length (stature) was measured between the vertex of the head and the heel using a measuring tape.

After external examination, all three body cavities were opened by routine skin incisions. The skin and subcutaneous tissues were reflected from the chest and neck. The sternum was removed by cutting costal cartilages just medial to costo-chondral junction and reflected from xiphisternum end to the manubrium sterni and by excising the sterno-clavicular joint.

After removing from cadaver, soft tissues and muscles were removed from the bones as much as possible. The collected sternum bones were tagged and put in a solution of sodium chloride for a week for maceration. These were cleaned and soft tissues were removed and than bones were put in to the solution of hydrogen peroxide for cleaning.

For determining the sex; all the required measurements were taken with Baker's Digital Calliper having reading accuracy of 0.01mm/0.0005 inches and with measuring range of 0-300 mm/0-12 inches. A rectangular wooden board was taken; all four borders of the wooden board were thicker than then the rest of the board so that while taking measurements sternum remain in contact with two thicker borders placed at 90 degree with each other . This will confirm the position of the sternum and it will not move while taking the measurement with calliper. The sternum bone taken for measurement was placed on this board in such a way that the posterior surface of the sternum was in contact with the surface of the board. This was further supported with the hand at the xiphoid region during the examination. The sternum placed in such a way was practically immovable during the examination. After proper positioning, following measurements were taken by digital calliper.

Length of Manubrium (L1)

It is the distance from suprasternal notch to sternal angle in midline.

Length of Body of Sternum (L2)

It is the distance from sternal angle to the junction of body of sternum to xiphoid process in the midline.

Manubrio corpus index (Sternal index) = L1/L2 × 100

The data obtained were analysed statistically to find out the mean and standard deviation for each of the above measurements and indices in both the sexes. The P value was determined to find out whether the sexual difference between means were significant or not. The data was also analysed statistically to find out the number of cases lying in overlapping zones and to find out reliability of each and every parameter separately. The bar diagram of each parameter was plotted taking measurement on X axis and number of cases on Y axis. From bar diagram the overlapping zone, identification point and percentage of cases beyond the identification point were determined for each parameter.

Results

Table 1 shows sex wise distribution of length of manubrium (L1) which suggests that maximum number of cases were falling in the range of 46-50.99 mm. in both sexes i.e. 31% in male and 12% in female.

Total number of cases falling in the range of 41-55.99 mm were 65 i.e. 91.54% of total number of male cases, while in female total number of cases falling in the range between 36-50.99 mm were 25 i.e. 86.20% of total number of female cases.

Minimum length of manubrium found in male was 40.55 mm and in female it was 27.04 mm. Maximum length of manubrium found in male was 66.87 mm

and in female it was 56.72.

Overall mean of total cases (i.e.100 cases) was 47.39 and SD ± 5.56.

Mean of male cases was 48.60 and SD ± 4.97.

Mean of female cases was 44.41 and SD ± 5.89.

Average difference in mean of male and female cases was 4.19. By applying independent t–test it was observed that difference found in mean of male and female was statistically significant as the P value obtained was 0.000. (P value was taken significant at the level P<0.05).

Distributions of male and female cases were analyzed for overlapping. Overlapping zone is 40.55-56.72 mm. Number of male cases falling in the overlapping zone was 67 i.e. 94.36% of total number of male cases. Number of female cases which were falling into overlapping zone was 23 i.e. 79.31% of total number of female cases. It was found that all the sternum bones having length of manubrium >56.72 mm were of males and length < 40.55 mm were of females , so by this only 5.64% of male cases and 20.69% of female cases sex could be determined correctly.

Table 2 shows sex wise distribution of length of body of sternum (L2) which suggests that maximum number of cases in males were falling in the range of 86-90.99 mm. i.e. 18% of total cases and in females maximum number of cases were falling in the range of 71-75.99 mm i.e. 8% of total cases.

Minimum length of body of sternum found in male was 74.57 mm and in female it was 61.05 mm. Maximum length of body of sternum found in male was 111.58 mm and in female it was 84.49.

Overall mean of total cases (i.e.100 cases) was 88.02 and SD± 11.90.

Mean of male cases was 93.63 and SD ± 8.35.

Mean of female cases was 74.30 and SD ± 7.16.

Average difference in mean of male and female cases was 19.33. By applying independent t–test it was observed that difference found in mean of male and female was statistically highly significant as the P value obtained was 0.000. (P value was taken significant at the level P<0.05).

Distributions of male and female cases were analyzed for overlapping. Overlapping zone was 74.57-84.49 mm. Number of male cases falling in the overlapping zone was 10 i.e. 14.08% of total number of male cases. Number of female cases which were falling into overlapping zone was 13 i.e. 44.82% of total number of female cases. It was found that all the sternum bones having length of body of sternum >84.49 mm were of males and length < 74.57 mm were of females, so by this 85.92% of male cases and 55.18% of female cases sex could be determined correctly.

Table 1: Sex wise distribution of length of manubrium (l1)

Length of Manubrium (In mm.) (L1) IN MM.	No. of Cases Male (%)	No. of Cases Female (%)
25-30.99	00(0%)	01(1%)
31-35.99	00(0%)	01(1%) 90
36-40.99	02(2%)	**05(5%)**
41-45.99	**22(22%)**	**08(8%)**
46-50.99	**31(31%)**	**12(12%)**
51-55.99	**12(12%)**	01(1%)
56-60.99	03(3%)	01(1%)
61-65.99	00(0%)	00(0%)
66-70.99	01(1%)	00(0%)
TOTAL	**71(71%)**	**29(29%)**

Table 2: Sex wise distribution of length of body of sternum (l2)

Length of Body of Sternum (L2) In Mm.	No. of Cases Male (%)	No. of Cases Female (%)
61-65.99	00(0%)	04(4%)
66-70.99	00(0%)	04(4%)
71-75.99	01(1%)	**08(8%)**
76-80.99	02(2%)	06(6%)
81-85.99	10(10%)	07(7%)
86-90.99	**18(18%)**	00(0%)
91-95.99	15(15%)	00(0%)
96-100.99	09(9%)	00(0%)
101-105.99	07(7%)	00(0%)
106-110.99	08(8%)	00(0%)
111-115	01(1%)	00(0%)
TOTAL	**71(%)**	**29(%)**

Table 3 shows sex wise distribution of sternal index which suggests that maximum number of cases in males were falling in the range of 46-50.99mm. i.e. 25 % of total number of cases and in females maximum number of cases were falling in the range of 61-65.99 mm i.e. 8% of total number of cases.

Minimum sternal index found in male was 39.33 mm and in female it was 36.70 mm. Maximum sternal indexes found in male was 73.514 mm and in female it was 80.1718 mm.

Overall mean of total cases (i.e.100 cases) was 56.64 mm and SD ± 8.68.

Mean of male cases was 52.39 mm and SD ± 7.70.

Mean of female cases was 60.12 mm and SD ± 8.63.

Average difference in mean of male and female cases was 7.73 mm. By applying independent t–test it was observed that difference found in mean of male and female was statistically significant as the P value obtained was 0.000. (P value was taken significant at the level P<0.05).

Distributions of male and female cases were analyzed for overlapping. Overlapping zone was 39.33-73.51 mm. Number of male cases falling in the overlapping zone was 71 that are 100 % of total number of male cases. Number of female cases which were falling into overlapping zone was 27 that is 93.10% of total number of female cases. Male sex could not be determined with this criterion and only in 6.9% cases of female sex could be determined correctly.

Table 3: Sex wise distribution of sternal index (l1/l2×100)

Width of Third Sternal Index (L1/L2×100) In Mm.	No. of Cases Male (%)	No. of Cases Female (%)
35-40.99	04(4%)	01(1%)
41-45.99	08(8%)	00(0%)
46-50.99	**25(25%)**	03(3%)
51-55.99	13(13%)	04(4%)
56-60.99	11(11%)	07(7%)
61-65.99	07(7%)	**08(8%)**
66-70.99	01(1%)	04(4%)
71-75.99	02(2%)	01(1%)
76-80.99	00(0%)	01(1%)
TOTAL	**71(71%)**	**29(29%)**

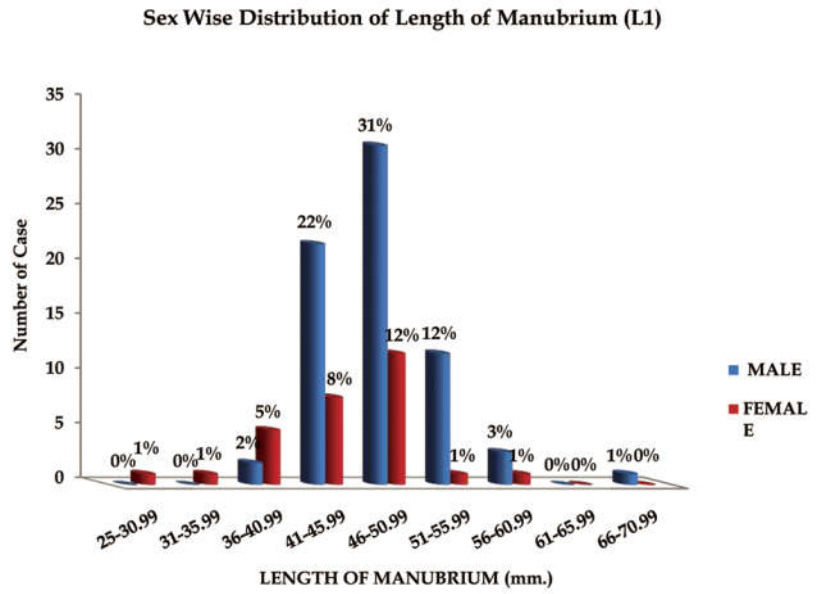
Table 4: Comparison of cases according to sex wise distribution of sternal index

Sternal Index	Tailor et al.[15]		Present Study	
	Male (%)	Female (%)	Male (%)	Female (%)
36-40	01(0.86%)	02(1.72%)	04(4%)	01(1%)
41-44	02(1.72%)	00(0%)	07(7%)	00(0%)
45-48	11(9.48%)	02(1.72%)	14(14%)	03(3%)
49-52	17(14.65%)	07(6.03%)	**16(16%)**	00(0%)
53-56	**20(17.24%)**	03(2.58%)	10(10%)	06(6%)
57-60	07(6.03%)	**15(12.93%)**	10(10%)	05(5%)
61-64	07(6.03%)	03(2.58%)	05(5%)	04(4%)
65-69	05(4.31%)	06(5.17%)	02(2%)	**08(8%)**
70-73	03(2.58%)	01(0.865)	03(3%)	01(1%)
74-77	02(1.72%)	01(0.865)	00(0%)	00(0%)
78-81	01(0.86%)	00(0%)	00(0%)	01(1%)
TOTAL	**76**	**40**	**71**	**29**

Table 5: Ability of hyrtl's[4] law (sternal index if <50=male, if >50=female) as recorded by various workers

Observer	Year	Number of Specimen	Sex	% Obeying Law
Dwight[16]	1890	142	M	59.10
		86	F	60.40
Patermoller[8]	1890	55	M	65.00
		33	F	-
Krause[17]	1897	-	M	-
		14	F	43
Ashley	1956	85	M	64.70
African[18,19]		13	F	69.20
Ashley European[18,19]	1956	378	M	52.90
		171	F	69.30
Narayan and Varma[20]	1958	126	M	34.12
		27	F	81.48
JIT et al.[21]	1980	312	M	31.08
		88	F	88.64
Dahiphale et al.[22]	2000	96	M	52.20
		47	F	100
Present Study	2011	71	M	**54.92**
		29	F	**86.20**

Dig. 1:



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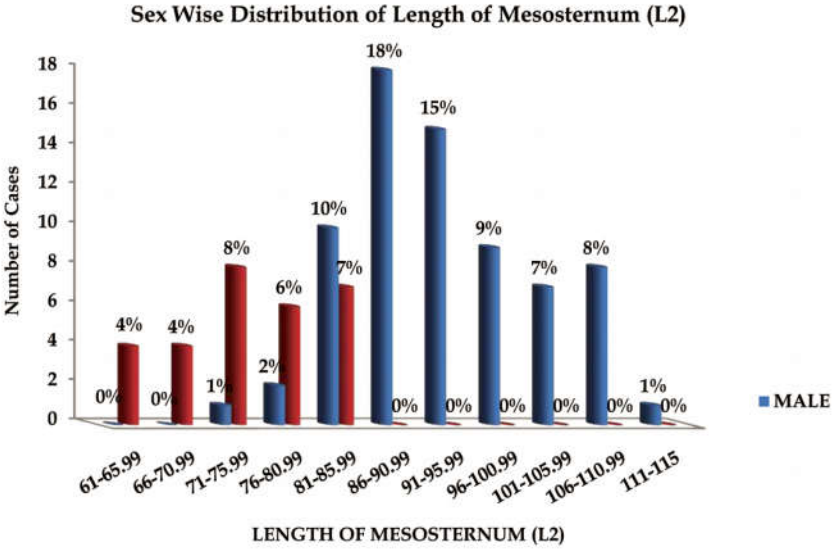

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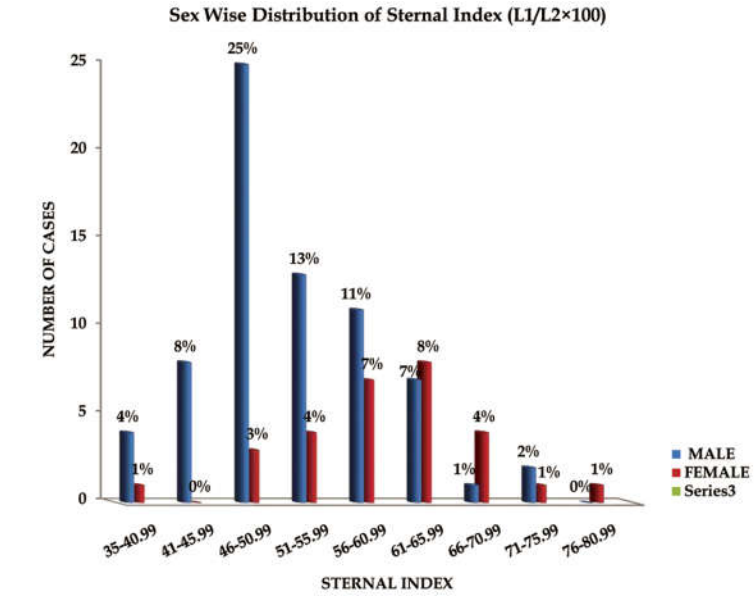

Discussion

Observations of sex wise distribution of sterna index of present study were compared with the study of Tailor et al. (2008) [15].

In present study maximum numbers of male cases (16%) were falling in the range of 49-52 mm. while in study of Tailor et al. [15] maximum numbers of male cases (17.24%) were falling in the range of 53-56 mm. In present study maximum number of female cases (8%) were falling in the range of 65-69 mm. while in study of Tailor et al. [15] maximum number of female cases (12.93%) were falling in the range of 57-60 mm.

In present study mean of male cases was 52.39 mm and SD ± 7.70 which was 57.42 mm and SD ± 8.41 in the study of Tailor et al. [15] In present study mean of female cases was 60.12 mm and SD ± 8.63 which was 59.12 mm and SD ± 8.0 in study of Tailor et al [15].

In present study difference in mean of male and female cases was found significant ($p<0.05$) while it was found insignificant in study of Tailor et al [15].

According to *Wenzel (1788)* [2] the manubrium in the two sexes, is almost equal in length, but the body of sternum is proportionally longer in males than the females. This led to enunciation of *Hyrtl's law [4],* according to which manubrio corpus index (sternaL index) exceeds 50 in females and is less than 50 in males. Table.16 gives the percentage of cases obeying the law in the two sexes. In present study percentage of male cases obeying the law (54.92%) was comparable to the study of Dwight [21] (59.10%), Ashley in European [22,23] 52.90%), and Dahiphale et al. [30] (52.20%). Percentage of female cases of the present study obeying the law (86.20%) was comparable to the study of Narayan and Varma [55] (81.48%) and Jit et al. [25](88.64%).

Conclusion

- Mean length of manubrium in males was 48.60 mm with SD of 4.97 while that of females was 44.41 mm with SD of 5.89. Length of manubrium in both sex had overlapping zone in the range of 40.55-56.72 mm. Only 5.64% of male cases had length >56.72 mm while 20.69% of female had length <40.55 mm.
- Mean length of body of sternum in males was 93.63 mm with SD of 8.35 while that of females was 74.30 mm with SD of 7.16. Length of body of sternum in both sex had overlapping zone in the range of 74.57-84.49 mm. 85.92% of males had length >84.49mm while 55.18% of female had length <74.57mm.
- Mean sternal index in males was 52.39 mm with SD of 7.70 while that of female cases was 60.12 mm with SD of 8.63.

Sternal index in both sex had overlapping zone in the range of 39.33-73.51 mm. Observations of all male cases were falling in this range while 6.90% of female cases were falling outside this range.

So Male sex could not be determined with this criterion and only in 6.9% cases of female sex could be determined correctly.

The variations in the sternal index are on account of different geography, ethnic and racial distribution. Further elaborative morphometric studies are required to make sternal index a valuable parameter in sexual dimorphism.

A number of workers have applied Hyrtl's law in their studies to find out its reliability in sexual dimorphism from sternum. In the present study 54.92% of male and 86.20% of female sterna were found obeying this law.

References

1. Reddy K. S. N. The Essentials of Forensic Medicine and Toxicology: 30th edition: Hyderabad, K. Suguna Devi: 2010.
2. Wenzel, J. Quoted by Ashley. (1956); A comparison of human and anthropoid mesosterna, American Journal Of Physical Anthropology. 1788; 3: 449-461.
3. Feigal JTA. Vollstandieges hundbuch deer Anatomic auf thren jet Zigen, wurzburg, cited by Jit inder (1980). American Journal of Anthropology. 1837; 53: 217-24.
4. Hyrtl, J. Handbuch der Topographischen Anatomic percentage BD. 1893; 1: S.348.
5. Dwight, T. The sternum as an index of sex and age, Journal of Anatomy. 1881; 15(3): 327-330.
6. Strauch, M. Anatom. Untersuch ungen uber des Brustbeing des menschen Dissertat. Dorpat.1881.
7. Patermollar, F. Uberden Sogen, Geschlechstypus des menschichen Brustbeings. Diss med. Kiel. 1890.
8. Paterson, A.M. : The Human Sternum. Williams And Norgate, London: University Press of Liverpool. 1904; pp 36-37 and 77.
9. Kanchan T, Menezes RG, Kotian MS. Stature estimation: valuable precautions. J Forensic Leg Med. 2008; 15: 413.
10. Krishan K, Sharma A. Estimation of stature from

dimensions of hands and feet in a North Indian population. J Forensic Leg Med. 2007; 14: 327–32.

11. Hunnargi SA, Menezes RG, Kanchan T, Lobo SW, Binu VS, Uysal S, et al. Sexual dimorphism of the human sternum in a Maharashtrian population of India: a morphometric analysis. Leg Med (Tokyo). 2008; 10: 6–10.
12. Hunnargi SA, Menezes RG, Kanchan T, Lobo SW, Uysal S, Herekar NG, et al. Sternal index: is it a reliable indicator of sex in the Maharashtrian population of India. J Forensic Leg Med. 2009; 16: 56–8.
13. Atal DK, Murari A, Rani Y, Naik SK. Gender differentiation from sternum: a postmortem metric study. Int J Med Toxicol Legal Med. 2008; 11: 53–8.
14. Telkka A. On the prediction of human stature from the long bones. Acta Anat (Basel). 1950; 9: 103–17.
15. Tailor, C.I. A determination of age and sex from the sternum in subjects above 10 years at autopsy in surat region. 2008.
16. Dwight, T. The sternum is an index of sex, height and age, Journal of Anatomy. 1890; 24: 527-535.
17. Krause, W. Ueber das weibliche sternum. Int. mschr. Anat. Physiol; Bd. 1897; 14: S.21-26.
18. Ashley, G.T. Observation on the human sternum proc. Anat soc. Get. Britain & Irlend, J.Anat. 1951; 85: 4,412.
19. Ashley, G.T. Typing of the human sternum an analysis of the ossification pattern in 520 sterna in the development stages, proc. Anat soc. Get. Britain & Irlend, J.Anat. 1953; 87: 4,439.
20. Narayan, D. and Varma, H.C. Sternal index for male and female in U.P. Journal of Anatomical Society of India. 1958; 7: 71-72.
21. Jit, I., Jhingan, V. and Kulkarni, M. Sexing the human sternum. American Journal of Physical Anthropology. 1980; 53: 217-224.
22. Dahiphale V.P., Baheete B.H., Kamkhedkar S.G. Sexing the human sternum in Marathwada Region. J. Anat. Soc. India.2002; 51(2): 162-167.

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Self Poisoning Deaths

B. Karunaker*, Abhijit Subhedar, Mojammed Taquiddinkhan***, Jakkam Surendar*****

Abstract

Suicide is nothing but self-killing which is a growing problem in developing as well as developed countries. Developing countries are suffering with suicide by agricultural poison whereas in developed countries it is by drugs. To analyze the situation of suicides by insecticide in males the present study is conducted in Hyderabad in department of forensic medicine, osmania medical college, hyderabad. Total of 132male cases of suicide by insecticides are observed.In this most of the deaths are in the age group of 41-50 years withfanancial health related problems. The decreasing order of insecticides to commit suicide areorganophospharus, organochlorins, carbamate.

Keywords: Suicide; Insecticide; Male.

Introduction

The word "suicide" was first used by the English author, Sir Thomas Browne in 1642 in his treatise "Religio Medici". The word originated from SUI (of oneself) and CAEDES (murder).Durkheim(1858-1917) defined suicide as " death resulting directly or indirectly from a positive or negative act of the victim himself, which he knows will produce this result" this excludes those who servive the attempt.

Suicide is among the top three causes of death among youth worldwide. According to the WHO, every year, almost one million people die from suicide and 20 times more people attempt suicide; a global mortality rate of 16 per 100,000, or one death every 40 seconds and one attempt every 3 seconds, on average. India ranks 43rd in descending order of rates of suicide with a rate of 10.6/100,000 reported in 2009 (WHO suicide rates) [2]. According to NCRB 2010 report In India, during 2009 consumption of a poison (33.6%), hanging (31.5%), self-immolation (9.2%), and drowning (6.1%) were the commonest modes of suicide [3,4]. Jumping from buildings accounted for 1.5%. Studies show that consumption of pesticides, such as the readily available agricultural pesticides in rural areas, is the commonest means of suicide and attempted suicide in India [5,6,7] and in rural areas of low income countries [8]. Agricultural chemical poisoning has also been reported in Japan [9], Thailand [10], Sri Lanka [11], Bangladesh [12], and the USA [13]. Men are more likely to use organophosphate poisons and women are more likely to use plant poisons [14]. The use of plant poisons as a means of suicide/attempted suicide is more common in India and south-east Asia [15]. It is however, interesting to note that the increased accessibility to plant poisons over the internet has led to reports of their use in other parts of the world as well [16,17]. The use of aluminium phosphide, a fumigant used to protect grain stores, is associated with a case fatality of >70% and is a particular feature of self-poisoning in northern India [18].

Aims and Objectives

The study was conducted to find out:

- The Incidence and pattern of insecticidal poisoning in males.
- The risk factors for control of incidents of death due to poisoning.

Authors Affiliation: *Associate Professor, ** Professor in charge, ***Professor and Head, Department of Forensic Medicine & Toxicology, Osmania Medical College, Hyderabad, Telangana

Reprints Requests: B. Karunaker, Associate Professor, Department of Forensic Medicine & Toxicology, Osmania Medical College, Hyderabad, Telangana 500095.
EMAIL-drkarnaker@gmail.com

Material and Methods

The present study is done in Department of Forensic Medicine, Osmania Medical College Hyderabad In 2013 on suicidal deaths by insecticidal poisons in males. Required information is collected from Inquest reports, RFSL reports and from family members of deceased with personal discussion. In this study male suicides by inorganic insecticide poisons are taken into consideration. Victims who are died due to organic insecticide are excluded.

Results

The number of Post mortem examinations conducted by the Department of Forensic Medicine Osmania Medical College, Hyderabadare 5082 in 2013. The total number of suicides committed by insecticidal poisoning is coming to 132(2.6%) in the studyperiod. Female deaths are 25(0.5%) by insecticidal poisons.

In the age distribution there is aincreasing incidence from 20 years to 50 years then decrease in the incidence of deaths. Maximum deaths of 35(26.5%) occurred in the age group of 41-50 years. Then 27(20.5%) in 21-30years, 28(21.25)in 31-40 years, 20(15.2%) in 51-60, 16(12.1%) in 61-70years, 2(1.6%) deaths in each age group of 11-20 years, 71-80 years, 81-90 years. Married persons are among the 110 (83.3%) and unmarried are 22 (17.7%).61 (46.2%) are illiterates; 59(44.7%) has primary education; 9 (6.9%) has secondary education; 3 (2.3%) are graduates.

121 (91.7%) are habitat in rural areas; 7 (5.3%) are from sub-urban area of towns and 4(3.0%) are living in city. 92 (69.7%) are farmers by their occupation; 16 (12.1%) are business mans 10 (7.6%) has employed in private agencies; 5 (3.8%) are government employees,5(3.8%) are laborers; 4 (3.0%) victims are not working anywhere and 2(1.5%) are students. 14 (10.6%) persons died on the spot because nobody observed them. 20(15.2%) of them are attended deaths and died within 6 hours from consumption. 45 (34.0%) persons survived between 6 to 24 hours. 34 (25.8%) persons died in between 1 to 3 days. And another 18 (13.6%) persons had a longer hospital stay and died after three days. The longest stay in the hospital was 21 days for a case of organophosphate poisoning.

Most of the deaths are committed by consuming Organo Phosphate compounds. They accounted for 110 (83.3%) deaths of total 132. 14(10.6%) persons consumed Organo Chlorine compounds; 8 (6.0%) persons consumed Carbamate.Financial reasons are the leading precipitating factors for committing suicides in the present study and 65 (49.2%) persons died for this. The next leading factor is the health problems, this accounts 37 (28.0%), Maladjustment with the family members is also another leading cause and 12 (9.0%) persons are died for this reason. Failure in love has taken 6 (4.6%) person and failure in education 2 (1.5%) persons.

Discussion and Conclusion

Suicide is one of the leading manner of deaths all over the globe.

It is found that the total number of deaths due to insecticidal poison are132 in the calendar year 2013.it seem the number is less because people are choosing other methods to commit suicide because insecticidal poisons are not easily available to all persons. The vulnerable age group found to be 21 years to 50 years with peaks in 41 years to 50 years, because at this age group people has to full fill many family responsibilities.

Most of the victims are from illiteracy group and from rural back ground. This gives us information that these are the risk group persons on whom vigilance should be kept constantly. The people in urban or sub-urban area are adopting other methods to commit suicide as hanging or burns also. Farmers are at risk in the present study because of their easy access to insecticidal substances.

14 persons were not seen immediately after they consumed the poison. They died on the spot. This is a voluminous number in expressing the unattended deaths. Majority of the victims are transported to the nearest hospital soon they witnessed the act. Even after that deaths are more because there is delay in transportation and giving of proper treatment.

The commonest poison consumed is Organo Phosphate compound. It is the same found in earlier studies also. This is because of the easy access to this insecticide. Recently Organo Chloro compound consumption is coming down as it is not preferred by the farmers as an insecticide.

Financial problems are the leading precipitating factors, followed by the health problems which include pain abdomen in young persons and incurable diseases in elderly persons. maladjustment with family members,Failure in education and failure in love are important aspects to be addressed, as because these are all preventable deaths.

Suggestions

Suicide is an important, largely preventable public health problem

- Early detection and adequate treatment to all vulnerable populations. They need counseling in adoptive positive health, they also need family and social support.
- Strict vigilance should be maintained in selling insecticides.
- All insecticides are properly labeled about its antidotes
- All health care facilities should be strengthened of with availability of all lifesaving drugs and proffer training should be given to all health care professionals in life saving measures.
- The role of the media is becoming increasingly relevant. A delicate balance needs to be maintained between press freedom and responsibility of the press to minimize the harm to vulnerable individuals.

Conflict of Interest: no

- Ethical comity clearance is taken
- Source of funding- self

References

1. Durkheim E. A study in sociology trans by J.A spolding&G.Simpson with introduction by Simpson Glancole,1917,free press.
2. World Health Organization. Suicide rates per 100,000 by country, year and sex. [Last accessed on 2012 Mar 27].
3. Accidental Deaths and Suicides in India. New Delhi: Ministry of Home Affairs, Government of India; 2010. National Crime Records Bureau. 2008.
4. Accidental Deaths and Suicides in India. New Delhi: Ministry of Home Affairs, Government of India; 2009. National Crime Records Bureau. 2007.
5. Sharma RC. Attempted suicide in Himachal Pradesh.Indian J Psychiatry. 1998; 40: 50–4.
6. Srivastava MK, Sahoo RN, Ghotekar LH, Dutta S, Danabalan M, Dutta TK, et al. Risk factors associated with attempted suicide: A case control study. Indian J Psychiatry. 2004; 46: 33–8.
7. Banerjee G, Nandi DN, Nandi S, Sarkar S, Boral GC, Ghosh A. The vulnerability of Indian women to suicide a field-study. Indian J Psychiatry. 1990; 32: 305–8.
8. Gunnell D, Fernando R, Hewagama M, Priyangika WD, Konradsen F, Eddleston M. The impact of pesticide regulations on suicide in Sri Lanka.Int J Epidemiol. 2007;36:1235–42.
9. Sato T, Takeichi M, Hara T. Suicide attempts by agricultural chemicals. Indian J Psychiatry. 1993;35:209–10.
10. Lotrakul M. Suicide in Thailand during the period 1998-2003. Psychiatry ClinNeurosci. 2006; 60:90–5.
11. Jeyaratnam J. Health problems of pesticide usage in the Third World. Br J Ind Med. 1985; 42: 505–6.
12. Khan N. Poisoning in a medical unit of Dhaka medical college hospital in 1983. Bangladesh Med J. 1985; 14: 9–12.
13. Langley R, Sumner D. Pesticide mortality in the United States 1979-1998. Vet Hum Toxicol. 2002; 44: 101–5.
14. Sudhir Kumar CT, Mohan R, Ranjith G, Chandrasekaran R. Gender differences in medically serious suicide attempts: A study from south India. Psychiatry Res. 2006; 144: 79–86.
15. Gaillard Y, Krishnamoorthy A, Bevalot F. Cerberaodollam: A 'suicide tree' and cause of death in the state of Kerala, India. J Ethnopharmacol. 2004; 95: 123–6.
16. Kawohl W, Habermeyer E. Plant poisonings - a problem extending the scope of ethnopharmacology. J Ethnopharmacol. 2005; 100: 138–9.
17. Jang DH, Hoffman RS, Nelson LS. Attempted suicide, by mail order: Abrusprecatorius. J Med Toxicol. 2010; 6: 427–30.
18. Chugh SN, Dushyant, Ram S, Arora B, Malhotra KC. Incidence & outcome of aluminium phosphide poisoning in a hospital study. Indian J Med Res. 1991; 94: 232–5.

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Study of Incidence of Psychotropic Drug Abuse among the UG & PG Medical Students in Padmashree Dr Vithalrao Vikhe Patil Foundation's Medical College, Ahmednagar, Maharashtra

RishiRaj Ashok Sinha*, Dilip Kumar Gund**

Abstract

During the past few years, dramatic changes have occurred in the pattern of drug abuse and crime pattern. Significant increase is noticed in the number of drug abusers and emergence of money and muscle power centres who are the member of dominant and governing class these groups or centres acts as drug providers.All Medical students of PDVVPF's Medical Collge Ahmednagar. All participants will be educated about study undertaken and importance of reply given by them . Acceptance of participation in the study will be taken as consent. All medical students of either sex will be included. Available research indicates that, traditionally, the actual rate of drug use in medical school has been similar, if not lower, than that of an equivalent non-medical school population for many drugs.

Keywords: Medical Students.; Substance Abuse; Medical Institutions; High Risk Population.

Introduction

Drug dependence and drug abuse are not synonymous to be considered as a disease and may be considered as a variant of social behaviour norms. It represents two different facets of the same drug abuse [1]. After a long time, it results in physical harm due to organic involvement, behavioural , psycho-social and financial problem. Friendship with like minded drug dependents or drug abuser is the main hurdle in rehabilitation in post detoxification period encountered by the family. The psychiatric pressure and the peer pressure from the past friends leads to relapse in drug abuse. During the past few years, dramatic changes have occurred in the pattern of drug abuse and crime pattern. Significant increase is noticed in the number of drug abusers and emergence of money and muscle power centres who are the member of dominant and governing class these groups or centres acts as drug providers [2]. All the abusers turn to some form of petty crimes like burglary, extortion ,bullying so as to meet the finances required to procured of substance for abuse [3]. Juvenile drug abuse and delinquency in metro cities is common but small cities and villages have been afflicted with it [4]. Thus, it is clear that, medical students be sufficiently counselled about the drug abuse and its consequences for self protection and the society. Preventive counselling, early detection and treatment with rehabilitation within the studentship of medical students would go in long way in prevention of rising trend of drug abuse and juvenile delinquency [5]. Medical students are more likely to come in contact, knowledge and use of drugs to have desired effect.They are conversant with its effect, potency and cost thus they are more likely to abuse a number of substance / drugs for desired effect.

Materials & Methods

Cross sectional study will be carried out among medical students of PDVVPF's Medical College Ahmednagar, Maharashtra. All participants chosen willbe from Second MBBS onwards having attained the majority from both sexes. They will be assured of confidentiality of the information given to the questions given in the questionnaire.

Drug abuse means taking drug without any

Authors Affiliation: 3rd Year MBBS, Associate Professor, Department of Community Medicine, PDVVPF's Medical College, Vilad Ghat, Ahmednagar, Maharashtra 414111.

Reprints Requests: RishiRaj Ashok Sinha, 3rd Year MBBS, Department of Community Medicine, PDVVPF's Medical College, Vilad Ghat, Ahmednagar, Maharashtra 414111.

E-mail: sinharishiraj24@gmail.com

medical reasons as self medication to get the desired effect(s).

Study Design

Cross sectional study.

Hypothesis

Being a descriptive study hypothesis is Not required.

Feasibility Criteria

No feasibility criteria is required.

Inclusion Criteria

All Medical students of PDVVPF's Medical Collge Ahmednagar.

All participants will be educated about study undertaken and importance of reply given by them . Acceptance of participation in the study will be taken as consent. All medical students of either sex will be included.

Exclusion Criteria

Those who don't like to participate or having participated and not answered the question(s) will be rejected. Those who are taking psychiatric treatment including any medication will be excluded as well.

Ethical and Legal Consideration

Sufficient permissions and consent were procured from Principal, Hospital and clearance from the Institutional Ethical Committee was obtained in advance

Observation

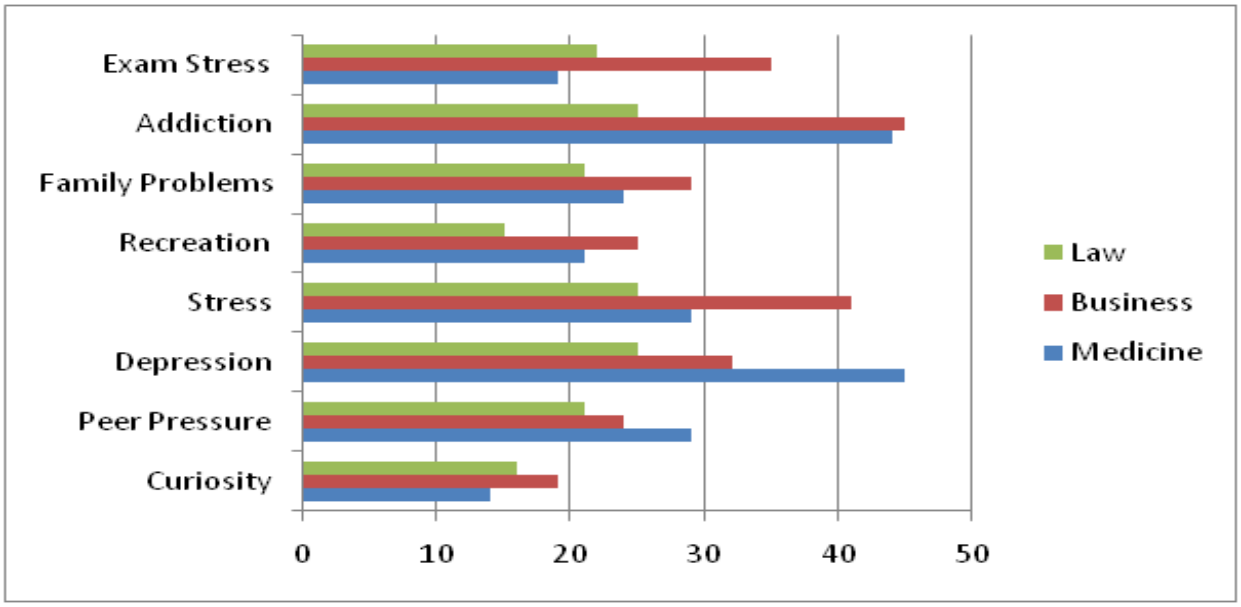


Fig. 1:

Results:- Among boys (N=500).

Substance	Never used	Just to experiment	Occasional use	Light Use	Moderate Use	Heavy use
Cigarette.	180	170	35	35	40	40
Smokeless Tobacco.	370	50	20	15	25	20
Alcohol.	15	120	70	25	20	250
Diazepam.	380	40	47	20	3	10
Crocin.	410	40	15	10	10	15
Morphine.	460	10	20	8	2	0

Results:- Among Girls (N=200).

Substance	Never used	Just to experiment	Occasional use	Light Use	Moderate Use	Heavy use
Cigarette	124	16	10	25	15	10
Smokeless Tobacco.	142	18	20	5	10	5
Alcohol.	41	21	60	30	20	28
Diazepam.	165	10	15	5	5	0
Crocin.	153	17	10	3	7	10
Morphine.	170	3	17	10	0	0

Fig. 2:

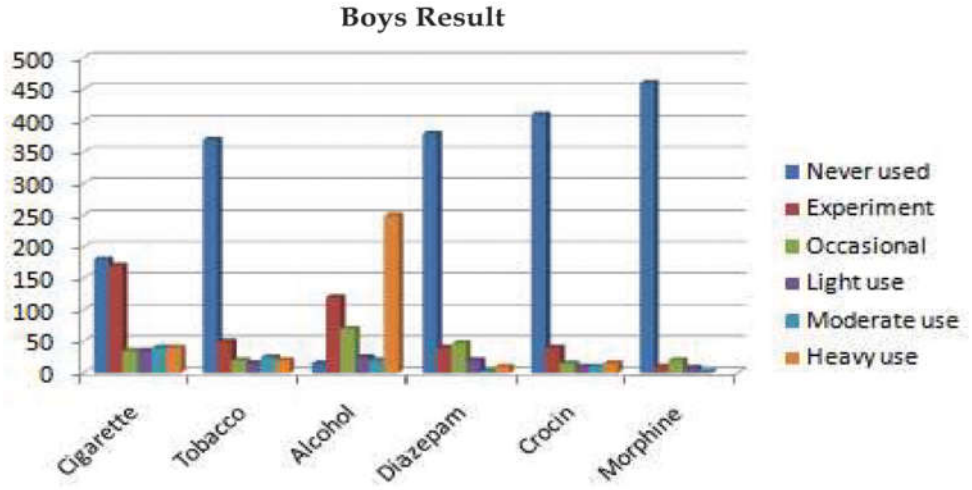


Fig. 3:

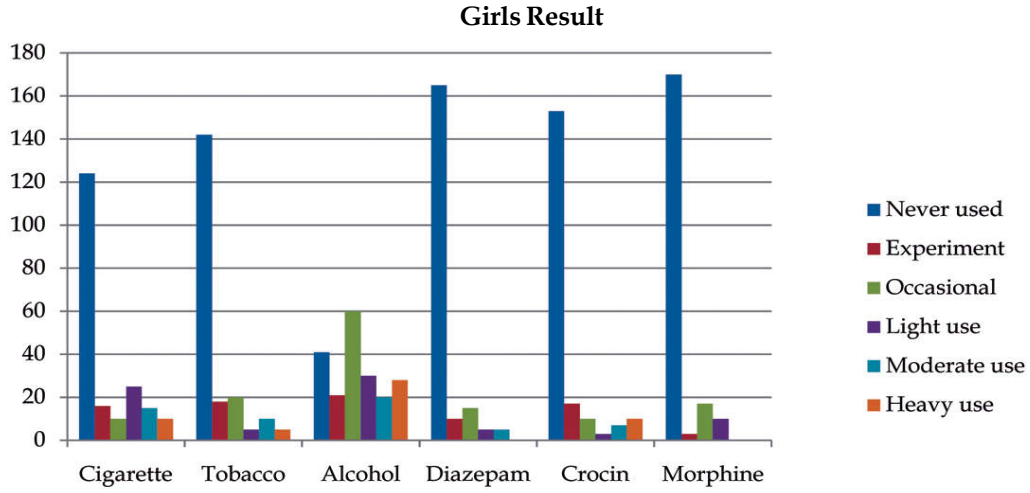
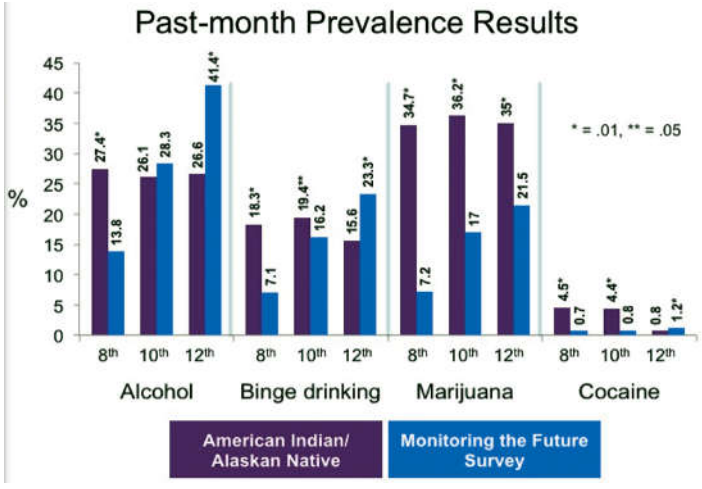


Fig. 4:



Discussion

1. The frequency of substance abuse found in the present study among the medical students was relatively high in some case and low in some case compared to other similar study.
2. Use of alcohol at least once in lifetime was found to be 14 percent in boys and 10.5 percent in girls, total 24.5 percent in the present study as compared to 89 percent (Webb et al 1966), [16] 57.8 percent (Ponnudurai et al, 1984), [2] and 58.4 percent (Singh, 1979) [3] in other similar studies.
3. Even the frequency of daily cigarette smoking was found to be only 30 percent in present study as opposed to 30 percent (Melani et al, 2000), [11] 11 percent (Hussain et al,1955) [7] and 30.8 percent (Tandon et el,1990) [12] in other studies. Result was somewhat similar compare to other studies
4. In the other study Daughton et al. Showed that 84% medical students reported history of alcohol use [20].
5. Khan N studies on substance use among medical school in zimbabwe showed that alcohol was the commonest (34.9%)substance in this area [21].
6. It was also interesting to note that students from extended joint families and students having history of substance abuse in siblings were at higher risk of using these substances.
7. It was disturbing to note that nearly half of students 43.7% ,did not perceive any ill effects of substance abuse, many continued their substance abuse though they did not enjoy it, none of them had ever sought a medical or psychiatric help for their substance abuse and most of them failed in their attempts to quit and attributed it to lack of will power .
8. Available research indicates that, traditionally, the actual rate of drug use in medical school has been similar, if not lower, than that of an equivalent non-medical school population for many drugs [13].
9. However, medical students have still been reported to use alcohol,marijuana, psychedelics, tranquilizers, and opioids.Current study reveal that Unprescribed use of drug like diazepam,crocin is taken by 41.71% whereas A recent survey at one medical school showed that 10% of medical students had a history of unprescribed use of prescription stimulants [14].
10. A medical student's drug use Behaviour typically begins prior to initiating their medical education during high school and college [13].
11. Current Study reveal that diazepam is taken among 22 percent of students whereas previous study shows Abuse of tranquilizers (e.g., benzodiazepines) is an exception in that its use more frequently begins during medical school [13,15].
12. Current Study and Previous researches have shown that significantly higher proportion of substance abuse was associated with pre disposing factors like joint family, parentral abuse status, working status, and illiteracy/ school dropout, migration, loosening of traditional methods of social control [17,18].
13. Current Study reveal that there are 55% drug abuser belong to business class families and 20% from farming background whereas Previous studies revealed that highest percentage of drug abusers (61.3%) are coming from business-class families and the least from the families where father is involved in farming(34%) [19].

Conclusion

Reason for substance abuse in medicos. (N=700)

REASONS:-	No of students : (in %)
Curiosity.	70.4%
Celebrate occasions.	60.8%
Show off.	12.7%
Broken affair.	5%
To kill time.	15.6%
Peer pressure.	9.5%
For sleep.	5%
For headache due to tension.	2%

Ill effects of substance use by Medicos

Perceived ill effects of the substance.	No of students : (in %)
1. No ill effects.	**43.7%**
2. Problems in physical health.	**30.3%**
3. Problems in academic performance.	**10%**
4. Problems in mental health.	**8.5%**
5. Problems in social relationships.	**5%**
6. Problems in family relationships.	**2.5%**

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Conflict of Interest

No conflict of interest involved so ever.

Source of Finding

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Reference

1. Zulfikar Ali. R. and V. Vankar G. K. Psychoactive Substance Use among Medical Students. Indian Journal of Psychiatry. 1994; 36: 138-40
2. Ponnudurai, R., Somasundaran, O., Indira, T. P.and Gunasekar, P. Alcohol and Drug Abuse Among Internees, Indian Journal of Psychiatry. 1984; 26: 128-32.
3. Singh, G. Drug Abuse Among Medical Students-I. Prevalence of Pattern of Use. . Indian Journal of Psychiatry. 1979; 21: 332-38.
4. Singh, G. Drug Abuse Among Medical Students-II. Sociodemographical and Personality Factors. Indian Journal of Psychiatry. 1979a; 21: 339-44.
5. Pickard, M., Bates, L., Dorain, M., Greig, H. and Saint, D. Alcohol and Drug Use in Second Year Medical Students at the University of Leeds, Medical Education. 2000; 34: 86-7.
6. Newbury-Birch, D., White, M.and Kamali, F. Factors Influencing Alcohol and Illicit Drug Use amongst Medical Students. Drug and Alcohol Dependence. 2000; 59: 125-30.
7. Hussain, S. F., Moid, I.and Khan, J. A. Attitudes of Asian Medical Students Towards Smoking. Thorax. 1995; 50: 996-97.
8. Crofton, J. W., Freour, P. P.and Tessier, J. F. Medical Education on Tobacco; Implications of a Worldwide Survey. Medical Education.1994; 28: 187-96.
9. Dekker, H. M, Looman, C. W. N, Adriaanse, H. P Vander and Maas, P. J. Prevalence of Smoking in Physicians and Medical Students and the Generation Effect in Netherlands. Society of Scientific Medicine. 1993; 36: 812-22.
10. Tessier, J. F., Freour, P., Belougne, D. and Crofton, J. Smoking Habits and Attitudes of Medical Students Towards Smoking and Antismoking in Nine Asian Countries. International Journal of Epidemiology. 1992; 21: 298-304.
11. Melani,A.S.,Verponziani, W.,Boccoli,E.,Trianni,G.L., Federici,A.,Amerini, R.,Vichi, M.G. And Sestini, P. Tobacco Smoking Habits, Attitudes and Beliefs among Nurse and Medical Students in Tuscany. European Journal of Epidemiology. 2000; 16: 607-11.
12. Tandon, A. K.., Chaturvedi, P. K., Dubey, A.L., Narang, R.K., Singh, S.K. And Chandra, S. Psychosocial Study of Cigarette Smoking. Indian Journal Of Psychiatry. 1990; 32: 159-61.
13. Baldwin DC, Hughes PH, Conard SE, Storr CL, Sheehan DV..Substance use among senior medical students. JAMA. 1991; 265(16): 20748. http://dx.doi.org/10.1001/jama.1991.03460160052028.
14. Tuttle JP, Scheurich NE, Ranseen J. Prevalence of ADHD diagnosis and nonmedical prescription stimulant use in Medical Students . Acad Psychiatry. 2010; 34(3): 220-3.
15. Maddux JF, Hoppe SK, Costello RM. Psychoactive substance use among medical students. Am J Psychiatry. 1986; 143(2): 18791.
16. Webb, E., Ashton, C. H., Kelly, P. And Kamali, F. Alcohol and Drug Use in UK University Students.Lancet. 1996; 348: 922-25.
17. Sarangi L, Himanshu P, Acharya O, P Panigrahi. Substance abuseamong adolescents in urban slums of Sambhalpur. Indian J Community Med. 2008; 33: 265-7.
18. Bansal RK, Banerjee S. Substance use by child laborers. Indian J Psychol. 1993; 35: 159-61.
19. Naskar NN, Roy M, Bhattacharya S K. A study of some socioeconomic factors on drug abuse among the undergraduate medical students in Calcutta. Indian J Community Med. 2004; 29: 69-71.

20. Daughton JM, Daughton DM, Patil KD. Self recognition of alcohol and cigarette dependency among medical students. Perceptual and motor skills. 1997; 85(1): 115-20.

21. Khan N, Arnott R. Substance use among medical school in Zimbabwe : pattern and prevalence . Central African journal of medicine. 1996; 42(8): 223-9.

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Profile of Fatal Craniocerebral Injuries

Vikrant S. Kalokhe*, R.S. Bangal, Anand P. Dongre*****

Abstract

Head injuries or Craniocerebral injuries occupy a significant place due to high morbidity and mortality in developing countries like India. With severe paucity of trained man power, investigative facilities and rehabilitative services, traumatic brain injuries place considerable burden on care givers in different situations. Head injury is the most common emergency encountered in trauma units and casualty departments. The present study was undertaken on 100 victims died due to head injury to find their age & sex distribution, timing of head injury, survival period, types of skull fractures & types of intracranial haemorrhage. The highest incidence was seen in age group of 21-30 years and males clearly outnumbered females. In the present study, most of the incidents occurred between 6 PM to 12 midnight. Maximum number of victims died on spot.

Linear fracture was the commonest type of skull fracture & combination of subdural haemorrhage with subarachnoid haemorrhage was the commonest intracranial haemorrhage.

Keywords: Head Injury; Skull Fractures; Intracranial Haemorrhages.

Introduction

Head accommodates one of the most vital organs, the brain. Generally speaking, it is well protected within the bony cranial cage. But once the impact of force crosses the protective threshold, then life is invariably in danger [1]. One of the characteristic features of brain is that once it is damaged, regeneration or complete healing does not occur. Head injury is commonly used as synonym to craniocerebral injury, acquired brain injury and traumatic brain injury [2].

National Advisory Neurological Disease and Stroke Council has defined craniocerebral injury as "a morbid state resulting from gross or subtle structural changes in the scalp, skull and / or the contents of the skull, produced by mechanical forces". Head injury is the most common emergency encountered in trauma units and casualty departments [3].

At the global level, it is estimated that the annual incidence and mortality from Acquired Brain Injuries (ABIs) or Traumatic Brain Injuries (TBIs) is 200 and 20 per 1,00,000 per year, respectively. Like other developing countries, India is also passing through rapid industrialization, urbanization, motorization, economic liberalization and changing social milieu, and is facing a myriad of health, social, economic and technological problems at the beginning of the new millennium. An emerging problem due to this demographic, epidemiological and social transition has been an increase of injuries especially head injuries and consequent effects. The complex interaction of human, vehicle and environmental factors along with lack of sustainable preventive programs has contributed to this 'silent epidemic' of injuries. In India incidence of head injuries is 160/ 100,000/ year, prevalence is 97/100,000/year, mortality is 20/100,000/year and case fatality rate is 9% [4].

The study of craniocerebral injury cases from

Authors Affiliation: *Assistant Professor, ***Professor, Dept. of Forensic Medicine, Dr. Vasantrao Pawar Medical College Hospital & Research Centre, Nashik, Maharashtra 422207. **Professor, Dept. of Forensic Medicine, Smt. Kashibai Navale Medical College, Pune, Maharashtra.

Reprints Requests: Vikrant Kalokhe, Assistant Professor, Dept. of Forensic Medicine, Dr. Vasantrao Pawar Medical College Hospital & Research Centre, Nashik, Maharashtra 422207.
E-mail: rbangal@gmail.com

medico legal point of view among rural population is still lacking. Most of the studies are done in urban areas only. Hence present work was carried out in rural area of Loni which has patient's drain from various villages of Ahmednagar, Nashik and Aurangabad Districts.

Main objective of the study is to asses and evaluate the medico-legal profile of craniocerebral injuries resulting from all causes. It is expected that the study will not only help in medico-legal investigation but also will be a good reference for prevention and management of head injury cases.

Material and Methods

The present study was carried out in the Department of Forensic Medicine & Toxicology, Rural Medical College, Loni, in Dist. Ahemadnagar, Maharashtra. Total 100 cases of head injuries due to various reasons were studied. Preliminary data related to name, age, sex, address, brought by whom, date and time of incidence, date and time of admission, treatment given, date and time of death was gathered from police inquest report, hospital papers, concerned investigating officer and also from relatives. The available record of radiological investigations including X ray film, and CT scan were also carefully reviewed. During autopsy, detailed examination was carried out & both external and injuries were noted. Data was analyzed and presented in this paper.

Observations

Age and Sex Distribution

The highest incidence was seen in age group of 21-30 years comprising 37% cases followed by 31-40 years having 19% cases. The lowest incidence was seen in age group of more than 70 years (2%). Males comprised 82% of the total victims with male to female ratio as 4.5:1.

Table 1: Distribution of Cases according to Age and Sex.

Age Group (Years)	Male	Female	Total No (%)
0-10	5	5	10 (10)
11-20	3	2	5 (5)
21-30	34	3	37 (37)
31-40	18	1	19 (19)
41-50	11	4	15 (15)
51-60	5	2	7 (7)
61-70	4	1	5 (5)
> 70	2	0	2 (2)
Total	**82**	**18**	**100**

Time of Incident

In the present study, most of the incidents occurred between 6 PM to 12 midnight comprising 41% of total cases, followed by time interval 12 noon to 6 PM (28%). The least number of cases (11%) occurred 6 AM to 12 noon.

Table 2: Distribution of Cases according to the Time of Injury

Time of Incidence	No. of Cases (%)
12 Midnight-06 A.M.	20(20)
06 A.M.-12 Noon	11(11)
12 Noon-06 P.M.	28(28)
06 P.M.-12 Midnight	41(41)
Total	**100(100)**

Survival Period

The maximum number of victims (57%) died on spot, followed by 14% victims died within 24 hours after sustaining injuries. Only 5% victims survived for more than 7 days.

Table 3: Distribution of Cases according to the Survival Period.

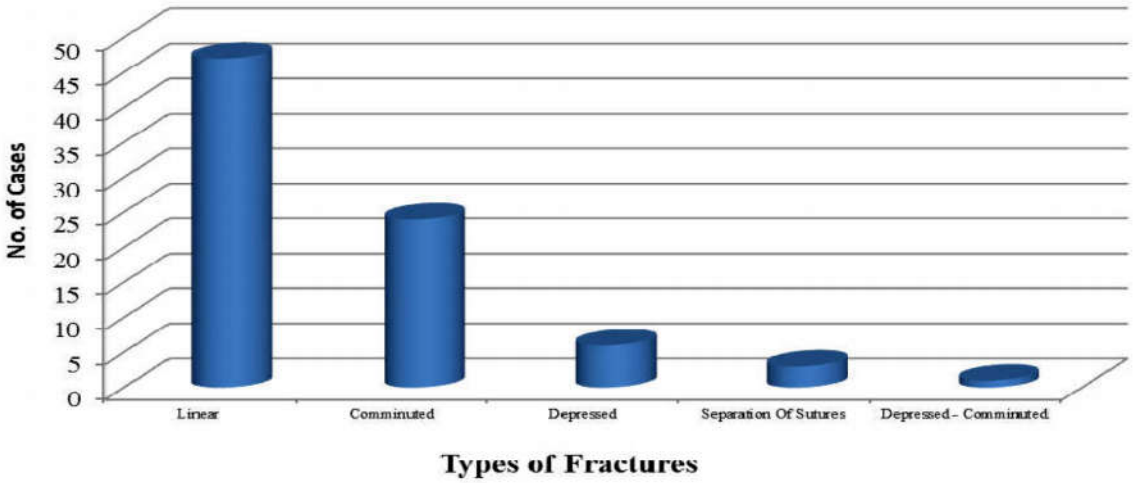
Survival Period	No. of Cases (%)
Death on Spot	57 (57)
0-6 Hrs	11 (11)
6-12 Hrs	0 (0)
12-24 Hrs	3 (3)
1-2 Days	5 (5)
2-4 Days	11 (11)
4-7 Days	8 (8)
More Than 7days	5 (5)
Total	**100(00)**

Incidence of Skull Fracture

In present study, 71% fatal cases of craniocerebral injury showed fractures of skull in various forms, while 29% fatal craniocerebral injury cases did not reveal any fracture. 81 fractures were observed in 71 cases. Out of which linear fracture was the commonest type 47(58.02%) and depressed comminuted type was least common 1 (1.23%).

Table 4: Distribution according to the Type of Fracture of Skull

Type of Fracture	No. of Fracture (%)
Linear	47 (58.02)
Comminuted	24 (29.62)
Depressed	6(7.40)
Separation of Sutures	3(3.70)
Depressed-Comminuted	1(1.23)
Total	**81(100)**



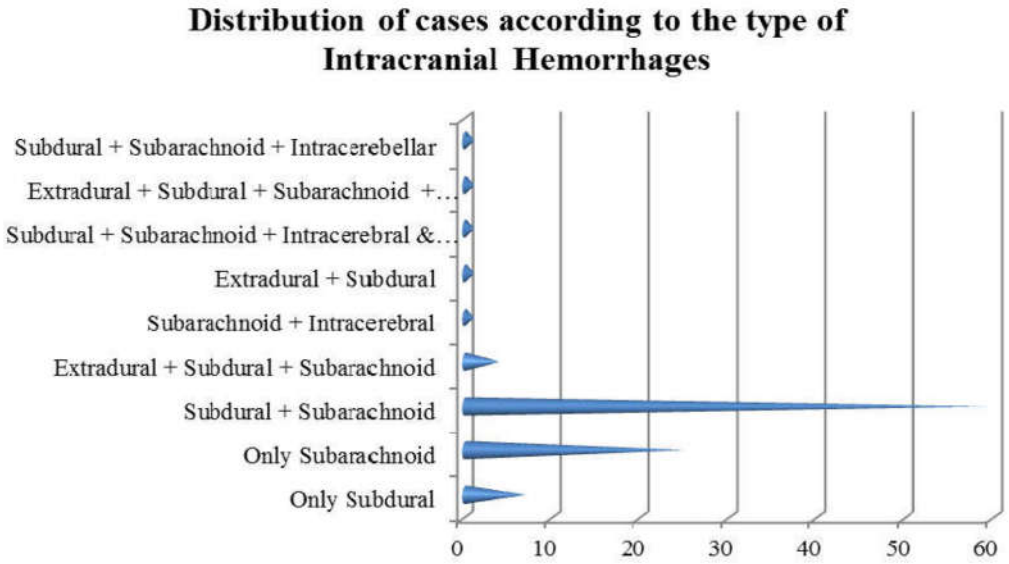
Graph 1: Distribution according to the Type of Fracture of Skull.

Types of Intracranial Haemorrhages

Intracranial haemorrhages were observed in all the cases (100) studied. Isolated subarachnoid haemorrhage was seen in 25% cases. Subdural haemorrhage was seen in 7% cases. Combination of subdural haemorrhage with subarachnoid haemorrhage was on the first place (59%), followed by other combination.

Table 5: Distribution of Cases according to the Type of Intracranial Hemorrhages

Type of Hemorrhage	No. of Cases (%)
Only Subdural	7 (7)
Only Subarachnoid	25 (25)
Subdural + Subarachnoid	59 (59)
Extradural + Subdural + Subarachnoid	4 (4)
Subarachnoid + Intracerebral	1 (1)
Extradural + Subdural	1 (1)
Subdural + Subarachnoid + Intracerebral & Intraventricular	1 (1)
Extradural + Subdural + Subarachnoid + Intrventricular	1 (1)
Subdural + Subarachnoid + Intracerebellar	1 (1)
Total	**100 (100)**



Graph 2: Distribution of Cases according to the Type of Intracranial Hemorrhages

Discussion

In this study, highest incidence was seen in age group of 21-30 years comprising 37% cases followed by 31-40 years having 19% cases. The lowest incidence was seen in age group of more than 70 years (2%). The similar findings are noted by Tirpude BH et al [5] and Tandle RM and Keoliya AN [6]. The maximum number of cases in age group of 21-30 years can be explained by the fact that this age group is really active group, as it is necessary to go out of house for doing the service and/ or to do the work, day to day activities for maintenance of life and survival. Individuals in the age group more than 60 years and less than 20 years were the least affected which is explained by the fact that these age groups are dependent age group and having less outdoor activities as well as external affairs. If sex wise distribution of cases is considered, males clearly outnumbered females with male to female ratio as 4.5:1. This is in accordance with the other researcher like Agarwal SS et al [7] and Vij A et al [8]. High preponderance of males in fatal craniocerebral injury can be attributed to their involvement in activities outside the home (i.e. driving, strenuous work, industrial work and agricultural work). While females mainly do household work which is unlikely to expose them to such accidents.

The maximum numbers of accidents were reported between between 6 PM to 12 midnight comprising 41% of total cases, followed by time interval 12 noon to 6 PM (28%). The least number of cases (11%) occurred 6 AM to 12 noon. These findings are consistent with the study of Sinha VS et al [9] and Parmar P et al [10] Preponderance of head injury cases during evening and night time due to lack of street lights, poor condition of vehicles (e.g. defective head lights), poor road conditions and lack of signals on road in rural area. Attention of person is disturbed due to sleep, fatigue and also due to alcohol consumption.

The maximum number of victims (57%) died on spot, followed by 14% victims died within 24 hours after sustaining injuries. Only 5% victims survived for more than 7 days. Similar findings are noted by Murty OP et al [11]. Maximum number of victims dies while on the way to hospital (brought in death cases) or died within 24 hours because severe injuries in the form of intracranial haemorrhages or contusions and lacerations of brain which are not compatible with life. Delay in the shifting of the patient from the spot of incidence to the hospital also responsible for immediate death.

In present study, 71% fatal cases of craniocerebral injury showed fractures of skull in various forms, while 29% fatal craniocerebral injury cases did not reveal any fracture. Fracture of skull indicates an impression of severe injury and the impact occurred with considerable force.

81 fractures were observed in 71 cases. This finding is consistent with the findings of Agarwal SS et al [7] and Elesha SO and Daramola AO [12]. Out of which linear fracture was the commonest type 47 (58.02%) and depressed comminuted type was least common 1 (1.23%). Similar trends are seen by Patel DJ and Agnihotram G [13] and Menon A et al [14]. Intracranial haemorrhages were observed in all the cases (100) studied. Isolated subarachnoid haemorrhage was seen in 25% cases. Subdural haemorrhage was seen in 7% cases. Combination of subdural haemorrhage with subarachnoid haemorrhage was on the first place (59%), followed by other combination. These findings are consistent with the study of Patil AM and Walter FV [15] and Shaikh MI et al [16].

References

1. Nandy A. Regional Injuries. In: Principles of Forensic Medicine. 2nd ed. Calcutta: New Central Book Agency (p) Ltd 2005; 295-303.
2. Gordon I, Shapiro HA. Regional Injuries of Medico-legal Importance. In: Forensic Medicine A Guide to Principles, 2nd ed, New York: Churchill Livingstone. 1984; 250-296.
3. Tedeschi CG. Head and Spine. In: Forensic Medicine, Philadelphia: W B Saunders Company; 1977; 1: 29-63.
4. Gururaj G. Epidemiology of traumatic brain injuries: Indian scenario. Neurological Research. 2002; 24: 24-28.
5. Tirpude BH, Naik RS, Anjankar AJ and Khajuria BK. A study of the pattern of craniocerebral injuries in road traffic accidents. J Indian Acad Foren Med. 1998; 20(1): 9-12.
6. Tandle RM, Keoliya AN. Patterns of head injuries in fatal road traffic accidents in a rural district of Maharashtra- autopsy based study. J Indian Acad Forensic Med. 2011 July-September; 33(3): 228-231.
7. Agarwal SS, Sheikh I, Lavlesh K. Cranio-cerebral trauma deaths: A postmortem study on 0-15 yrs age group. J Indian Acad Foren Med. 2005; 27(3): 154-158.
8. Vij A, Menon A, Menezes RG, Kanchan T, Rastogi P. A retrospective review of homicides in Mangalore, South India. J Forensic Leg Med/ 2010 Aug; 17(6): 312-315.

9. Sinha VS, Kapoor AK, Pandey SK. Pattern of homicidal deaths in SRN Hospital's Mortuary at Allahabad. Journal of Forensic Medicine and Toxicology. 2003 July-Dec; 20(2): 33-36.
10. Parmar P, Saiyed MZG, Patel PR. Study of pattern of head injury in drivers of two wheeler auto vehicle accidents. Indian journal of Forensic Medicine & Toxicology. 2012 July-Dec; 6(2): 248-252.
11. Murty OP, Arshad AI, Siang LT, Kassim N, Rosli S. Pattern of injuries in fatal motorcyclist accidents and their correlation with drugs, alcohol and road safety measures. International journal of Medical Toxicology and Legal Medicine. 2005; 8(1).
12. Elesha SO, Daramola AO. Fatal head injuries: the Lagos University Teaching Hospital experience (1993-1997). Niger Postgrad Med J. 2002 Mar; 9(1): 38-42.
13. Patel DJ, Agnihotram G. Study of road traffic accidental deaths (RTA) in and around Bastar Region of Chhattisgarh. J Indian Acad Forensic Med. 2010April-June; 32(2): 110-112.
14. Menon A, Pai VK, Rajeev A. Pattern of fatal head injuries due to vehicular accidents in Mangalore. J Forensic Leg Med. 2008 Feb; 15(2): 75-77.
15. Patil AM, Walter FV. Pattern of fatal blunt head injury: a two year retrospective/prospective medico legal autopsy study. J Indian Acad Forensic Med. 2010April-June; 32(2): 144-149.
16. Shaikh MI, Prajapati P, Tailor, Satish K. Pattern of head injury in homicidal deaths. Indian Journal of Forensic Medicine and Toxicology. 2009 Jul-Dec; 3(2): 18-21.

Case Report

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Anomalous Origin of Left Coronary Artery from Pulmonary Trunk

Monil P. Thakrar*, Sapna Gandhi, Alpana Jain***, Arpita Jindal******

Abstract

Anomalous origin of the left coronary artery from the pulmonary trunk also known as Garland-bland-White syndrome is a rare congenital anomaly. The usual clinical course is severe left sided heart failure and mitral valve insufficiency presenting during the first months of life. However, in some cases collateral blood supply from the right coronary artery is sufficient and symptoms may be subtle or even absent. Arrhythmias or sudden cardiac death in adult life may be the first clinical presentation in patients with this anomaly.

Keywords: Coronary Artery; Pulmonary Trunk; Congenital Anomaly.

Case Report

A 21 year old male was found unconscious at his place and was rushed to a nearby hospital where he was declared dead on arrival. A postmortem examination was requested to ascertain the cause of death.

Physical Examination

Subject was averagely built, well nourished male. Rigor mortis was present all over the body. Postmortem lividity was present on back and dependent parts of the body. Fingernails of both hands had bluish tinge.

Gross Examination of the Heart

The heart weighed 380 gms, measured 12x7x4 cms. On opening heart by inflow outflow method, the cut surface of the heart showed ventricular cavities dilated. Right ventricular wall thickness was 0.3 cms. Left ventricular wall thickness was 1.7 cms and its anterior wall was 0.3 cms thick suggesting dilated cardiomyopathy. Interventricular septum thickness was 2 cms. Right coronary artery was found to be dilated and tortuous like a vein from origin to insertion. Left coronary artery was found to be arising from the pulmonary trunk. Aortic stump was 1.3 cms in length and its inner surface was smooth. Left anterior descending artery was unremarkable. Tricuspid valve circumference was 12 cms and its external surface was unremarkable. Mitral valve circumference was 10 cms and its external surface was also unremarkable. Pulmonary valve circumference was 8 cms and its cusps were within normal limits. Aortic valve circumference was 7 cms and its cusps were within normal limits. See Figure 1, Figure 2.

Fig. 1: Figure depicts anomalous origin of the left coronary artery from pulmonary trunk

Authors Affiliation: *2nd Year Resident, **Assistant Professor, ***Senior Demonstrator, ****Associate Professor, Department of Pathology, SMS Medical College, Jaipur.

Reprints Requests: Monil Thakrar, 102, Pearl Grands, A-57, Shantipath, Tilaknagar, Jaipur – 302004.
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Fig. 2: Figure depicts cut surface of the heart with dilated left ventricle and thinned out papillary muscles

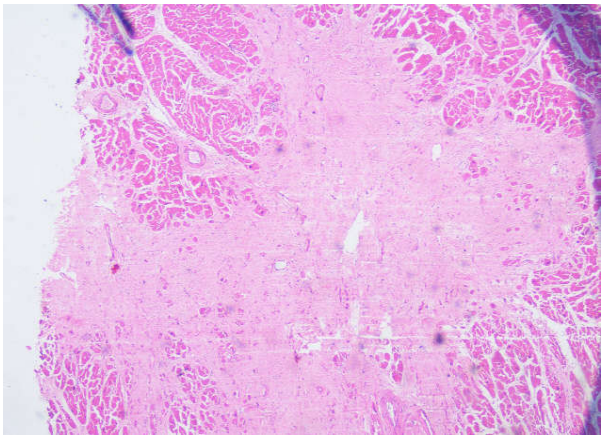

Fig. 3: Microscopic picture of left ventricular wall showing fibrosis of myocardial muscle fibres due to recent myocardial infarction

Microscopic Description of the Heart

- *Left ventricular walls* showed features of recent myocardial infarction. Anterior wall of the left ventricle showed old healed infarct undergone dystrophic calcification. See Figure 3.
- Right ventricular wall, both coronary arteries, aorta and left anterior descending artery were within normal limits.

Discussion

Anomalous origin of the left coronary artery from the pulmonary artery (ALCAPA) was first described by Brook in 1886, and, in 1933, Bland, White, and Garland reported the clinical syndrome of this disease for the first time [1,2,3,7,10]. Its occurrence is rare (present in one of 300,000 live births or about 0.26% in patients with congenital heart disease) [1,2,7,10]. Ever since its first introduction, it was generally an isolated genetic anomaly although there are reports of its association with other diseases including ventricular septal defect, patent ductus arteriosus, tetralogy of Fallot, and AP window [2,5,6,10]. Anatomically, the whole left main coronary artery or only the left anterior descending or circumflex branch connects anomalously to the proximal pulmonary trunk or very rarely to the proximal right pulmonary artery. Very rarely, both coronary arteries connect to the pulmonary artery by a single trunk [3,7]. The anomalous main LCA connects most often to the sinus of valsava immediately above the left or posterior cusp of the pulmonary trunk and rarely above the right cusp [2,7]. Branching pattern of the anomalous left coronary artery remains normal. Because of its high mortality rate (up to 90%)[2], early diagnosis and prompt surgical interventions are necessary to provide gradual myocardial recovery and good clinical outcome, and, due to this reason, the majority of the cases were diagnosed before the patient reaches the age of one year. But even with clinical awareness and early intervention, 65% of the infants born with this anomaly die within the first year of life [7,10]. In the remaining infants who survived beyond the age of one year, the hazard lessens considerably, and the chronic phase ensued. Among the patients who are in the chronic phase and lived into the adulthood, as in the patient reported in this case, rich collateral from the right coronary artery, which arises normally from the aorta, feeds the left coronary artery and the flow is reversed, in which the left coronary artery drains into the pulmonary artery [1,2,4,7,10]. Many such patients are in good health, and few even have normal ECGs. Survival beyond the first year may be related to marked RCA dominance, supplying not only the diaphragmatic portion of LV but also much of the septum and lateral wall [7]. Patient with these arrangements may occasionally only have papillary muscle ischemia and fibrosis, and mitral regurgitation may dominate the clinical picture [7]. Some adults remain asymptomatic or complain only of fatigue, dyspnea, or palpitations. About half have effort angina. The resting ECG is always abnormal, with ST changes or evidence of old anterolateral infarction [3,7]. Exercise ECG usually shows an abnormal ischemic response, while the stress thallium myocardial imaging is usually abnormal [7]. CXR may be normal or may show cardiac enlargement. Cineangiography shows collaterals from the RCA and usually a near normal LV ejection fraction, but

with anterolateral hypokinesia [7,8,10]. However, patients who survived infancy continue to be at risk of death from chronic heart failure secondary to ischemic left ventricular cardiomyopathy, and diagnosis is an indication for operation even among the older patients [7]. In older patients, internal thoracic artery grafting with or without mitral valve repair is a reasonable alternative when size of the graft permits, and this case is achieved simply by the standard coronary arterial bypass grafting technique and ligation or obliteration of the anomalous left coronary artery [2,4,7,8,9]. The risk of premature death depends on the perioperative status of the left ventricle (especially the left ventricular myocardium) and mitral regurgitation [2,7]. The postoperative functional class depends primarily on preoperative LV status and it was generally good late postoperatively. The LV, size (including cardiothoracic ratio) is nearly always markedly reduced after operation [7]. Signs of myocardial ischemia are also reduced. However, the myocardial flow reserve is reduced, and exercise tolerance is lower than normal among the survivors [2,7,10]. In terms of mitral regurgitation, when operation is performed in infancy, even important mitral regurgitation can regress postoperatively. However, if the mitral regurgitation was severe before surgery, it would not regress, and reoperation would require a few months to a few years later [2,7].

Conclusion

Anomalous origin of the left coronary artery from the pulmonary trunk, also known as Garland-Bland-White syndrome, is an extremely rare but potentially fatal congenital cardiovascular anomaly. With its high mortality within the first year of life, even fewer infants who were born with this anomaly. Our case was thereby presented not only because of its rarity but also for the mild clinical onset the patient presented, and a simple operation utilizing the well-established and common cardiac procedures could have effectively corrected this highly fatal defect.

References

1. McMahon CJ, DiBardino DJ, Ündar A, Fraser Jr. CD. Anomalous origin of left coronary artery from the right pulmonary artery in association with type III aortopulmonary window and interrupted aortic arch. Annals of Thoracic Surgery. 2002; 74: 919–21.
2. Dodge-Khatami A, Mavroudis C, Backer CL. Anomalous origin of the left coronary artery from the pulmonary artery: collective review of surgical therapy. Annals of Thoracic Surgery. 2002; 74: 946–55.
3. Keith JD. The anomalous origin of the left coronary artery from the pulmonary artery. British Heart Journal. 1959; 21: 149–61.
4. Alexi-Meskishvili V, Berger F, Weng Y, Lange PE, Hetzer R. Anomalous origin of the left coronary artery from the pulmonary artery in adults. Journal of Cardiac Surgery. 1995; 10: 309–15.
5. Morell VO, Feccia M, Cullen S, Elliott MJ. Anomalous coronary artery with tetralogy of Fallot and aortopulmonary window. Annals of Thoracic Surgery. 1998; 66: 1403–05.
6. Richardson JV, Doty DB, Rossi NP, Ehrenhaft JL. The spectrum of anomalies of aortopulmonary septation. Journal of Thoracic and Cardiovascular Surgery. 1979; 78: 21–7.
7. Kouchoukos N, Blackstone E, Doty D, Hanley F, Karp R. Congenital anomalies of the coronary arteries. In Kirklin/Barratt-Boyes, editor. Cardiac Surgery: Morphology, Diagnostic Criteria, Natural History, Techniques, Results, and Indications, 3rd ed. Philadelphia, Pa, USA: Churchill Livingstone. 2003; 945–69.
8. Bojar R, Warner K. Coronary artery disease. In Manual of Perioperative Care in Cardiac Surgery, 3rd ed. Malden, Mass, USA: Blackwell Science; 1999. p. 5–10.
9. Kreutzer C, Schlichter AJ, Roman MI, Kreutzer GO. Emergency ligation of anomalous left coronary artery arising. Annals of Thoracic Surgery. 2000; 69: 1591–92.
10. Wesselhoeft H, Fawcett JS, Johnson AL. Anomalous origin of the left coronary artery from the pulmonary trunk. Its clinical spectrum, pathology, and pathophysiology, based on a review of 140 cases with seven further cases. Circulation. 1968; 38: 403–25.

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Plasma Cell Leukemia: Clinicopathological Profile of Five Cases

Bajaj Preeti Sumeet*, Kasture Jyoti Uttamrao, Shah Balbir Singh*****

Abstract

Aims: Plasma cell leukemia (PCL) is a rare disorder which develops spontaneously (primary PCL) or evolves in patients with multiple myeloma (secondary PCL). It is defined by the presence of 2×10^9/L peripheral blood plasma cells and plasmacytosis accounting for more than 20 % of the differential white cell count[1]. This study aims to analyze the clinical, morphologic and immunophenotypic profile of cases of Plasma cell leukemia and determine the significance of peripheral blood smear, bone marrow aspiration, serum protein electrophoresis and flow cytometry in the diagnosis. *Methods:* All cases diagnosed as Plasma cell leukemia during the period January 2012 to January 2015 were included in this study. Giemsa (MGG- May Grunwald Giemsa) stained smears of peripheral blood smears and bone marrow aspiration were examined. Serum protein electrophoresis (SPE) and immunophenotyping by flow cytometry were also subsequently done. *Results:* There were five cases of PCL diagnosed during this period which included four males and one female. *Conclusion:* Plasma cell leukemia is an aggressive disease. Peripheral blood smear examination, bone marrow aspiration, serum protein electrophoresis and immunophenotyping (flow cytometric analysis) are very useful in the diagnosis of PCL.

Keywords: Plasma Cell Leukemia; Peripheral Blood Smear; Bone Marrow Aspiration; Serum Protein Electrophoresis; Immunophenotyping.

Introduction

Plasma cell leukemia is defined by the presence of 2×10^9/L peripheral blood cells and plasmacytosis accounting for more than 20% of the differential white cell count [1]. Primary PCL is defined as a malignant Plasma cell proliferation first diagnosed in the leukemic phase, while secondary PCL corresponds to the leukemic transformation of a previously diagnosed multiple myeloma (MM), probably as consequence of clonal transformation [2,3]. Clinical presentation is characterised by nonspecific symptoms, such as fatigue, weight loss and bone pain. The prognosis of PCL is poor with a median survival of 7-11 months. Survival is even shorter when PCL occurs in the context of refractory or relapsing MM [4].

Materials and Methods

Between January 2012 and January 2015, 5 diagnosed cases of Plasma cell leukemia were studied. These included four males and one female. Peripheral blood smear and bone marrow aspirate smears of the patients were studied. These smears were stained with Giemsa (MGG- May Grunwald Giemsa) stain for morphologic evaluation. Serum Protein electrophoresis and Flow cytometry were outsourced to a reference laboratory. The chief complaints of the patients were noted. The following

Authors Affiliation: *Professor & Head, **Assistant Professor, Department of Pathology, Dr Vasantrao Pawar Medical College, Hospital & Research Centre, Nashik – 422003, Maharashtra, India. ***Former Professor, Department of Pathology and Medical Superintendent, Dayanand Medical College & Hospital, Ludhiana-141001, Punjab, India.

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biochemical parameters were determined at diagnosis for each patient: serum calcium, serum creatinine, serum urea and serum uric acid.

Results

Leucocytosis was noted in all the five cases, and anaemia was seen in all the cases. Thrombocytopenia was noted in 4 patients. One patient had normal platelet counts. All the patients had bone pain, history of weight loss and fatigue alongwith non-specific symptom such as malaise. Differential leucocyte count on peripheral blood smear examination showed the plasma cell percentage more than 20% (range 25-52%) in all 5 cases (Figure1& 2). Bone marrow aspirate smears revealed bone marrow involvement by increased number of plasma cells (range 38-88%). Biochemical investigations revealed hypercalcaemia, increased blood urea, high serum creatinine and uric acid levels. M-band was detected on serum protein electrophoresis.

Immunophenotypic Characteristics

Flow cytometry in all five cases was done. All of these cases showed moderate to strong expression of CD 38. Co-expression of CD 38 and CD 138 was also noted. CD 20 positivity was noted in three cases. CD 56 was positive in two cases. However, all five cases were negative for CD 19 and CD 117 (Table 1).

Table 1: Immunophenotypic characteristics of five cases of PCL

Case no.	CD 38	CD 138	CD 20	CD56	CD 19	CD 117
1.	+	+	+	+	-	-
2.	+	+	-	-	-	-
3.	+	+	+	+	-	-
4.	+	+	-	-	-	-
5.	+	+	+	-	-	-

Abbreviations:
PCL- Plasma Cell leukemia
CD - Cluster of Differentiation

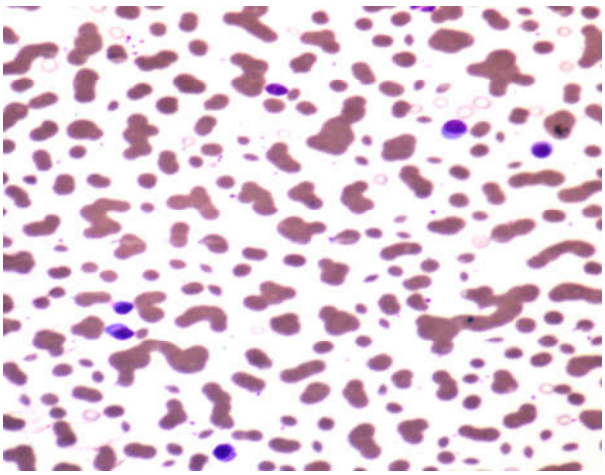

Fig. 1: MGG Stained peripheral blood smear showing circulating plasma cells in Plasma cell leukemia (100X)

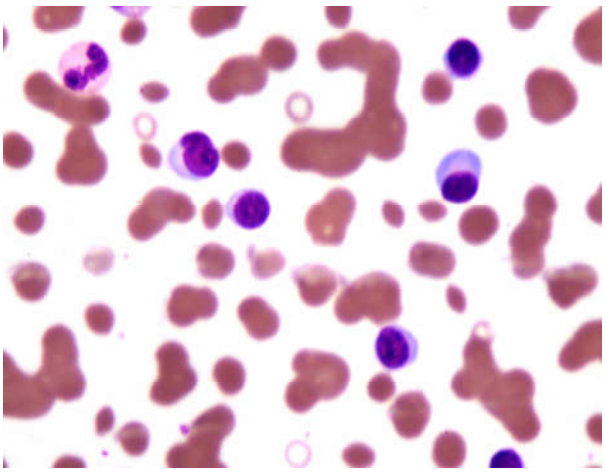

Fig. 2: MGG Stained peripheral blood smear showing circulating plasma cells in Plasma cell leukemia (400X)

Discussion

PCL is a rare disorder representing less than 5% of malignant plasma cell diseases [5]. PCL is a rare and aggressive variant of myeloma characterized by the presence of circulating plasma cells. It is classified as either primary PCL occurring at diagnosis or secondary PCL in patients with relapsed/ refractory plasma cell myeloma. Primary PCL is a distinct clinic-pathological entity with different cytogenetic and molecular findings. The clinical course is aggressive with short remissions and survival duration. The diagnosis is based upon the percentage (20%) and absolute number (2×10^9/L) of plasma cells in peripheral blood [6].

Flow cytometry is useful to differentiate PCL from other chronic lymphoproliferative disorders with plasmacytoid morphology as well as from non-neoplastic reactive plasma cells. Co-expression of CD38 and CD 138 is the best tool to identify the plasma cells [7].

Plasma cell leukemia is the most aggressive presentation of plasma cell neoplasm characterized by plasma cells circulation in peripheral blood, immaturity and heterogeneity of proliferating cells, acute course, extramedullary involvement and poor prognosis. PCL presents more often extramedullary involvement, anemia, thrombocytopenia, hypercalcemia, as well as impaired renal function. Cytogenetic abnormalities and mutations observed in PCL lead to escape from immune surveillance and independence from the bone marrow microenvironment with changes in expression of adhesion molecules or chemokines receptors. The outcome of PCL has improved with combination approaches with novel agents (including bortezomib and immunomodulatory drugs, such as lenalidomide) and with autologous stem cell transplantation.

Conclusion

Plasma cell leukemia is an aggressive disease. Peripheral blood smear examination, bone marrow aspiration, serum protein electrophoresis and immunophenotyping (flow cytometric analysis) are very useful in the diagnosis of PCL.

Conflict of Interest

None

Acknowledgements

I am thankful to the technical staff for their cooperation.

References

1. Ravinet A, Bay JO, Tournilhac O.Bull Cancer. 2014 Nov; 101(11): 1048-58.
2. Noel P, Kyra RA. Plasma cell leukemia: an evaluation of response to therapy. Am J Med. 1987; 83: 1062-8.
3. Criteria for the classification of monoclonal gammopathies, multiple myeloma and related disorders: a report of the International Myeloma Working Group. Br J Haematol. 2003; 121:7 49-57.
4. Flavio A, Rafael F. Blood Rev. 2011 May; 25(3): 107-112.
5. Maria K, Ryszard P, Joanna K et al. Plasma cell leukemia: clinical and immunophenotyping characteristics, treatment and survival. NOWOTWORY Journal of Oncology. 2011; 61: 29e-41e.
6. Fernandez C, Kyle R A et al. Plasma cell leukemia: consensus statement on diagnostic requirements, response criteria and treatment recommendations by the International Myeloma Working Group. Leukemia. 2012.
7. Anshul D Agarwal, Beena S Brahmbhatt, Biren P Parikh, Manoj J Shah. Plasma cell leukemia: A reterospective study of 10 cases. Indian Journal of Cancer. 2014 Jan-March; 51(1): 18-19.

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[1] Flink H, Tegelberg Å, Thörn M, Lagerlöf F. Effect of oral iron supplementation on unstimulated salivary flow rate: A randomized, double-blind, placebo-controlled trial. J Oral Pathol Med 2006; 35: 540-7.

[2] Twetman S, Axelsson S, Dahlgren H, Holm AK, Källestål C, Lagerlöf F, et al. Caries-preventive effect of fluoride toothpaste: A systematic review. Acta Odontol Scand 2003; 61: 347-55.

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[3] Fleischer W, Reimer K. Povidone iodine antisepsis. State of the art. Dermatology 1997; 195 Suppl 2: 3-9.

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[4] American Academy of Periodontology. Sonic and ultrasonic scalers in periodontics. J Periodontol 2000; 71: 1792-801.

Unpublished article

[5] Garoushi S, Lassila LV, Tezvergil A, Vallittu PK. Static and fatigue compression test for particulate filler composite resin with fiber-reinforced composite substructure. Dent Mater 2006.

Personal author(s)

[6] Hosmer D, Lemeshow S. Applied logistic regression, 2nd edn. New York: Wiley-Interscience; 2000.

Chapter in book

[7] Nauntofte B, Tenovuo J, Lagerlöf F. Secretion and composition of saliva. In: Fejerskov O, Kidd EAM,

editors. Dental caries: The disease and its clinical management. Oxford: Blackwell Munksgaard; 2003. p. 7-27.

No author given

[8] World Health Organization. Oral health surveys - basic methods, 4th edn. Geneva: World Health Organization; 1997.

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[9] National Statistics Online—Trends in suicide by method in England and Wales, 1979-2001. www.statistics.gov.uk/downloads/theme_health/HSQ 20.pdf (accessed Jan 24, 2005): 7-18. Only verified references against the original documents should be cited. Authors are responsible for the accuracy and completeness of their references and for correct text citation. The number of reference should be kept limited to 20 in case of major communications and 10 for short communications.

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