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Patiala.

Editor-in-Chief : Prof. R.K. Gorea

From Editor's Desk

With pleasure I am presenting the third number of the journal this year. I am overwhelmed by the response from all the members of Indian Academy of Forensic Medicine. Continuing with the feature started from the first number I will be sharing my thoughts on the female feticide this time. This problem is altering the very face of our society. This problem needs our utmost attention at this junction as only laws will not be able to change this trend. All the members of the society will have to rise to the occasion to counter this trend and make this society more responsible for its own benefit. I thank Dr. G.S.Randhawa, Eye Surgeon of Patiala, Mr. G.S.Cheema of Cheema Marble House, Patiala and M/s Patiala Marketing Services Pvt. Ltd., Patiala; along with my departmental colleagues who have provided me support in this noble endeavor to bring this issue of the journal to you.

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Editorial

In Atharva Veda mantras are written for change of sex of fetus. Adverse sex ratio is from very beginning. In1871 census there was 940 females to 1000 males. This was due to higher mortality in women and Sati Pratha. Mainly north India, which was attacked by invaders, resorted to female infanticide. One Sikh village had 31 females to 100 males. With female infanticide there was a feeling of sin. There was a ritual of purification after female infanticide. To check this Infanticide Act was passed in 1870. Government dowry fund was kept to take care of cause. In 1901 census still there were 930 females to 1000 males. This was due to subtle neglect of females. There was a belief that there is no life till quickening. With abortions there was no feeling of sin. In 1970 pre-natal testing was introduced in India. In 1981 census there were 930 females to 1000 males. There were advertisements "invest Rs. 500 now and save Rs. 50,000 later on"...from 1977-1982 78,000 female fetuses were aborted in India. From 1982 -1987 in Bombay, 10 sex determination clinics increased to 248.From 8000 abortions 7999 were female fetuses. There was a son mania.

In most of the states of India there is a craze for the male child in the society. Many women consider themselves complete only when they have a male child. Many women consider it is better not to have a child rather than having a female child. There are so many misconceptions in the society in this regard. These misconceptions are due to superstitions, poverty and illiteracy and dowry. Some religious rites also add to this problem e.g. only sons can perform the last rites on the dead body. discrimination with the females in the society add to the woes of the females and even females do not want to have the female children, perhaps they think that what they have suffered, their female progeny should not suffer the same.

With the advancement in the science now the sex of the fetus can be determined in the womb only with the help of the amniocentesis (after 15 weeks), ultrasonography (after 12 weeks) and chorion villous sampling (after 9 – 12 weeks) and levels of MSHCG (16 days after conception) higher level indicates female fetus is present (under research)

All these tests and investigations were developed to know the diseases and abnormalities of the fetuses. These tests were gradually employed to know the sex of the fetus in those females who were having many female children and were very keen to have a male child. Then these tests were gradually misused and after determining the sex, if it happened to be female, people started them getting aborted and misuse of MTP act started

With the result of low esteem for female child and the misuse of these tests sex ratio which was 945 females per 1000 males in 1991 dropped to 927 per 1000 males in 2001. In certain states like Punjab, Haryana, Delhi and Gujarat this ratio declined to 800:1000 and in the worst affected district of Fatehgarh Sahib this ratio declined to 752:1000. All this was due to misuse of the diagnostic techniques and the medical fraternity played a major negative role in this.

A lot of hue and cry was raised by the Non Governmental Organizations and ultimately government enacted a law known as "Pre-Natal Diagnostic Techniques (Regulations and Prevention of Misuse) amendment act 2002 (14 of 2003). This act was enforced with effect from Feb. 13, 2003.

This law was enacted to prevent the misuse of diagnostic techniques for determination of the sex of the fetus which ultimately leads to female feticide. With the enactment of the law advertisements for the pre-natal diagnostic techniques for determination of the sex of the fetus have been prohibited. Any doctor who will violate this act can be punished with up to 3 years imprisonment and fine up to Rs. 10,000 for the first offence and for 5 years imprisonment and fine up to rupees 50,000 for subsequent offence and State Medical Council can erase his name for 5 years for the first offence and permanently for any subsequent offence. Any person who seeks such aid can be punished up to 3 years and fine up to rupees 50,000 for the first offence and up to 5 years and fine up to rupees 100,000 for any subsequent offence.

Any doctor doing the abortion of the fetus after such tests can be punished under the MTP act and sections 312, 313, 316 and 318 of the IPC depending upon the circumstances, as it will become a criminal abortion.

In cases where there is charge of female feticide it is important to know the sex of fetus because charge of the female feticide can be sustained only if the sex of the fetus is female. Usually in such cases examination of the genitalia may solve the problem but if fetus is mutilated we should do the nuclear sexing and should try to find out the percentage of Barr bodies in the cells and presence of Y chromosomes can rule out the female fetus.

Another important thing is that it should be established that the fetus belongs to that particular women and determine its maternity without any doubt. This can be done by doing the DNA profile of the women and the fetus. For this blood of the women and the tissue of the fetus should be sent to the forensic science laboratory (forensic serology laboratory) after proper preservation. 10 ml blood of the women in EDTA should be sent in a glass vial, preserved with dry ice. Alternatively a blood stain can be made on a piece of fresh cloth and dried and sent. Fetal tissue should be sent as such preserved in dry ice. Any tissue having intact nuclear material is a good sample. Other routine examination should be carried out as is done in the examination of the women and examination of the aborted material.

Long term complications that would be the fallout of female feticide will include fall in number of female children, imbalance in society, increase in sex related & other crimes against women, breakdown of traditional family, forced marriages and polyandry.

Further female feticide leads to unsafe motherhood due to complications of abortion like sepsis (uterus, peritonitis and septicemia), shock (hemorrhage, trauma and septicemia), hemorrhage (incomplete abortion, injury to cervix/uterus), oliguria, anuria (excessive haemolysis, hypovolaemia, infertility, chronic pelvic inflammation, etc.

Due to this, in India, abortion deaths per year have risen to about 20,000 and morbidity has increased many folds. Females are cornerstone of Indian families and part of Indian labor force. There was population explosion in south Asia. Mortality rate decreased but birth rate did not. People started talking if women do not get pregnant after 6 months of marriage. Up to 1987 it was a problem of numbers. Population control policy was devised by foreign experts who were funding and who had less knowledge about culture of India. A slogan – "Do ya teen bache hote hai ghar men ache" was popularized. With this not much of disturbance of sex ratio was there. Later on government switched to two child norms while propagating family planning. Advertising with one male and one female baby started. There are social and cultural compulsions for male baby. Status of women depended on male children in India. Who puts pressure on females to have the male child? Mothers in law and husbands, everybody wants inheritors of property. If the first child was female, it was nice. If the second pregnancy was of a female then what to do? People thought get rid of this pregnancy. It was the beginning of female feticide. It had an adverse impact on sex ratio of population. Amritsar is the seed farm of female foeticides. Even in 1991 census ratio of females in Amritsar was 861. Faridkot was 863 and in Bathinda were 865 for 1000 males. Greed amongst medical profession played its own role.

Root causes of this are dowry system in upper castes, superstitions – moksha is not possible without sons, poverty- males get better wages and religious rites- fire to funeral pre is by the sons only. It is a patrilineal society, patriarchal society, patrilocal society and males are family pride. Males are warriors and females do not fit the role. Females are considered social stigma.

Female infanticide will lead to less number of females in the society. It will lead to child marriages, marrying of woman to several brothers, increased sex violence against women, less work force, less teachers and nurses and reduced girl's esteem. 5 million women kill their unborn baby girl every year. Some doctors have sold their soul for greed

There was confusion in priorities either to control population or stop female feticide. Disturbed sex ratio is also a bane for China, South Korea and Taiwan and they also share this problem.

Projections for 2001 were 944 females to 1000 males but census of 2001 revealed 927 females to 1000 males. In Kerala there is more number of women, people more educated, there is matrilineal society and there is sexual equity. No doubt female feticide is bad but is male feticide good? We will have to give a thought to it also. There is misuse of technology in sex determination in the form of ultrasound machines and genetic centers

For sex determination there are myths that if fetal heart sounds is more than 140/min – fetus is male and if it is less than 139/min – fetus is female. There is also a Chinese calendar, according to date of birth of mother and month of conception. There is also said to be a Draino test by urine test in which if color is green- fetus is male and if color is brown fetus is said to be female. Ultrasonography is safe, easy to do, cheap and affordable. But if there is nexus of gynecologists with ultrasonography to be rich even if it is against law, has to be curbed.

Maharashtra was first to enact the law to curb female feticide. Maharashtra regulation of use of prenatal diagnostic techniques act was passed in 1988. PNDT act is an act to provide for the prohibition of sex selection, before or after conception, and for regulation of pre-natal diagnostic techniques for the purposes of detecting genetic abnormalities or metabolic disorders or chromosomal abnormalities and for prohibition of detection of sex of fetus, leading to female feticide and for advertisement prohibition. Permission and regulation of PNDT for detection of genetic diseases is for permitting the use of such techniques only under certain conditions by the registered institutions. Punishment for violation of the provision of the legislation. no pre-natal diagnostic techniques shall be used or conducted unless the person qualified to do so is satisfied that any of the conditions are fulfilled like if age is more than 35 years or more than 2 spontaneous abortions or exposed to teratogenic drugs or family history of mental retardation, genetic disease, physical disease or any other condition specified by CBS. Every offence under this act shall be cognizable, non-bail able and non-compoundable.

No person being a relative or the husband of the pregnant woman shall seek or encourage the conduct of any pre-natal diagnostic techniques on her except for the purpose specified like certain congenital malformations or sex-linked disorders and for the prevention of their misuse for sex determination leading to female feticide and for matters connected therewith or incidental thereto.

Greatest drawback is that there is no complainant neither the lady nor the doctors and fetuses never complain: they die a silent death.

We are trying to fix the symptoms and not solve the problem. In the last decade 14 millions female fetuses have been lost. My worries are that female infanticide may not become the natural outcome of law if we not taking care of root causes. Recently one father shot dead one month old female baby. There may start neglect of girls in early life and it may lead to higher female child mortality rate.

What to do? Female feticide is one extreme form of violence against females and humanity. Change the mindset. Energize all resources within your reach. There should be no dowry payment, educate masses and have women empowerment not only at workplaces, markets, schools but also at homes. I apology, I don't have answer to the problem. Answer lies with you or lies with masses. It is a tall order to women to produce two children and at least one should be a male. A process over which she has no control except female feticide 70% of deliveries in govt. hospitals are of male children (report in The Tribune on November 24, 2004.)

Look at the problem holistically. All sections of society including politicians and doctors along with the silent population have to be motivated to solve this problem from all the angles. Until we strike at the root causes and demolish them completely we will not see the light of the day. Policies have to be implemented honestly and with vigor otherwise only rates for these tests and procedures will increase and we will not get the results. I am reminded of a small story that a pond was ordered to be filled by milk by morning by the king. Everybody thought if I put water it will not be detected. In the morning it was all water in the pond. We may not face the same situation on female feticide. Have the will power and act and I assure you success will be yours, success will be of society, and success will be of the generations to come. Choice is yours - act or quit, but be ready - future generation will not forgive you if you miss the opportunity at this time.

Prof. R.K.Gorea

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AGE ESTIMATION FROM THE PHYSIOLOGICAL CHANGES OF TEETH

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ABSTRACT :
This study was done to evaluate physiological changes in the teeth with the advancing age. 30 cases were taken in this research and the six factors were recorded, these were attrition, periodontal disease, secondary dentine deposition, cementum apposition, root resorption. Each factor was allotted a score of 0-3 depending upon degree of changes in the tooth. Total scores were used to estimate the age using the formula and regression line was obtained. A mean difference ± 2.16 years was found between actual and calculated age

KEY WORDS : Age estimation, Gustafson method, Teeth

INTRODUCTION

Age is one of the essential factors in establishing the identity of the person. Estimation of the human age is a procedure adopted by anthropologists, archaeologists and forensic scientists. Different factors have been used for age estimation but none has withstood the test of time for adults above 25 years. Examination of teeth in many ways form a unique part of human body e.g. they are most durable and resilient part of the skeleton. The science dealing with establishing identity of a person by teeth is popularly known as Forensic Odontology or Forensic Dentistry [1].

Changes that are appreciable with increasing age are attrition, periodontal disease, and deposition of secondary dentine, root translucency, cementum apposition, root resorption, color changes and increase in root roughness [2]. By taking in consideration, these secondary changes in teeth with advancing age various studies were done to estimate the age of an individual. Such research has resulted in multi-factorial methods that help in age estimation.

Gustafson [2] in 1950 suggested the use of six retrogressive changes and ranked them on arbitrary scale, allotting 0-3 points according to degree of the change. Due to error in this morphometric method several modification were done in subsequent studies. Johanson [3] in1971 in his research used same six criterions but different ranking scale and then estimated the age of an individual. Solheim [4] used in situ teeth and eight variables which included two of color estimate, two for periodontosis, and two for attrition, crown length and sex. None of the changes took singly proved more accurate than when these were studied together.

MATERIAL AND METHODS

The medico legal cases received for the autopsy by the Department of Forensic Medicine, Government Medical College, Patiala, were taken for the study. 30 cases were studied (age group of 25 to 70 years). The following dental parameters were studied in each case: Attrition, Periodontal disease, Cementum apposition, Secondary dentine deposition, Root translucency and Root resorption. The apparatus used in the study are Tooth extraction forceps, Probe, Electric lathe, Carborundum stone (rough and smooth), Alcohol and Xylene, Formalin, Microscope and slide, etc.

The details of the deceased were noted from the relatives accompanying. After collecting the details, teeth to be studied were selected and this selection is made based on the study of Solheim (1980) with priority given to first premolars

then second premolars and canines and lastly incisors [4]. Degree of attrition and extent of periodontal disease were recorded before the extraction of the tooth. Then the tooth was extracted by extraction forceps and preserved in formalin until the ground section was prepared. Ground section was prepared by hand grinding which was done first with lathe and then with rough Carborundum stone until a section of 1 mm was obtained and at this thickness, the root translucency was noted. Grinding was further done using fine stone until the section of 0.25-mm thickness is left. Finally, cleaned and dried section was mounted on slide and viewed under microscope for secondary dentine, cementum apposition and root resorption.

The factors seen in the tooth before and after sectioning were recorded using 4 points allotment system [5] as follows:

Attrition (A):
A0- No Attrition,
A1- Attrition limited to enamel level,
A2- Attrition limited to dentine level,
A3- Attrition up to pulp cavity.

Periodontal disease (P):
P0-No obvious periodontal disease,
P1-Beginning of periodontal disease but no bone loss,
P2-Peridontal disease more than 1/3rd of the root,
P3-Peridontal disease more than 2/3rd of the root.

Secondary dentine (S):
S0-No secondary dentine formation,
S1-Secondary dentine up to upper part of pulp cavity,
S2-Secondary dentin up to 2/3rd of the pulp cavity,
S3-Diffuse calcification of entire pulp cavity.

Root translucency (T):
T0- No translucency,
T1- Beginning of translucency,
T2- Translucency more than 1/3rd of the apical root,
T3- Translucency more than 2/3rd of the apical root.

Cementum apposition (C):
C0- Normal cementum,
C1- Thickness of cementum more normal,
C2- Abnormal thickness of cementum near the apex of the root,
C3- Generalized abnormal thickness of cementum throughout the apex of the root.

Root resorption (R):
R0- No resorption,
R1- Spotted resorption,
R2- Resorption limited to cementum,
R3- Extensive resorption of the cementum and dentin both.

After collecting the data and calculating the total score, estimated age calculated using the formula. A graph was plotted with actual age on one side, the score calculated on the other, and regression formulae [6] is obtained.

FORMULA USED [7]
AGE = 11.43 + 4.56 (TOTAL SCORE)

OBSERVATIONS

Out of the total 30 cases taken randomly from the mortuary of Govt. Medical College. Study group consisted of 17 males and 13 females while 12 were vegetarian and 28 non-vegetarian.

AGE - WISE DISTRIBUTION

GROUPS	AGE (in yrs)	No. of Cases
Group A	25-30	8
Group B	31-35	3
Group C	36-40	4
Group D	41-45	3
Group E	46-50	6
Group F	51-55	2
Group G	56-60	4
TOTAL		30

Known Age in years

COMPARISONS OF AGES

Case No.	Actual Age	Score	Calculated Age	Difference in Ages
1	27	4	29.87	2.87
2	34	5	34.43	0.43
3	35	6	38.99	3.99
4	29	5	34.43	5.43
5	58	11	61.79	3.79
6	60	11	61.79	1.79
7	38	5	34.43	3.57
8	50	8	48.11	1.89
9	40	6	38.99	1.01
10	28	3	25.31	2.69
11	30	5	34.43	4.43
12	55	9	52.67	2.33
13	62	11	61.79	0.21
14	49	7	43.55	5.45
15	37	6	38.99	1.99
16	46	8	48.11	2.11
17	25	4	29.75	4.75
18	42	7	43.55	1.55
19	52	8	48.11	3.89
20	28	4	29.75	1.75
21	50	8	48.11	1.89
22	47	8	48.11	1.11
23	35	5	34.43	0.57
24	28	4	29.87	1.87
25	40	6	38.99	1.01
26	50	9	52.67	2.67
27	57	10	57.23	0.23
28	29	4	29.87	0.87
29	30	4	29.87	0.13
30	45	7	43.55	1.45

DISCUSSION

The mean age difference of calculated age from the actual age was ± 2.16 years, which was contrary to the finding of Gustafson who found age difference of ± 3.63 years. A regression formula y = 4.6696x + 10.381 was obtained where X is total points and Y is estimated age. Diet whether vegetarian or non-vegetarian did not affect the scores as our study was on premolars, which are not much in use while eating. These findings were similar to the results of the study done by Pillai and Bhaskar [6] in 1974.

CONCLUSION

In this study, Mean age difference of the calculated age from actual age was found to ± 2.16 years. Standard deviation was 1.56. The attrition factor was found to contribute more in males than in females. Vegetarian and Non-vegetarian also had similar scores. Regression line obtained can be used to estimate the age of unknown cadaver by first calculating the score and then finding the age using this regression line.

REFERENCES

1. Parikh CK: Parikh Text Book of Medical Jurisprudence and Toxicology. Identification in Mass Disasters: CBS Publishers and Distribution. Bombay: 5th edition: 1990: p. 76
2. Gustafson G: Age determination from teeth; Journal of American Dental Association: 1980: 41: 45-54.
3. Lucy D, Aykroyd RG, Pollard AM, Solheim T: A Bayesian approach to adult human age estimation from dental observations by Johanson's age changes: Journal of Forensic Science: 1996: 41 (2): 189-194.
4. Solheim T., Sundnes PK.: Dental Age Estimation of Norwegian Adults – A Comparison of Different Methods; Forensic Science International Journal: 1980: 16(1): 7-13.
5. Vij K: Textbook of Forensic Medicine and Toxicology. Identification: B.I.Churchill Livingstone: Second Edition: 2002: 4: 71-72.
6. Pillai PS, Bhaskar G: Age Estimation from the teeth using Gustafson's method – A Study in India; Journal of Forensic Science: 1974: 3: 135-141.
7. Pillay VV: Text Book of Forensic Medicine and Toxicology. Identification. Paras Publishers. Bangalore. 14th edition; 2004: p. 68
8. Singh AM, Mukerjee JB: Age Determination from teeth of Bengalee subject by following Gustafson's method ; Journal of Indian Academy of Forensic Science : 1985 : 24 (2) : 1.

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WEIGHTS OF HUMAN ORGANS AT AUTOPSY IN CHANDIGARH ZONE OF NORTH-WEST INDIA

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ABSTRACT

Mean organ weights in 2025 subjects who died and autopsied at Postgraduate Institute of Medical Education and Research, Chandigarh revealed that they in general were heavier than reported from other parts of India. Various organs continued to attain their maximum weight up to 40-50 years of age.
KEY WORDS: Medico-legal deaths, organ weights, autopsy

INTRODUCTION

Human body organs play a significant role in almost all the ancestral branches of medical sciences including forensic sciences, as any deviation in weight from the normal range suggests some pathological change in the organ and thus helps in interpreting the opinion regarding the cause of death in various pathological conditions and also in finding out the relationship between trauma and disease [1-3]. Organ weights also play a significant role in estimation of body height and weight of an individual [1-2]. Human organ weights besides race, age, gender etc. were also reported to be dependent on environmental and socio-economic conditions [1-10] which are quite different in various parts of India. Hence, the organ weights reported from other parts of India are definitely not applicable directly to the population of Chandigarh zone of India. As literature available on the subject for the population of north-west India in general and Chandigarh zone in particular is scanty, hence the present study is an attempt to provide such information.

MATERIALS AND METHODS

The present study was carried out on 2025 (1449 males and 576 females) subjects who were admitted and died between 1st April, 1996 and 31st March, 2004 at Postgraduate Institute of Medical Education and Research, Chandigarh for various medico-legal causes and on whom postmortem examination was conducted by the department of Forensic Medicine within 6 hours of death.

In the present study, only those subjects were included who belonged to Chandigarh zone of north-west India i.e. states of Punjab, Haryana, Himachal Pradesh and U.T. of Chandigarh (old combined Punjab) and in those who complete demographic profile was known. Subjects with septicemia or with gross organ pathology were not included in the present study. Standard autopsy protocol and procedure (as described in Current methods of Autopsy Practice by J Ludwig,2nd edition, W.B.Saunders Company) were employed for removal of various organs. After removing the extraneous tissues and draining of the blood, each organ was weighed on electronic weighing machine having the accuracy of ± 0.1gram. To see the role of age on various organ weights, the subjects were divided into seven age groups i.e. <10, 11-20, 21-30, 31-40, 41-50, 51-60, >60 years.

OBSERVATIONS AND DISCUSSION

Mean organ weights as observed in the present study in general were more (table 1 & 2) than those reported from other parts of India. [2-10] They are more in concordance with the western population, possibly because the population of this zone in general is taller and heavier than rest of the population of the country and is more akin to western population so are their organ weights [1].

In a study from Nagpur, region [3] weights of brain and liver were reported to be maximum at

Table-1 - Organ weight (grams) in various age- groups in males

Age (yrs)	subjects	variables	Brain	Rt lung	Lt lung	heart	Rt Kidney	Lt Kidney	liver	spleen	pancreas	Rt suprarenal	Lt suprarenal	Rt testes	Lt testis	prostate
<11	34	Mean	1098.24	149.52	143.42	88.17	52.92	56	619.73	57.97	45.50	4.02	4.32	6.83	7.11	15.22
		S.D.	219.53	46.48	44.62	34.91	21.28	22.14	222.42	28.81	29.94	1.42	1.24	1.42	1.49	3.31
		Range	510-1340	70-210	50-190	30-170	10-105	20-110	311-880	21-90	12-75	2-5	3-6	5-9	5-10	12-20
11-20	172	Mean	1315.13	444.92	411.51	247.93	114.20	123.52	1420.62	130.05	106.27	6.55	8	23.72	25.16	39.94
		S.D.	133.14	99.22	103.64	61.97	23.53	24.71	175.49	29.95	13.50	1.68	1.78	7.48	7.66	16.12
		Range	870-1500	195-530	172-510	90-420	50-145	55-160	909-1645	70-180	80-127	5-10	7-13	20-35	12-48	29-78
21-30	457	Mean	1340.38	579.75	531.92	289.59	128.77	138.88	1493.79	162.45	131.15	7.55	8.57	28.24	29.37	62.18
		S.D.	113.162	151.51	146.31	55.26	22.40	23.11	168.78	43.02	33.12	2.15	2.02	6.34	6.01	14.77
		Range	1040-1620	210-580	180-545	140-440	56-180	65-190	835-1816	76-270	80-144	8-19	9-20	21-45	20-37	34-87
31-40	372	Mean	1336.85	608.92	547.78	301.68	136.71	146.12	1544.67	164.37	131.91	9.54	10.12	29	30	64.12
		S.D.	109.97	163.05	155.95	57.61	31.74	30.71	361.47	62.56	19.39	2.34	1.91	2.51	4.19	8.87
		Range	1080-1640	210-835	205-810	180-465	78-265	75-295	903-1890	89-316	71-165	8-18	9-20	20-49	18-48	35-80
41-50	212	Mean	1333.53	621.36	555.29	314.65	132.67	141.44	1591.48	168.52	133.52	10.80	11.57	30.52	31.85	65.23
		S.D.	120.58	162.15	160.17	67.55	30.27	34.85	268.88	69.55	21.57	2.71	3.51	6.16	6.142	5.28
		Range	1030-1550	260.-755	235-730	120-480	60-260	70-280	1120-2032	110-330	112-190	9-19	10-21	26-48	19-48	50-88
51-60	116	Mean	1309.1	607.22	540.65	319.05	130.87	141.58	1486.16	145.57	130.46	12.74	13.55	29.41	29.10	65.90
		S.D.	118.09	171.02	183.21	81.21	32.19	30.25	108.90	28.33	10.40	4.72	4.24	3.91	1.56	3.08
		Range	1000-1590	230-760	210-745	130-490	80-290	100-260	830-1588	102-310	115-145	8-20	9-21	24-36	24-42	60-90
>60	86	Mean	1288.09	602.96	528.82	325.31	125.86	135.70	1480.78	144	114.88	9.77	10.77	27	27.77	66.33
		S.D.	122.84	178.42	163.20	84.61	31.57	32.75	369.95	27.02	15.07	1.09	1.20	9.30	8.88	3.39
		Range	1040-1570	240-780	220-880	130-490	90-220	100-235	848-1995	108-300	84-135	9-19	10-21	18-40	18-48	62-88
Total	1449	Mean	1324.05	568.85	516.62	291.87	128.15	137.74	1426.62	155.17	124.73	7.67	8.62	27.38	28.46	59.82
		S.D.	126.06	174.85	165.45	72.21	30.40	31.29	278.47	54.19	36.85	2.67	2.63	7.46	7.35	16.95
		Range	510-1650	70-835	50-880	30-490	10-290	20-295	311-2032	21-330	12-190	2-20	3-21	5-49	5-48	12-88

Table-2 - Organ weight (grams) in various age groups in Females

Age (yrs)	subjects	variables	Brain	Rt lung	Lt lung	heart	Rt Kidney	Lt Kidney	liver	spleen	pancreas	Rt suprarenal	Lt suprarenal	uterus	Rt ovary	Lt ovary
<11	27	Mean	1044.59	148.63	137.96	92.03	58.66	67.70	498	51.75	59.25	2.75	3.5	18.5	7	7.75
		S.D.	154.76	52.25	48.31	29.53	21.40	23.26	76.36	7.93	7.36	2.06	1.91	4.50	1.41	1.258306
		Range	500-1218	60-200	55-190	30-150	20-110	30-120	410-596	41-60	50-60	1-5	1-5	15-25	5-8	6-8
11-20	123	Mean	1206.46	388.87	370.04	214.71	114.99	122.51	1282.86	129.35	101.28	6.92	8.03	57.28	8.14	8.57
		S.D.	109.25	90.38	111.93	47.12	26.94	27.35	222.48	18.81	15.65	1.68	1.62	11.23	2.14	2.20
		Range	890-1550	150-470	140-455	90-380	40-140	50-155	825-1519	70-150	72-124	5-8	5-10	46-72	6-10	3-12
21-30	204	Mean	1210.21	435.07	403.43	241.27	124.43	133.84	1302.29	131.94	111.76	8.12	8.88	75.11	14.47	15.47
		S.D.	109.94	67.95	72.99	50.50	23.49	25.65	199.80	33.33	28.33	2.11	2.23	10.01	7.60	8.00
		Range	940-1610	210-890	200-860	135-385	70-165	74-170	846-1580	72-210	83-151	5-12	5-13	65-96	8-30	9-32
31-40	112	Mean	1208.06	440.61	405.75	251.98	125.04	134.11	1341.57	137	121.57	10.14	10.71	94.71	15.1	16
		S.D.	122.96	88.41	82.68	49.17	33.76	33.32	313.70	8.86	14.32	2.47	3.19	15.30	4.46	5.47
		Range	1010-1550	220-810	200-800	140-390	75-230	80-240	801-1720	80-252	110-127	5-11	4-14	75-114	12-25	12-28
41-50	54	Mean	1192.54	480.05	450.59	265.68	115.96	123.66	1381.93	139.06	122.86	9.7	11.3	91.06	16.2	17.46
		S.D.	101.84	112.92	141.38	45.11	26.27	28.08	244.28	29.03	5.81	1.53	2.10	23.92	4.05	4.68
		Range	930-1530	260-800	250-690	160-370	70-200	80-205	1090-1700	107-280	96-118	7-11	8-13	70-123	11-22	11-24
51-60	35	Mean	1174	471.88	449.08	286.68	114.77	123.02	1381.58	133.57	104.21	8.26	9.78	88.26	13.89	14.05
		S.D.	72.15	110.38	111.14	55.48	19.22	20.03	170.78	20.43	7.99	2.02	2.27	9.75	1.24	1.22
		Range	960-1450	200-705	195-775	180-400	90-170	100-180	970-1660	110-195	60-120	7-12	9-14	65-97	12-16	13-14
>60	21	Mean	1165.24	468.76	440.95	288.66	113.38	119.04	1355.73	126.90	106.45	8.63	9.45	76.72	13.36	13.63
		S.D.	82.30	89.52	93.57	38.26	31.11	31.84	154.19	13.64	9.37	1.62	1.80	9.68	1.361	0.80
		Range	1070-1580	240-750	290-810	140-380	90-190	100-210	1212-1620	110-150	98-123	7-12	7-13	68-80	12-15	13-15
Total	576	Mean	1195.73	421.2	392.87	235.69	117.35	125.90	1292.9	132.17	107.95	8.08	9.19	75.01	12.58	13.21
		S.D.	116.47	108.23	112.54	61.53	30.12	31.10	272.03	32.40	22.90	2.42	2.69	21.77	5.14	5.56
		Range	500-1610	60-890	55-860	30-400	20-230	30-240	410-1720	41-280	50-124	1-12	1-14	15-123	5-30	6-28

the age 20 and 40 years respectively, whereas in the present study in both the genders, the weight of the brain increased up to 30 years. Lung, liver, spleen, pancreas, suprarenal attained their peak weights at 40-50 years and the kidney at 30-40 years. It may be attributed to the difference in dietary habits and socioeconomic conditions of both the regions. After attaining the peak, all organ weights declined with the advancing age with the exception of the heart, possible reasons being the deposition of fat and higher incidence of cardiomyopathies in the population under study.

Comparing the weights of liver and brain, it was seen that except in children, the mean weight of the liver was more than the mean weight of the brain in both the genders. This is in concordance with the findings of the studies on European and Japanese population [10-15], and contrary to the studies from other regions of India. [2, 9]

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REFERENCES

1. Singh D, Sharma AK, Singh S, Thind AS and Tyagi S. Prediction Of Spine Body Length And Body Weight From Brain Weight Of Adults In Chandigarh Zone Of India. JIAFM, 1998:20(3), 53-59.
2. Kohli A and Agarwal BBL. Study of Normal Adult Organ Weights in the North Indian Population. JFMT, 1996:12, 21-22.
3. Batra AK, Dongre AP and Mohanty AC. A Study of Organ Weight from Persons Who Died In Accident in Nagpur District of Maharashtra State. JFMT, 2002:19(1),21-24
4. Buchnan WJ and Daly FJ. Weights of Human Viscera in Natives of Bengal. Indian Med. Gazzate, 1902; 37-56
5. Buchnan TW and Maddox RH. Editorial: Tables of Weight of Viscera. 1902; 402(37):255
6. Gharpure PV and Jhala HI. Normal Standard for Body Weight and Organ Weights in India. IMG 1958; 92, 93:445-47.
7. Venkatraman K, Somasundesam S, Soman SD. An Evolution of Radiation Protection Standard for Indian Conditions. Health Phys 1963; 9(1963):647.
8. Jain SC, Mehta SC, Dogra TD, Chandrasekhar N, Reddy AR, Nagaratnam A. Organ Weights In Autopsy Cases From An Urban Apex Hospital. Ind J Med Res, 1992: 96, 37-44.
9. Franklin CA. Modi's Text book of Medical Jurisprudence and Toxicology, 21st edition, NM Tripathi Pvt. Ltd, 1990; p 332.
10. Pearl R. The Weight of the Negro brain. Science, 1934: 80, 216.
11. Bean RB. The Weights of the Organs In Relation To Type, Race, Sex, Stature and Age. Ant Recll, 1917; 326.
12. Edgar R and Smith H. Glaister's Medical Jurisprudence and Toxicology, 13th ed. Churchill Livingstone, Edinburgh, 1973, 755.
13. Sunderman FW and Boemer F. Normal Values in Clinical Medicine. W.B.Saunders, Philadelphia, 1949.
14. Williams PL and Warwick R. In: Gray's anatomy, 36th ed., Longman 1980, pp: 480.
15. Tanaka GI. Reference Japanese Man – Mass of organs and Other Characteristics of Normal Japanese. Health Physics, 1979:36(3), 336-46

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ESTIMATION OF STATURE FROM HAND AND PHALANGE LENGTH

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ABSTRACT

Personal identification is an integral part of the investigation in cases of mass disasters where disintegrated and amputated body organs are found very frequently. Plastic and latent fingerprints and palm prints are also available very commonly at most of the scene of crime. Estimating stature from various parameters based on the above mentioned evidences becomes one of the most important and essential exercise for personal identification .In present paper, study on stature estimation from hand and phalanges length has been reported.

Stature and phalanges length of all the fingers of both the hands of 60 individuals have been measured. The inked palm prints were also obtained and the same measurements were recorded from it also. The regression equations have been drawn from the data collected. It has been observed that stature can be estimated from the phalangeal lengths.

KEY WORDS: Forensics Anthropology, personal identification, stature, hand length, phalange length and regression equations

INTRODUCTION

The stature prediction occupies relatively a central position both in the anthropological research and in the identification necessitated by the medical jurisprudence or by the medico-legal experts. Estimation of stature of an individual from the skeletal material or from the mutilated or amputated limbs or parts of limbs has obvious significance in the personal identification in the events of the murders, accidents or natural disasters mainly concerns with the forensic identification analysis. Studies on the estimation of stature from the skeletal remains or from the mutilated limbs, mostly of the long bones have been reported as indicated by the published work of the Pearson (1899), Trotter and Glesser (1952). The Indian perspective of the problem of stature estimation has been studied by the Athwale et al (1963), Patel et al (1964), Joshi et al (1964,65), Lal and Lala (1972), Kalte and Bansal (1974), Thakur and Rai (1987), Saxena (1984), Bhatnagar et al (1984), Jasuja (1987), Jasuja et al (1991,93,97).

Estimation of stature from hand, finger and phalangeal length has been reported (Saxena, 1984; Thakur and Rai, 1987; Shintaku and Furuya, 1990; Tyagi et al 1999; Begum 1999; Sharma and Kapoor, 2001). But, in forensic cases, one finds latent prints including palm and fingerprints. In these types of the cases, one does not know which part of the hand will be available for the analysis and also that part may not be having sufficient ridge characteristics to establish identity. Many times, impression of any of the phalanges or only outline of the palm may be available. In these cases, only possibility to use that information is to measure the dimensions of the outlines available and estimate the stature to which those may belong. To the best of our knowledge, only Sharma and Kapoor, 2001 has reported from this aspect therefore, in present study, an attempt has been made to estimate the stature not only from hand and phalanges length measurements but also from their measurements taken from inked prints including phalanges length.

MATERIAL AND METHODS

Present study is based upon various measurements of stature, hand length, individual phalange length of each finger. Subjects that included 30 male and 30 female Jat Sikhs were of age ranging from 18 to 60 years. Jat Sikh is a peasant tribe or caste of northern India and erstwhile Punjab now part of Pakistan. In 1960's, the Jats constituted one fifth of the population of Punjab. Jats in general have fair complexion, dark eyes, and hair with narrow noses. They are the medium to tall in their height. They are thought to be of Rajput origin. Data was collected from the students of Punjabi University campus, Patiala and

Table -1: Stature (cm)

S.No.	Name of the author	Sex	Min. Stature	Max. Stature	Mean	± SD	± SE
1.	Baul (1974)	-	-	-	167.0	6.11	-
2.	Thakur (1975)	-	-	-	167.4	6.40	-
3.	Jasuja (1987)	-	-	-	170.1	6.14	-
4.	Kler (1990)	-	-	-	167.9	5.88	-
5.	Present Study (2003)	Male	166.2	185.6	175.2	5.24	0.957
		Female	152.0	167.9	159.7	5.17	0.945

Table-2: Hand Length (cm)

S.No.	Authors	Measurements	Sex	Side	Min.	Max.	Mean	± SD	± SE
1.	Thakur (1975)	Hand length	-	-	16.70	22.15	19.34	1.7	-
2.	Bhatnagar et	Hand length	-	Right	-	-	19.30	1.3	-
	al (1984)		-	Left	-	-	19.42	1.6	-
3.	Present Study	Hand length	Male	Right					
	(2003)	Measured			18.4	21.3	19.80	0.73	0.13
		Print			19.0	21.3	20.23	0.72	0.13
				Left					
		Measured			18.2	21.2	19.793	0.76	0.13
		Print			19.1	21.5	20.30	0.69	0.12
			Female	Right					
		Measured			19.1	19.7	17.51	0.81	0.14
		Print			16.0	16.3	17.867	0.85	0.15
				Left					
		Measured			19.1	19.9	17.47	0.80	0.14
		Print			16.2	16.5	17.83	0.89	0.16

surrounding areas. Care has been taken for inclusion of the unrelated subjects only. Both the sexes were mostly having right-sided preponderance. Measurement of stature was taken by a standard Anthropometer and hand lengths as well as phalange length were taken by a sliding caliper (Una & co., India). Here it is worth mentioning that the thumb has not been considered in the present study because of its variable flexibility as compared to other fingers, which are straight.

MEASUREMENTS

1. STATURE: It was measured as vertical distance from the vertex to the floor. Measurement was taken by making the subject stand erect on a horizontal resisting plane bare footed with shoulder blocks and buttocks touching the wall. Palms of hand were turned inwards and fingers horizontally pointing downwards. Anthropometer was placed in straight vertical position in front of the subject with head oriented in eye-ear-eye Plane (Frankfurt Plane). The movable rod of the Anthropometer is brought in contact with vertex in the mid saggital plane.
2. HAND LENGTH: It was measured as the straight distance from the metacarpo-phalangeal wrist crease to the most forwardly projecting point on the middle finger. Sliding caliper was used to measure the hand length.
3. PHALANGE LENGTH: It was measured as the distance between two phalangeal ridges in case of the first two phalanges and straight distance between most forwarding projecting point on the tip of the finger to the first distal phalangeal crease in case of the third phalange. It was measured with the help of a sliding caliper.
4. MEASUREMENTS ON PALM PRINTS: Before taking the inked impressions, hands were thoroughly washed and rubbed clean and dry. Ink was uniformly applied on the hand as well as fingers along with the Bracelet crease. Palm prints were obtained by pressing the fingers as well as palm on the clean sheet of paper. All the measurements mentioned previously were taken on the palm prints by using a transparent scale. All the measurements were recorded in centimeters.

Table- 3: Phalange Length in Males (Left hand in italics) (in cm.)

S. No.	Finger / Phalange		Print / Measured	Min. length	Max. length	Mean	S.D. +/-	S.E. +/-
1	Index	I	Print	1.8	3.0	2.307	0.292	0.053
				1.8	*3.0*	*2.330*	*0.312*	*0.056*
			Measured	1.8	3.0	2.357	0.262	0.047
				1.8	*3.0*	*2.407*	*0.260*	*0.047*
		II	Print	2.0	2.7	2.427	0.186	0.033
				2.0	*2.7*	*2.433*	*0.197*	*0.035*
			Measured	2.0	2.7	2.423	0.187	0.034
				2.1	*2.7*	*2.430*	*0.202*	*0.034*
		III	Print	2.1	2.8	2.413	0.176	0.032
				2.1	*2.8*	*2.420*	*0.163*	*0.029*
			Measured	2.1	2.7	2.420	0.165	0.030
				2.1	*2.7*	*2.423*	*0.159*	*0.029*
2.	Middle	I	Print	1.0	3.1	2.390	0.511	0.093
				1.0	*3.1*	*2.360*	*0.490*	*0.089*
			Measured	1.9	3.1	2.680	0.268	0.048
				1.9	*3.1*	*2.693*	*0.243*	*0.044*
		II	Print	2.4	3.2	2.767	0.214	0.039
				2.4	*3.2*	*2.827*	*0.212*	*0.038*
			Measured	2.3	3.2	2.763	0.217	0.039
				2.3	*3.2*	*2.827*	*0.212*	*0.038*
		III	Print	2.2	2.8	2.497	0.147	0.026
				2.2	*2.8*	*2.490*	*0.165*	*0.030*
			Measured	2.2	2.8	2.480	0.156	0.028
				2.2	*2.8*	*2.477*	*0.196*	*0.035*
3.	Ring	I	Print	1.0	2.6	2.147	0.385	0.070
				1.0	*2.5*	*2.110*	*0.443*	*0.080*
			Measured	1.7	2.9	2.353	0.249	0.045
				1.7	*2.8*	*2.333*	*0.264*	*0.048*
		II	Print	2.1	3.0	2.600	0.220	0.040
				2.1	*3.0*	*2.583*	*0.193*	*0.035*
			Measured	2.1	3.0	2.597	0.209	0.038
				2.1	*2.9*	*2.580*	*0.192*	*0.035*
		III	Print	2.1	2.9	2.523	0.191	0.034
				2.1	*2.8*	*2.487*	*0.193*	*0.035*
			Measured	2.2	2.9	2.520	0.190	0.034
				2.2	*2.9*	*2.470*	*0.160*	*0.029*
4.	Little	I	Print	1.0	2.3	1.837	0.358	0.065
				1.0	*2.3*	*1.777*	*0.270*	*0.049*
			Measured	1.2	2.3	1.887	0.270	0.049
				1.1	*2.3*	*1.810*	*0.173*	*0.031*
		II	Print	1.4	2.3	1.830	0.202	0.036
				1.4	*2.3*	*1.887*	*0.196*	*0.035*
			Measured	1.4	2.3	1.833	0.199	0.036
				1.4	*2.3*	*1.883*	*0.180*	*0.032*
		III	Print	2.0	2.7	2.310	0.165	0.030
				2.0	*2.6*	*2.287*	*0.131*	*0.023*
			Measured	2.0	2.7	2.303	0.167	0.030
				2.0	*2.7*	*2.270*	*0.139*	*0.025*

Table- 4: Phalange length in females (Left hand in italics) (in cm.)

S. No.	Finger / Phalange		Print / Measured	Min. length	Max. length	Mean	S.D. +/-	S.E. +/-
1.	Index	I	Print	1.7	2.5	2.103	0.239	0.043
				1.7	*2.5*	*2.107*	*0.272*	*0.049*
			Measured	1.7	2.5	2.063	0.222	0.040
				1.6	*2.5*	*2.113*	*0.189*	*0.034*
		II	Print	1.8	2.6	2.213	0.198	0.036
				1.8	*2.6*	*2.153*	*0.229*	*0.041*
			Measured	1.8	2.6	2.207	0.210	0.038
				1.8	*2.6*	*2.153*	*0.226*	*0.041*
		III	Print	1.9	2.5	2.163	0.147	0.026
				1.9	*2.6*	*2.277*	*0.152*	*0.027*
			Measured	1.9	2.5	2.153	0.153	0.027
				2.0	*2.5*	*2.167*	*0.160*	*0.029*
2.	Middle	I	Print	1.4	2.9	2.250	0.364	0.066
				1.4	*2.9*	*2.213*	*0.422*	*0.076*
			Measured	1.9	2.9	2.363	0.236	0.043
				1.8	*2.9*	*2.377*	*0.218*	*0.039*
		II	Print	2.1	2.8	2.517	0.202	0.036
				2.1	*2.8*	*2.513*	*0.200*	*0.036*
			Measured	2.0	3.0	2.503	0.206	0.037
				2.0	*3.0*	*2.500*	*0.205*	*0.037*
		III	Print	1.9	2.6	2.253	0.150	0.027
				1.9	*2.6*	*2.267*	*0.154*	*0.028*
			Measured	1.9	2.6	2.240	0.154	0.028
				1.9	*2.5*	*2.157*	*0.159*	*0.029*
3.	Ring	I	Print	1.6	2.8	2.083	0.311	0.056
				1.6	*2.8*	*1.993*	*0.339*	*0.061*
			Measured	1.8	2.8	2.107	0.229	0.041
				1.5	*2.7*	*2.100*	*0.213*	*0.038*
		II	Print	2.0	2.7	2.273	0.180	0.032
				2.0	*2.7*	*2.323*	*0.181*	*0.033*
			Measured	1.8	2.7	2.260	0.194	0.035
				1.8	*2.7*	*2.307*	*0.184*	*0.033*
		III	Print	2.0	2.7	2.247	0.172	0.031
				2.0	*2.7*	*2.237*	*0.152*	*0.027*
			Measured	1.9	2.5	2.227	0.168	0.030
				1.9	*2.5*	*2.237*	*0.154*	*0.028*
4.	Little	I	Print	1.2	2.2	1.670	0.232	0.042
				1.2	*2.2*	*1.643*	*0.292*	*0.053*
			Measured	1.0	2.2	1.617	0.235	0.042
				1.0	*2.2*	*1.653*	*0.208*	*0.037*
		II	Print	1.1	1.9	1.567	0.197	0.035
				1.1	*1.9*	*1.597*	*0.179*	*0.032*
			Measured	1.1	1.9	1.543	0.205	0.037
				1.0	*1.9*	*1.580*	*0.181*	*0.033*
		III	Print	1.6	2.6	2.043	0.198	0.036
				1.6	*2.5*	*2.043*	*0.157*	*0.028*
			Measured	1.6	2.6	2.033	0.188	0.034
				1.6	*2.5*	*2.027*	*0.157*	*0.028*

RESULTS AND DISCUSSION

STATURE: The results of the stature and the hand measurements including phalange measurements of Punjabi Jat Sikhs are given in the following table 1-4. It is evident from the table-1 that mean stature in the males is higher as compared to that of the females. Baul (1974), Thakur (1975), Jasuja (1987), Kler (1990) have also studied the stature of Jat Sikhs.

HAND LENGTH: Length of the hand was measured both from hand as well as from the palm

Table -5: Statistical correlation coefficients for hand and phalange length with stature

S.No.	Hand	Finger	Phalange	Print		Measured	
				Male	Female	Male	Female
	Right	-	-	0.652	0.577	0.502	0.529
	Left	-	-	0.586	0.575	0.452	0.557
1.	Right	Index	I	0.431	0.429	0.383	0.375
			II	0.653	0.632	0.632	0.622
			III	0.325	0.323	0.319	0.349
		Middle	I	0.643	0.654	0.631	0.615
			II	0.499	0.426	0.505	0.527
			III	0.371	0.302	0.357	0.377
		Ring	I	0.367	0.327	0.366	0.399
			II	0.423	0.433	0.411	0.407
			III	0.386	0.390	0.334	0.343
		Little	I	0.254	0.243	0.302	0.376
			II	0.241	0.269	0.225	0.279
			III	0.287	0.258	0.215	0.296
2.	Left	Index	I	0.334	0.383	0.334	0.357
			II	0.456	0.464	0.450	0.427
			III	0.417	0.511	0.416	0.335
		Middle	I	0.610	0.618	0.681	0.618
			II	0.522	0.513	0.522	0.583
			III	0.374	0.440	0.316	0.453
		Ring	I	0.377	0.340	0.486	0.426
			II	0.435	0.419	0.441	0.427
			III	0.463	0.454	0.495	0.479
		Little	I	0.386	0.301	0.307	0.322
			II	0.301	0.370	0.496	0.417
			III	0.394	0.376	0.327	0.336

prints. Hand length statistics is given in table-2. As evident from the table, sexual dimorphism exists in mean hand length and hand length was observed to be higher in males. There exists no bilateral difference in the hand length nor any statistically significant difference was observed in print length from the actual hand length.

PHALANGE LENGTH: Phalange length statistics are given in the table-3 and 4. It is evident from the tables that there exists no statistically significant difference vis-à-vis sex, bilateral and print and actual measurements of the phalanges.

STATISTICAL CORRELATION COEFFCIENT: It is evident from the table 5-6 that all the measurements have a positive as well as a statistically significant correlation with the stature. Saxena (1984) also reported statistically significant correlation between stature and hand length. Shintaku and Furuya (1990) reported for Japanese women a correlation of proximal phalange and stature ranging from 0.521 –0.696. Therefore an attempt has been made to draw the regression equations to estimate stature from hand and phalangeal measurements.

TABLE- 6: Regression equations for stature estimation from hand measurements

No.	Author	Measurements		Regression Equations
1.	Thakur (1987)	Hand Length (HL)		
			Left	S = 158.91 + 0.440 x Left HL
			Right	S = 51.388 + 5.988 x Right HL
			Mean	S = 94.208 + 3.788 x ML
		Hand Breadth (HB)		
			Left	S = 113.458 + 6.539 x Left HB
			Right	S = 092.308 + 8.908 x Right HB
			Mean	S = 078.548 + 10.69 x MB
2.	Bhatnagar et al (1984)	Hand Length		Y = 127.97 + 2.06 * X
		Hand Breadth		Y = 141.67 + 3.13 * X
3.	Present Study (2004)	Right Hand		
			Print	Y = 101.991 + 3.767 * X ± 4.627
				*Y = 133.961 + 1.473 * X ± 5.127*
			Measured	Y = 069.513 + 5.223 * X ± 4.033
				*Y = 130.954 + 1.612 * X ± 5.061*
		Left Hand		
			Print	Y = 104.171 + 3.611 * X ± 4.820
				*Y = 131.051 + 1.636 * X ± 5.090*
			Measured	Y = 084.742 + 4.491 * X ± 4.406
				*Y = 130.035 + 1.660 * X ± 5.064*

*Denotes the multiplication sign.Figures for females in italics.

TABLE -7: Regression equations for stature estimation from phalange measurements

No.	FINGER	PHALANGE	MEDIUM	REGRESSION EQUATION	
				Male	Female
1.	Index	I	Print	Y=153.62+9.326*X±4.884	Y=152.74+3.371*X±5.212
				Y=154.411+8.757*X ± 4.904	Y=144.790+7.055*X ± 5.090
			Measured	Y=155.439+8.748*X ± 4.83	Y=154.026+2.698*X ± 5.226
				Y=159.521+6.893*X± 5.006	Y=152.342+3.493*X ± 5.178
		II	Print	Y=131.77+18.119*X± 4.364	Y=153.039+3.019*X ± 5.22
				Y=147.279+11.742*X ± 4.973	Y=153.421+2.916*X ± 5.224
			Measured	Y=130.028+18.812*X ± 4.28	Y=152.07+3.446*X ± 5.22
				Y=146.380+12.098*X ± 4.929	Y=151.725+3.704*X ± 5.196
		III	Print	Y=155.212+8.461*X ± 5.273	Y=134.166+11.858*X± 4.935
				Y=177.166+(-.545)*X ± 5.464	Y=136.283+10.808*X ± 4.963
			Measured	Y=155.984+8.164*X ± 5.26	Y=135.169+11.339*X± 4.98
				Y=167.453+3.444*X± 5.433	Y=123.808+16.642*X ± 4.412
2.	Middle	I	Print	Y=139.904+13.252*X ± 4.089	Y=153.724+2.528*X ± 5.232
				Y=133.104+15.709*X ± 3.743	Y=158.679+(-.430)*X± 5.266
			Measured	Y=171.902+1.645*X±5.40	Y=157.909+0.769*X ± 5.259
				Y=177.357+(-.647)*X ±5.456	Y=161.598+(-.857)*X ± 5.254
		II	Print	Y=138.232+13.575*X ± 4.638	Y=157.970+0.691*X±5.265
				Y=136.521+13.868*X ± 4.67	Y=154.495+2.082*X ± 5.249
			Measured	Y=137.977+13.652*X ± 4.655	Y=160.765+(-.423)*X ± 5.266
				Y=136.521+13.868*X ± 4.67	Y=152.365+2.919*X ± 5.23
		III	Print	Y=137.982+15.108*X ± 4.828	Y=138.918+9.277*X ± 5.061
				Y=155.593+8.090*X ± 5.190	Y=125.172+15.233*X ± 4.696
			Measured	Y=134.758+16.318*X ± 4.843	Y=136.26+10.402*X ± 5.021
				Y=154.804+8.375*X ± 5.257	Y=125.668+14.948*X ± 4.729
3.	Ring	I	Print	Y=154.286+9.104*X± 4.975	Y=154.984+2.239*X ± 5.241
				Y=149.143+11.276*X ± 4.502	Y=161.036+(-0.636)*X± 5.265
			Measured	Y=170.632+2.42*X± 5.386	Y=155.283+2.120*X ± 5.224
				Y=173.254+1.224*X ± 5.438	Y=160.924+(-0.614)*X± 5.263
		II	Print	Y=148.642+10.438*X± 5.017	Y=153.222+2.866*X ± 5.237
				Y=142.456+12.913*X ± 4.921	Y=151.427+3.587*X ± 5.224
			Measured	Y=149.209+10.208*X± 4.995	Y=157.545+0.948*X ± 5.264
				Y=143.848+12.347*X ± 4.958	Y=145.205+6.239*X ± 5.140
		III	Print	Y=164.470+4.470*X± 5.391	Y=143.0+7.50*X ± 5.109
				Y=154.952+8.366*X ± 5.254	Y=138.749+9.367*X ± 5.058
			Measured	Y=161.558+5.608*X± 5.348	Y=153.628+2.703*X ± 5.246
				Y=155.021+8.299*X ± 5.209	Y=140.362+8.646*X ± 5.095
4.	Little	I	Print	Y=163.090+6.711*X± 5.176	Y=156.995+1.673*X± 5.252
				Y=155.907+10.914*X ± 5.118	Y=160.09+(-.550)*X ± 5.266
			Measured	Y=167.609+4.436*X± 5.245	Y=158.087+0.966*X ± 5.2626
				Y= 163.497+6.858*X ± 5.143	Y=159.660+0.024*X± 5.267
		II	Print	Y=165.034+5.870*X± 5.341	Y=148.815+7.053*X ± 5.058
				Y=145.461+16.064*X ± 4.662	Y=149.867+6.224*X ± 5.141
			Measured	Y=164.417+6.215*X ± 5.321	Y=148.617+7.074*X ± 5.072
				Y=147.790+14.810*X ± 4.667	Y=151.851+4.916*X ± 5.190
		III	Print	Y=170.509+2.304*X ± 5.451	Y=154.313+2.649*X ± 5.243
				Y=171.472+1.914*X ± 5.457	Y=137.337+11.034*X ± 4.962
			Measured	Y=157.180+8.042*X ± 5.300	Y=156.582+1.526*X ± 5.250
				Y=167.595+3.590*X ± 5.440	Y=141.090+9.108*X± 5.062

REGRESSION EQUATIONS FOR STATURE ESTIMATION FROM HAND AND PHALANGES LENGTH: The regression equations for the estimation of stature from the hand measurements have been reported earlier also. The comparative listing of regression equations for estimation of stature from different hand measurements in Punjabi population has been given in Table-6. These equations were tested by putting the actual values and found that error of estimation of stature exists within the calculated range.

In the present study, regression equations have been formulated with the standard error ranging from 4.033 to 4.82 centimeters in case of the males and 5.061 to 5.127 in case of females .The standard error difference between print and measured ranges from 0.400 to 1.00 centimeters, which again indicates that both the parameters are efficient to indicate the estimation. It also indicates that either of two can be used for stature estimation, which is of great significance as at the scene of occurrence only prints may be available. The findings from the print measurements can be compared with the findings obtained from suspect's actual measurements.

As references indicate that very little work has been done for estimation of stature from phalange length except one reported by Shintaku and Furuya (1990). Kapoor (1987) and Sharma and Kapoor (2001) reported estimation of stature from finger tip length and fingerprint tip length among criminals. While Shintaku and Furuya (1990) studied proximal phalange in females only, Sharma and Kapoor (2001) have studied distal phalange in males only. In present study, all the three phalanges of each finger have been studied for stature estimation in both the sex. It is evident from the table that as the range of error of stature estimation remains almost same from all the phalanges therefore any phalange may be used for this purpose. This fact increases the chances to extract more information from even a part of the print is available at the scene.

CONCLUSION

Sixty adult male and female Jat Sikhs have been studied for their stature, hand length and phalangeal length .In addition to this inked palm prints were also obtained to measure hand length and phalangeal length from print. It was found that no significant difference exists between hand length and palm print length. The difference between measured phalangeal length from hand and print also is not significant. Statistically significant correlation is present among the stature and these measurements. The regression equations have been derived from these measurements and concluded that stature can be estimated from actual as well as print measurements with a standard error of estimate ranging from 4.033 to 5.127 cm. .

REFERENCES

1. Athwale MC. Estimation of height from length of forearm bones - A study on 100 Maharashtrian male adults of age 25-30, American journal of physical anthropology, 1963; 21: 105-112.
2. Begum E. Estimation of Stature from Hand Measurements in Assamese Muslims, Bulletin of Department of Anthropology, University of Guwahati, Assam. 1999
3. Bhatnagar DP, Thapar SP and Batish MK. Identification of personal height from somatometery of hands in the Punjabi males, Forensic science international, 1984; 24 : 137-141
4. Baul S. Anatomical Clinical Study of Human foot. M.S. Thesis, Punjabi University, Patiala (Unpublished). 1974
5. Jasuja OP. Calculation of stature from foot and shoe impressions, PhD Thesis, Punjabi University, Patiala. (unpublished) 1987
6. Jasuja OP, Singh J and Jain M. Estimation of stature from foot and shoe measurements by multiplication factors: A reviewed attempt. Forensic science international 1991; 50: 203-215.
7. Jasuja OP and Manjula. Estimation of stature from footstep length, Forensic science International 1993; 61:1-5.
8. Jasuja OP, Harbhajan S, Anupama K. Estimation of stature from stride length while walking fast, Forensic science international 1997; 86: 181-186
9. Kalte PM and Bansal PC. Determination of regression formulae for reconstruction of stature from long bones of upper limbs in Maharashtrians and Marathwara region. Journal of Anatomical Society (India), 1974; 23: 6 11.
10. Kapoor AK. Estimation of stature from hand length as obtained through palm prints among the Lodhas of district Midnapur, West Bengal. Indian journal of physical anthropology 1987; 13: 139.
11. Lal CS and Lala JK. Estimation of stature from tibial and ulnar lengths in North Bihar. Journal of Medical Association; 1972; 58: 120 121.
12. Patel MP, Joshi NB and Dongre AV. Regression equation of height on tibial length. Indian Journal of Medical Research, 1964; 52: 531 534.

13. Pearson K. Mathematical contributions to the theory of evolution V. On the reconstruction of stature of pre historic races. Philosophical Transection of Royal Society; London; 1899; 192: 169 224. Cited in "Krogman's Human Skelton in Forensic Medicine" 2nd Edition, Charles Thomas, U.S.A.
14. Saxena SK. Study of correlations and estimation of stature from hand length, hand breadth and sole length. Anthropol Anz. 1984; 42(4):271-6.
15. Sharma PK and Kapoor AK. Estimation of stature from finger tip length and finger print tip length among criminals, Recent advances in forensic biology (edited) , Kamla-Raj Publishers 2001; pp 117-127
16. Shintaku K and Furuya Y. Estimation of stature based on the proximal phalangeal length of Japanese women's hands. JUEOH 1990; 12(2): 215-19
17. Thakur SD and Rai KS. Determination of Stature from hand measurement, Medicine Science and Law, 1987; 78: 25 28.
18. Trotter M and Glesser GC. Estimation of stature from long bones of American White and Negroes, American journal of physical anthropology 1952; 10: 463.
19. Tyagi AK, Kohli A, Verma SK and Aggarwal BB. Correlation between stature and finger Length, International journal of medical toxicology and legal medicine 1999; 1: 20-22

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AGE ESTIMATION FROM ERUPTION OF TEMPORARY TEETH

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ABSTRACT

Teeth are very important indicators in medico-legal cases as they help in identification and age estimation in the living as well as in the dead because they resist putrefaction and are constant in their appearance. 126 children up to the age of 33 months were studied for the time of eruption of their teeth. It was studied in correlation with age, sex, socio-economic status, nutritional status and halves. From the findings it was concluded that there was a delayed pattern of eruption and teeth appeared earlier in the females and in the lower jaw.

KEY WORDS: Eruption, temporary teeth, mean age.

INTRODUCTION

Teeth are well known to help in identification as well as in estimation of age from eruption, counting cross-striations as by Boyd's method as these are very durable, resist heat, chemicals, putrefaction etc. From eruption of temporary teeth, one can estimate the age of a child from 6 months to 33 months. Eruption of teeth is affected by climate, race, diet and geographical factors. India is a very big country, with different climates. Hence it is not correct to apply same data to whole of the country. Moreover no recent study on eruption of teeth has been performed in this region. Because of this present work of age estimation from eruption of temporary teeth was undertaken.

MATERIAL AND METHODS

In this study, a total of 126 subjects were examined for eruption of teeth. The cases were taken from out patient doors of Rajindra hospital Patiala and Dental Medical College Patiala. Their teeth were examined for eruption and charting of teeth was done on Palmer's Notation chart. This system uses numbers e to a starting from periphery towards center for each half of jaw. Only, healthy children who do not show any diseased tooth or chronic illness in the form of endocrinal disorder or nutritional disorder or musculo-skeletal disorder, with good and moderate nutrition after doing their general physical examination along with height and weight were considered. The visual examination was done in good light using probe, spatula and mirror. For socio-economic status, KupuSwamy chart that has classified community into five categories of upper, middle, lower middle, upper-lower and lower classes named as 1, 2, 3, 4 and 5 respectively. The statistical tables were prepared for eruption and age, sex and age, nutritional status and socio-economic status for each individual tooth and from this, their mean age range of eruption, effect of nutrition and socio-economic status on eruption of teeth was calculated.

$\overline{X}$

The statistical tables, which correlate between eruption and age for each tooth, were prepared and their mean age and standard deviation calculated by using the following equation

$$= \sum \frac{m}{n}$$

Where:

$\overline{X}$ - Stands for mean or average

$\sum m$ - Total of all observations

n - Number of observations

When n is < than 5 S.D = $\sqrt{\frac{\sum (x - \bar{x})^2}{n}}$

When n is ≥ than 5 S.D. = $\sqrt{\frac{\sum (x - \bar{x})^2}{n-1}}$

Where

S.D – stands for standard deviation

x - Stands for values of observation

$\bar{x}$ - Mean of the sample.

n - No. of observations

OBSERVATIONS & DISCUSSIONS

After doing the statistical analyses it was found that the mean age of eruption of central incisors of upper jaw was 9.48±0.96 months and of lower jaw was 8.28±0.84 months. In case of lateral incisors the mean age of eruption was 10.20±1.08 months for both upper and lower jaws, the first molars of lower jaw erupted at a mean age of 15.56±0.72 months and of upper jaw at 15.84±0.72 months of age. For canines this age was 19.20±1.44 months and 19.32±1.56 months in upper and lower jaws respectively. Second molars of upper and lower jaw erupted at the mean age of 27.72±3.36 months (Table 1). In table 2 comparison of mean age of eruption of teeth according to the sex of the individuals is done.

CONCLUSIONS

Following conclusions were drawn from this study: -

1. Average age and range for eruption of temporary teeth in general is given in Table No.1
2. Average age for eruption of temporary teeth in male and female is given in TableNo.2.
3. No significant difference of means ages in the eruption of temporary teeth for right and left halves of the same jaw was found.
4. No significant difference was observed in the eruption of teeth in upper and lower jaw for lateral incisor, canine, first molar and second molar.
5. As for as eruption of temporary teeth is concerned, socio-economic status has no role to play.
6. There is no significant effect of moderate and good nutrition, on the eruption of temporary teeth.
7. On comparing with the study conducted by Swami et al, there is early eruption of all the temporary teeth except second molar.
8. On comparing with the observations of Vij, Parikh, Modi and Das, it was observed that there is delayed eruption of all the temporary teeth of both the upper & lower jaws except lower lateral incisor.

Table 1 showing mean age and range of eruption of temporary teeth

Type of tooth	Jaw	Side	No. of cases	Range	Mean + S.D.
Central Incisor	UJ	R	6	8.28-11.04	9.48±0.96
		L	6	8.28-11.04	9.48±0.96
	LJ	R	9	6.60-9.36	8.28±0.84
		L	9	6.60-9.36	8.28±0.84
Lateral Incisor	UJ	R	12	8.88-13.08	10.20±1.08
		L	12	8.88-13.08	10.20±1.08
	LJ	R	12	8.88-13.08	10.20±1.08
		L	12	8.88-13.08	10.20±1.08
Canine	UJ	R	21	17.40-21.84	19.20±1.44
		L	21	17.40-21.84	19.20±1.44
	LJ	R	19	17.40-21.84	19.32±1.56
		L	19	17.40-21.84	19.32±1.56
M1	UJ	R	5	14.64-16.56	15.84±0.72
		L	4	14.64-16.56	15.56±0.72
	LJ	R	7	13.08-16.56	15.12±1.32
		L	7	13.08-16.56	15.12±1.32
M2	UJ	R	25	20.88-32.16	27.72±3.36
		L	25	20.88-32.16	27.72±3.36
	LJ	R	27	20.88-32.16	27.72±3.36
		L	27	20.88-32.16	27.72±3.36

Table 2 showing comparison of sex in relation to eruption of teeth

Type of tooth	Jaw	Sex	No. of cases	Range	Mean±S.D.
Central Incisor	UJ	M	4	8.64-11.04	9.84±0.96
		F	2	8.04-9.96	9.0±1.32
	LJ	M	4	6.60-9.36	7.92±1.20
		F	5	7.44-9.12	8.52±0.60
Lateral Incisor	UJ	M	9	8.88-12.00	9.96±0.84
	LJ	F	3	8.88-13.08	11.04±1.68
Canine	UJ	M	13	17.52-21.84	19.32±1.44
	LJ	F	8	17.40-21.60	18.96±1.56
M1	UJ	M	4	14.64-16.44	15.48±1.20
		F	1	15.60-15.60	15.60±0.00
	LJ	M	4	14.64-14.64	15.48±1.20
		F	3	13.08-15.60	14.28±1.68
M2	UJ	M	12	21.36-32.16	27.96±3.24
	LJ	F	13	20.88-32.04	27.60±3.60

REFERENCES

1. Al-Jasser NM, Bello LL. Time of eruption of primary dentition in Saudi children. J Contemp Dent Pract 2003; 4(3): 65-75.
2. Choki NK, Yang KH. A study on the eruption timing of primary teeth in Korean children. ASDC J Dent Child 2001; 68(4): 228, 244-9.
3. Das AK. Dental anatomy and oral histology. 1st Ed. Calcutta, India: Current Distributors; 1972. p. 1-68.
4. Delgado H, Habicht JP, Yarbrough C, Lechtig A, Martorell R, Malina RM et al. Nutritional status and timing of deciduous tooth eruption. Am J Clin Nutr 1975; 28(3): 216-24.
5. Kaul SS, Pathak RK, Santosh. Emergence of deciduous teeth in Punjabi children, North India. Z Morphol Anthropol 1992; 79(1):25-34.
6. Kromeyer K, Wurschi F. Tooth eruption in Jena children, in the first phase of mixed dentition. Anthropol Anz 1996;54(1):57-70.FF
7. Lavelle CL. A note on the variation in the timing of deciduous tooth eruption. J Dent 1975; 3(6):267-70.
8. Lozy M, Reed RB, Kerr GR, Boutourline E, Tesi G, Ghamry MT et al. Nutritional correlates of child development in southern Tunisia. The relation of deciduous dental eruption to dental development. Growth 1975; 39(2):209-21.
9. Magnusson TE. Emergence of primary teeth and onset of dental stages in Icelandic children. Community Dent Oral Epidemiol 1982; 10(2):91-7.
10. Swami D, Mishra VK, Rao CM. Age and stage of dental eruption. Journal of Forensic Medicine and Toxicology 1994; 11(2):8-12.
11. Saleemi M, Jalil F, Karlberg J, Hagg U. Early child health in Lahore, Pakistan. Primary teeth emergence. Acta Pediatric Suppl 1993; 82 Suppl 390: 159-67.
12. Shuper A, Sarnat H, Mimouni F, Mimouni M, Varsano I. Deciduous tooth eruption in Israeli children. A cross-sectional study. Clin Pediatr (Phila) 1985; 24(6):342-4.
13. Swami D, Mishra VK, Bahal L and Rao CM. Age estimation from eruption of temporary teeth in Himachal Pradesh. Journal of Forensic Medicine and Toxicology 1992; 9: 3-7.
14. Ulijaszek SJ. Age of eruption of deciduous dentition of anga children, Papua New Guinea. Ann Hum Biol 1996; 23(6):495-9.
15. Yam AA, Cisse D, Tamba A, Diop F, Diagne F, Diop K et al. Chronology and date of eruption of primary teeth in Senegal. Odontostomatol Trop 2001; 24(93):34-8.
16. Zadzinska E. The interrelation between the number of deciduous teeth and the morphological maturity of a child. Anthropol Anz 2002; 60(2):199-207.

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UTILITY OF DAUBERT GUIDELINES IN INDIA

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ABSTRACT

This paper deliberates on the legal admissibility criteria and competence of scientific evidence and expert opinion in the courts of America and its use in Indian law. A review of important events in American law in this regard, especially the Daubert Guidelines is presented. This is followed by a review of the applicable section of the Indian Evidence Act. Finally, it concludes that although there is usually no problem in admissibility of scientific evidence in Indian Courts, in case of doubt, the Daubert Guidelines can be followed. But quality control and standards for scientific evidence have to be set, to avoid discrepancies in the Court of Law.

KEYWORDS : Legal admissibility, scientific evidence, expert opinion, American Law, Daubert Guidelines, Indian Evidence Act, standards.

INTRODUCTION

Medicolegal problems include an infinite number of areas of potential litigation [1]. It is thus imperative for us to understand the admissibility of our findings, methods and opinion as forensic medicine specialists and forensic scientists to legal matters. Previously, because of lack of sophistication in chemistry, physics, biology and medicine, investigation was largely subjective, which lead to great controversy and legal challenges during court trials [2]. Evidence simply is anything perceptible to the five senses when submitted to the court, if competent. Hence a special test of competence is required for scientific evidence [3].The major issues are :

1) whether the subject matter of the expert's opinion is appropriate to the case;
2) whether the expert is sufficiently qualified to render the opinion;
3)The type of information on which the expert bases his opinion;
4) the role of general consensus in the scientific community in evaluating the admissibility of expert testimony; and
5)limitations other than the above pertaining to the type of opinion an expert can express [4].

THE AMERICAN LAW

In America, debate in the legal community arose regarding standards for the admissibility of scientific evidence [5]. Judge Cox grouped evidence into three levels :

1)some scientific principles are so greatly accepted that the principle need not be established each time (eg. Dactylography, bite marks);
2) some junk principles that are universally discredited which can be outrightly rejected (eg. Astrology, voodoo);
3) some novel scientific methods which can neither be accepted nor be rejected outrightly (eg. Polygraphy, DNA typing) [6]

Two other methods employed for evaluation of scientific validity are :

1) Legislative action;
2) Stipulation which is a trial technique.

Later, an analytic framework was advocated which depended on :

1) validity of the technique applying the theory;
2) proper application of technique on proper occasion [6].

The Frye Test (General Acceptance Test): This was the first important ruling in America regarding the admissibility of scientific evidence. The court stated: 'Just when a scientific principle or discovery crosses the line between the experimental and demonstrable stages is difficult to define. Somewhere in this twilight zone the evidential forces of the principle must be recognized, and while courts will go a long way in admitting expert testimony deduced from a well-recognized scientific principle or discovery, the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field to which it belongs'.

The Frye test has two aspects:

1) the principle or scientific technique;
2) the acceptance.
The criticisms of the test were :
1) There will have to be a considerable time lag for the scientific method to be accepted by the community;
2)It puts more faith in the scientific community than in the Court of Law [6].

The Federal Rules Of Evidence was then enacted in 1975, of which **Rule 702** stated : 'If scientific, technical or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training or education may testify thereto in the form of an opinion or otherwise' [7]. The Federal Rules instead of solving the matter led to more confusion because it neither included the Frye standard nor made a mention of the general acceptance standard [8].

The Daubert Guidelines : These were laid down in a remarkable judgment of the United States Supreme Court in the case Daubert vs. Merrell-Dow Pharmaceuticals,Inc.The court concluded that the Federal Rules Of Evidence superseded the Frye Rule and that the rigid general acceptance rule should not come on the way of a reasonable minority scientific opinion in the form of new and emerging research based on reliable studies. It also laid down factors for the basis of scientific evidence which are also known as The Daubert Guidelines. They are :

1) The content of the testimony can be (and has been) tested using the scientific method;
2) The technique has been subject to peer review, preferably in the form of publication in peer review literature;
3) There are consistently and reliably applied professional standards and known or potential error rates for the technique;
4) Considers general acceptance within the relevant scientific community [9].

The Federal Rules Of Evidence were then **amended in 2000**. the Rule 702 now reads : ' If scientific, technical or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training or education may testify thereto in the form of an opinion or otherwise if
1) the testimony is based upon sufficient facts or data,
2)the test is the product of reliable principles and methods, and
3) the witness has applied the principles and methods reliably to the facts of the case [7].

Prof. Imwinkelried has summed up the discussion regarding the debate with respect to scientific evidence (DNA) as : 'If there are shortcomings in the tests (DNA), these do not affect the admissibility of the test result, only the weight a judge should accord it [6].

The Indian Senario: Several convictions have occurred in India where the scientific evidence (DNA) has been accepted under Section 45 of the Indian Evidence Act [10].

Section 45 of the Indian Evidence Act :It is the section dealing with the opinion of the expert. It states : 'When the court has to form an opinion upon a point of foreign law, or science or art, or as to identity of handwriting(or finger impressions), the opinions upon that point of persons specially skilled in such foreign law, science or art,(or in questions as to the identity of handwriting or finger impressions) are relevant facts.

The Courts have opined that medical evidence is only an evidence of opinion and is hardly decisive. It is not a substantive evidence. But they say that that the opinion of the doctor who has held the postmortem examination and of the forensic science laboratory is reliable. The Supreme Court Of India has further stated that unless there is something inherently defective in the medical report, The Court cannot substitute its own opinion for that of the doctor [11].

Section 293 of the Code Of Criminal Procedure deals with reports of certain Government scientific experts. Section 293(2) says that the Court may, if it thinks fit, summon and examine any such expert as to the subject-matter of his report [12].
Some authors feel that while the underlying principles of the technique(DNA typing for example) cannot be questioned, legal scrutiny can only revolve around questions related to the collection, forwarding and authentication of samples [13]. However, other authors feel that there yet no proper

international(and national) guidelines and that each laboratory has its own control and standardization methods . But the fact remains that the court is unlikely to understand in any detail the principles of the process [10]. The expert's opinion is taken by the Courts on trust and faith [10,14]. Some Courts may still be reluctant to admit some type of scientific evidence (like DNA typing) as they may feel that it does not follow the Frye Rule. However of late, it is generally held that unless there is some special circumstance, all relevant evidence is admissible [14].

The Supreme Court Of India has held : 'A medical witness called in as an expert and the evidence given by the medical officer is really of an advisory character based on the symptoms found on examination. The expert witness is expected to put before the court all materials inclusive of the date which induced him to come the conclusion and enlighten the Court on the technical aspects of the case by explaining the terms of science so that the Court although not an expert, may form its own judgement on these materials after giving due regard to the expert's opinion because once the expert's opinion is accepted it is not the opinion of the medical officer but that of the Court [15]'.

Thus, it can be said that the laws and Courts in India are still not clear on the matter on the criteria of admissibility of scientific matters and confusion still prevails.

CONCLUSIONS

1. Though till today there is general acceptance of admissibility of scientific evidence and expert's opinion in Indian Courts, there is no special law with respect to this. Section 45 of the Indian Evidence Act is insufficient in this regard.
2. In case of doubt, the Daubert Guidelines can be adhered to.
3. Proper National protocol should be formulated and extensive studies carried out with respect to quality control, interpretation of results and understanding the potential error rates of scientific evidence matter.
4. A law providing for statistical probability of evidence is essential.
5. In conclusion, one should understand that it is ultimately for the Court Of Law to decide as to how much weightage should be given to the scientific evidence and to the expert's opinion.

REFERENCES

1. Eckert WG. Introduction to Forensic Sciences. In: Eckert WG. Editor. Introduction to Forensic Sciences.2nd Ed. New York: CRC Press, 1997:1-10.
2. Eckert WG. Historical Development of Forensic Sciences. In: Eckert WG. Editor. Introduction to Forensic Sciences.2nd Ed. New York: CRC Press, 1997:11-32.
3. Eckert WG, Turco RK. Scientific Evidence in Court. In: Eckert WG. Editor. Introduction to Forensic Sciences.2nded.NewYork: CRC Press, 1997:69-80.
4. Piorkowski JD. Medical testimony and the expert witness. In: Susie H. Baxter. Editor. Legal Medicine. 3rd ed. Missouri: Mosby, 1995:141-55.
5. Cwik CH. Guarding the gate: expert evidence admissibility.Litigation, 1999; 25:6-12, 66-7.
6. Wagner GN. Williams LD. Issues regarding scientific testing. In: Stimson PG and Mertz CA. editors. Forensic Dentistry. Florida: CRC Press, 1997:47-64.
7. Federal Rules of Evidence.1975; 2000.
8. Christensen AM. The impact of Daubert: Implications for testimony and research in Forensic Anthropology. J Forensic Sci. May 2004; 49(3):427-30.
9. Daubert vs. Merrell Dow Pharmaceuticals, Inc., 509 U.S. 579(1993).
10. KSN Reddy. The Essentials of Forensic Medicine and Toxicology.23rd ed. 2004:387.
11. The Indian Evidence Act, 1872. In: Justice Mallick MR. Criminal Manual (Criminal Major Acts).New Delhi: Professional Book Publishers, 2004:25-6.
12. The Code of Criminal Procedure, 1973. In: Justice Mallick MR. Criminal Manual (Major Criminal Acts).New Delhi: Professional Book Publishers, 2004:131.
13. VV Pillay. Textbook of Forensic Medicine and Toxicology. 14th ed. Hyderabad: Paras Publishing, 2004:89.
14. Vij K. Textbook of Forensic Medicine (Principles and Practice). 1st Ed. New Delhi: B.I.Churchill Livingstone, 2001:135.
15. Madan Gopal Kakkad vs. Naval Dubey and another (1992) 3 SSC 204. In: Bhat A. editor. Supreme Court on rape trials. New Delhi: Combat Law Publications, 2003:193-94.

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MEDICO-LEGAL AUTOPSY BY PANEL OF DOCTORS PRESENT SCENARIO

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ABSTRACT

Medico-legal autopsy to ascertain the cause of death or other factors concerning death in unnatural or suspicious cases is in general conducted by one autopsy surgeon. But situations do arise when services of more than one doctor in the form of panel are taken for conducting autopsies. Except administrative orders for panel formation for autopsy in dowry related or custodial deaths, there are no clearly defined guidelines for constitution of the panel of autopsy surgeons in a large number of cases. Keeping in view the scientific, administrative, medical, legal and academic aspects of such autopsies, there is an urgent need to formulate certain guidelines for constituting such panels for disbursement of justice in a better way in public interest and to counter the probability of harassment and exploitation of the autopsy surgeons later on.

KEY WORDS: Autopsy, Panel of doctors, Bride burning, Custodial death, Human rights, Model Protocol, Prosecutor, Anesthetic death, Torture, Exhumation.

INTRODUCTION

Autopsy implies examination of the dead body with a view to searching primarily for the cause of death. The necessity for this procedure was evident to our ancestors. Records from Roman times narrate the examination of the wounds of Gaius Julius Caesar by the physician Antistius in 44 BC. In 1302, a court in Bologna ordered the examination of one Azzolino, who had died under suspicious circumstances of alleged poisoning [1].

The medico-legal or forensic autopsy is performed on the instructions of the legal authority in circumstances relating to suspicious, sudden, obscure, unnatural, litigious or criminal deaths and the information so derived, to be applied for the legal purpose to assist the course of justice. The manner of death in a particular case whether natural, suicidal, homicidal or accidental and even the cause of death sometimes, is known to the attendants or the relatives of the deceased, or the doctors and the health staff who had attended it as patient and even the investigating authorities. But, the cause of death for legal purpose can only be given by the autopsy surgeon who is entitled to perform the medico-legal autopsies under his privileges as a registered medical practitioner [2] and who can give evidence at any inquest or in any court of law as an expert. One doctor in general conducts medico-legal autopsy but at times a panel or board of doctors is required to ascertain some facts of death.

The present scenario of the constitution of the panel of doctors for conducting medico-legal autopsy in a particular case of unnatural or suspected death, is discussed keeping in view the legal, administrative, public interest and the academic aspects of the issues concerning such autopsies.

PURPOSE OF MEDICO-LEGAL AUTOPSY

Purpose of postmortem examination [3] in a particular case of unnatural or suspicious death is to find out the following: -

1. To know the exact cause of death.
2. To find out the circumstances of death
3. To find out the postmortem interval.
4. In case of unidentified dead body, to establish identity of the deceased or to help to do so.
5. The period for which the deceased survived after sustaining injuries or exposure to poison.
6. To know the nature or the manner of death, whether natural, suicide or homicide.

7. Type of weapon or the poison used.
8. Whether one or more than one person was / was involved, in case of homicide.
9. Whether any natural disease process contributed in any way, to cause the death.
10. Whether any other offence was related with the death e.g. rape.
11. Is the injury, which has caused death, expected to cause death in ordinary course of nature.
12. Whether the dead body has been displaced from the original place of disposal.
13. To know whether more than one method or weapon were used or if more than one person were involved in the crime.
14. Whether the deceased received any treatment before death.
15. Whether there is anything on or with the dead body which may help identification of the assailant
16. In case of death due to assault, the relative positions of the victim and the assailant /s.

MEDICO-LEGAL AUTOPSY BY PANEL OF DOCTORS

Some situations worth discussion, where constitution of the panel of doctors is mandatory or otherwise becomes necessitated and the views expressed by medical or legal experts include: -

1. Dowry Related Deaths:

The dowry deaths, commonly known as 'bride burning' cases, are a bane of the society. In view of the increasing number of dowry deaths, the Government for examination of such cases has laid down guidelines, and the law in respect thereof has been suitably amended. According to a circular from the Home Ministry, a panel of two doctors is required to carry out the postmortem on the body of a married woman, dying of burns or other suspicious reasons within seven years of her marriage or if her age was less than thirty years at the time of her death. From the crime data in general [4,5] , the crime is a by-product of the exploitation of the newly married women by husbands and their relations in connivance with each other and usually no eyewitness will be forthcoming to testify against the guilty in the court.

2. Custodial Deaths:

The National Human Rights Commission which came into being in October, 1993 in terms of Section 2 of the Protection of Human Rights Act.1993, along with the functions assigned to it, gave highest priority to the issues of custodial deaths and rape. The commission during an exercise noticed that there were many irregularities in conduction of the Post Mortem to the extent that at times it was absolutely not done by the doctor and every custodial death was being reported as a suicide and nowhere even post mortem findings suggested that there have been instances of excesses and torture by the police. [6, 7]

3. Death on the Operation Table:

The so-called anesthetic deaths or the deaths on the operation table can be due to anesthesia or associated with anesthesia and the surgical procedure. The investigation of these deaths by no means is always easy. The dividing line of responsibility between the surgeon and the anesthetist is not well defined. In case of any death in the operating room, the surgical team must inform the Hospital Authorities, who in turn, inform the local police and in case of any obscurity, the surgical team of its own, must insist on an autopsy, for their own safety and defence. In a study of 1089 critical incidents, in majority human error, drug related or airway management was the cause and only in 4 per cent cases the mechanical failure. In another study by Philips (1960) in Baltimore (USA) it was concluded that in deaths under anesthesia faulty management of the anesthetic was the cause in about 50% of cases. [8]

It must, however, be realized that the findings of the autopsy surgeon alone will not be sufficient to explain death and no satisfactory investigation is possible without a free and full discussion between the surgeon, anesthetist and the forensic pathologist as regards the events leading to death because functional problems like vagal inhibition, spasm of the glottis, cardiac arrhythmia, and hypotension leave no trace at autopsy.

4. Factors Affecting Medico-legal Performance:

The medico legal work these days like modern day life is very much complicated. Disputing a scientifically correct but unfavorable report has become a part and parcel of the medico legal culture. Trend to get the medico legal results hurriedly in a desired fashion that too authoritatively, is as common as it is to reject an unfavorable opinion [9]. The medico-social issues related to medico-legal performance include:

a. Risky: Medico legal work at times is very difficult and risky because there are more probabilities of one's being disputed, criticized and challenged by many on many occasions for many reasons.
b. Controversy: The medico legal work is highly controversial. Both the aggrieved and the opposite party seem to be keen to interpret the medical observations to their benefit and interests and mismatching of the medico-legal opinions with the desires and expectations of the people is therefore not uncommon with emergence of many types of disagreements and disputes.
c. Delicate: Medico legal work is very delicate because if an innocent is involved unnecessarily or a crime goes unnoticed due to faulty application of the medical knowledge would mean different to different persons. It will irk all kinds of people including police, judiciary and the departmental peers.
d. Public outcry: Political workers and social activists are often up in arms in the so called cases of police torture, hospital or dowry related deaths especially when the medical opinion is different and contrary to the populous opinion and the doctor's failure to act in their favor brought a charge that the doctor for his ulterior motives had worked in collision.
e. Administrative hypocrisy and juggleries: The legal presumption is that the hospital and the district administrators of health department who are senior to those doing medico legal work by virtue of their age in the department are superior for all practical purposes. This sense of superiority seems to be on the basis of seniority of service and not the specialization and the experience in a particular line. Problems may arise when they either respond inadequately or do not respond in a manner, as they should while giving opinions.

5. Second Autopsy:

Postmortem re-examination or second autopsy of a dead body at times may be required under certain circumstances before cremation or after exhumation. The interpretation of the findings of a second autopsy, performed on a previously autopsied body, is not an easy task for the autopsy surgeon due to various artifacts and alterations resulting from the first autopsy and it is usually demanded or ordered under public cry or political overtones.

6. Referred Cases:

Such cases which are referred from Primary Health Centers to the Civil Hospitals and further to the referral institutions like Medical Colleges should be handled with care

7. Decomposed Dead Bodies:

Decomposed and mutilated bodies are often referred to the forensic pathologists for examination. One of the important tools to determine time since death in these cases is the examination of the entomological evidence or insect infestation on human corpse / remains which can be used to closely determine the time since death [10]. The potential for contributions of entomology to legal investigations has been known for at least 700 years, but only within the last decade or so has entomology been defined as a discrete field of forensic science. Insect evidence collected from and around the body of a victim of untimely death when properly collected, preserved and analyzed by an experienced and appropriately trained forensic entomologist, can provide an accurate estimation of the victim's death and

other valuable information. Examination of bones in such cases many a times reveals important facts about the cases.

CONSTITUTION OF THE BOARD OR PANEL OF DOCTORS

Constitution of the board is the most important determinant of its functions. It is important who constitutes the board, how many and who all are the members of the board.

Varying from case to case and circumstances, the board may be constituted by the SMO of the PHC, Civil Surgeon, head of department of Forensic Medicine, Principal of Medical College, and Medical Superintendent of a hospital. Senior police officials can request for the constitution of the board. Deputy Commissioner and Magistrates can order for the constitution of the board for conducting the postmortem examination.

ETHICAL ISSUES

- It is felt that doubts are raised against doctors for conducting the postmortem examination as there are no standard procedures and guidelines for conduction of postmortem and in spite of the fact that doctors put their best efforts and try to do justice but in the absence of any uniformity in reporting everything becomes suspicious.
- In referred cases it is better to have a board constituted to prevent any future problems.
- Further depending upon the cases the board may contain two or more members as may be deemed fit. Ideally the board should have at least one forensic specialist and the rest of the members of the board should be as per requirements of the cases. Expertise and knowledge of Anthropologists and entomologists is being increasingly utilized in criminal and civil proceedings as members of the autopsy panel or part of forensic laboratories or medico-legal investigation teams. From the medico-legal point of view, the autopsy of anesthetic deaths should be conducted by a panel of doctors including the forensic pathologist or the autopsy surgeon, an anesthetist and a surgeon / clinician. Autopsies of all custodial deaths should be done only by Forensic Pathologists at teaching hospitals of government medical colleges where the departments of forensic medicine are present and the authority conducting the inquest should also arrange for the videographer. On the face of these challenges in the medico-legal controversies that there is no violation of ethical or medico-legal duties or the omission or commission, the constitution of the panel of the doctors for conducting autopsies becomes necessitated to counter the probability of being harassed and exploited by many people for variety of reasons.
- Forensic nursing is recognized as the most contemporary concept in forensic services, only recently introduced in India. This concept brings together resources from forensic science, healthcare and criminal justice in a common concern for the plight of victims of crime, the accused and the families of both. Forensic medical examiners and forensic pathologists can better perform their professional duties in such cases with skilled forensic nurse associates and investigation of crime can receive a fillip, as forensic nurses help law enforcement officers attain a more precise interpretation of the medical aspects of case investigation and preservation of biological evidence. Forensic pathology, traumatology, toxicology, sexual assault cases, criminal abortion, human rights violations, psychiatry, insurance, scene of crime and social nursing, are the fields where the potential roles of forensic nurses have been identified [11].
- Evolving a Model Protocol Standard for videography of autopsies in custodial deaths is a must.
- Whenever a Board is formed, then there should not be any video recording and the members of this board should be from the same institute.
- All the heads of department of teaching hospitals and medical college should not hesitate to render help whenever Forensic Pathologist asks for their opinions on medico-legal issues.
- During autopsy, one person from the members of the autopsy team should be designated as the principal prosecutor who will have the authority to direct the performance of the autopsy and he should take the help of other team members.
- The re-examination requires panel of two or more doctors who should be forensic pathologists in case of unnatural death or one member as

senior specialist of forensic medicine and the other members as specialists of suspected cause of death in case of suspicious deaths. The autopsy should only be conducted in forensic medicine department of a medical college and the panel should be formed on the recommendation of the forensic pathologist acting as chairman of the autopsy team.

- Ideally board should have the odd number of members so that in case of differences a conclusion may be possible.
- Members should study the case impartially and should pay their maximum attention and time to solve the case scientifically irrespective of any influence and pressure usually being exerted at such times. Honesty is the key to such cases.
- Members of the board should try to reach a consensus by discussion but if a board member wants to differ from the opinion of others on scientific basis he should not hesitate to write his opinion. Because this is the crux of the formation of the board.
- One member of the board should be taken from the specialty to which the case under consideration falls.
- It is better to make the first board from the members of the staff in middle rank rather than the highest ranking officers because their services may be needed later on in case of allegations/shortcomings by the first board.

In the eyes of a doctor, all these death cases are like any other unnatural death cases as he gives his opinion on scientific facts observed in any given case. Routinely one doctor handles a murder case, which entitles for the highest punishment by the law of the land, efficiently and by asking two doctors to conduct postmortem examination has the disadvantages also like:

- At some centers like the primary health centers, two doctors may not be available to conduct the postmortems and the bodies have to be shifted to the distant major hospitals due to the non availability of one more doctor, causing unnecessary delay for disposal of the dead body and at the same time causing unnecessary and avoidable overburden to the doctors at the higher centers who are already taxed by busy schedule.
- Delay in conducting autopsy may cause decomposition changes and loss of crucial findings.
- When two doctors are asked to conduct postmortem, it causes unnecessary confusion and also amounts to expressing doubts on the ability of a doctor.
- Majority of the dowry deaths are due to burning or poisoning, where one doctor can arrive at cause of death easily.

CONCLUSION:

Presently, the medico-legal autopsies by panel of doctors including two or more forensic medicine or other specialists, are being conducted either in accordance with administrative instructions, circumstances of the cases, type of deaths, under pressure from public or the apprehensions of the autopsy surgeon being harassed or humiliated. At times the panels are constituted when not required at all thus loading the autopsy surgeons unnecessarily and wasting their valuable time in conducting autopsies or later on in the courts of law during evidence or are constituted in an unscientific manner when the members of the panel are not at all concerned with the circumstance or the suspected cause of death but are included just to please the public mood. There is an urgent need of rethinking and modeling of certain basic principals for the constitution of the medical boards for conducting medico-legal autopsies to serve the scientific, administrative and public interests in a better way.

REFERENCES:

1. Vij K. Textbook of Forensic Medicine; First Edition 2001: 29-30,360-367,411.
2. Parikh CK. Parikh's Text Book of Medical Jurisprudence and Toxicology; 5th Edition 1990: 114,385,551,582-583.
3. Nandy A. Principles of Forensic Medicine; 1st Edition 1995: 175.
4. Thirunavukkarasu L. Investigation of Unnatural Death of Married Woman: JKAMLS; Vol.8; No.2; 17.
5. Kulligod FS. A perspective & prospective aspect of forensic medicine in Karnataka State: JKAMLS; Vol.11; No.1; 16.
6. Biswas NR. National Human Rights Commission-An Overview; International J. of

Medical Toxicology & Legal Medicine; Vol.1; No.1; July-Dec 1998; 16-24.
7. Recommendations of National Human Rights Commission on Autopsy Protocol: JIAFM; 24; No.1; 2002; 23-37.
8. Gupta RL. The Medico legal Aspects of Surgery: 1st Edition 1999; 56, 59.
9. Sharma SK. What ails Medico legal Performance: JFMT Vol. XII; No.1&2; 28-32.
10. Aggarwal AD, Gorea RK, Aggarwal OP, Singh D. Forensic Entomology- A Guide to Post Mortem Interval: JPAFMAT, 2003; Vol. 3; 7-10.
11. Gorea RK, Lynch VA. Forensic Nursing-A boon to the society: JPAFMAT 2003; 32-36.

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AUTO EROTIC HANGING BROUGHT AS A CASE OF SUICIDAL HANGING - A CASE REPORT

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ABSTRACT:
A rare case of auto erotic hanging brought as a case of suicidal partial hanging is reported in this paper. Hanging is usually considered suicidal if not proved otherwise. The findings which were corroborative of auto erotic hanging decided that this was a case of accidental and not suicidal hanging.

KEY WORDS: Partial hanging, semi-erect penis, seminal emission, padded noose.

INTRODUCTION:

Accidental hanging in the course of some abnormal sexual practice has certain characteristics which are virtually specific. The victims are exclusively males. Some are nude, some are attired in female garments and others, if normally clothed, may have opened their trousers and there is evidence of manipulation or bandaging of the genitals. Protection of the neck is by soft material, a handkerchief, vest or other cloth, interposed between the ligature and the skin of the neck [1].

CASE REPORT:

One day, it was reported to the police that a constable of the 1st IRB (Indian Reserve Battalion) posted at Imphal was found hanging in the morning inside his quarter. He was a 44 year old man married with 2 (two) kids and staying with his wife and children in his quarter. On PME, stature was 5 ft. 5 inches weighing 50 kgs, of average build, fair nutrition. The lower half of the body was naked. He was wearing only a half-sleeved T-shirt.

Rigor mortis was fully developed, postmortem staining was present on the distal aspects of the limbs and fixed, saliva stains extended from the left angle of the mouth to the chest, tongue was bitten, head and neck congested, cyanosis present and penis was found to be semi-erect with dry seminal stain on the thigh which formed a very important finding.

One old blue plastic rope was tied around the neck in the form of a running noose. His vest was loosely wrapped around the neck beneath the rope to act as padding for the noose.

Ligature mark was found in the neck as a parchmentised groove high up in the neck, 40 cms x 1.0 cm, going obliquely upwards towards the right mastoid region. Internally, there was fracture of the hyoid and transverse tear of intima of both common carotid arteries. Viscera were congested. Blood was dark and fluidish. Stomach was full.

Death was concluded to be due to asphyxia as a result of hanging.

DISCUSSION:

Sexual deviation not infrequently leads to the performance of sexual acts in circumstances of partial asphyxia, which may enhance sexual sensation [1]. Homicidal and suicidal hanging has been reported by many and has been observed to have enough potential for creating controversy [2,3].

Hanging is a common method of committing suicide. A typical method is to attach a rope to a high point, the lower end formed into either a fixed loop or a slip-knot which is placed around the neck [4].

In the present case, according to the inquest the body was partially suspended with the feet on the ground and the knees flexed as if he had been sitting on a chair which was nearby. The upper end

AUTO EROTIC HANGING

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of the rope was tied to a window bar and noose was a running one, padded with his vest, which shows no intention of suicide. Also the semi-erect penis and seminal stains and the naked lower half of the body show that he had been indulging in a practice of sexual deviation.

CONCLUSION:

Absence of obvious motive for suicide (Lack of suicide note, financial or personal problems) points to another aspect of hanging. There was no evidence of foul play. So, accidental hanging during the process of auto erotic practice was strongly substantiated by the corroborative findings. Also, on further inquiries, history showed evidence of abnormal sexual predilections.

REFERENCES:

1. Polson CJ, Gee DJ. Hanging: The Essentials of Forensic Medicine, 4th edition, Pergamon Press: New York, 1986: 357-388.
2. Dalal JS, Gorea RK, Thind AS. Triple homicidal hangings presented as suicidal hanging – a case report: Journal of Indian Academy of Forensic Medicine, 1999; 21(4): 86-88.
3. Sharma SK. Suicidal versus postmortem hanging – a case report (artefactual implications), Journal of Forensic Medicine and Toxicology, Jan-June, 2000; 17(1): 34-36.
4. Reddy KSN. Mechanical asphyxia, The Essentials of Forensic Medicine, K. Suguna Devi, Hyderabad, 19th Edition, 2000: 283-316.

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SYNCHRONOUS USE OF MAGGOTS AND DIATOMS IN DECOMPOSED BODIES

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ABSTRACT

The use of maggots and diatoms conjointly has proved to be an important factor in the medicolegal cases referred with advance decomposition.

In practice it is quite much difficult to determine Post Mortem Interval (PMI) and as well as to ascertain ante-mortem drowning factor in the bodies, which are being recovered with advance putrefaction.

However the analysis of co-existing evidences associated with corpses viz: Maggots and diatoms may reveal to draw fairly sound inferences, relating to PMI and drowning mode of death as well, especially in the decomposed bodies. Otherwise, it would not be possible to solve the cases of this nature.

The present paper enumerates the two case studies recently reported in year 2003 emphasizing about the medicolegal application of both the evidences simultaneously in the cases with advance decomposition.

KEY WORDS : Entomology, Maggots, Diatoms, Time Since Death, Post mortem Interval.

INTRODUCTION

In Medicolegal practice during the examination of decomposed bodies it is often difficult to ascertain Post Mortem Interval (PMI) as well as ante-mortem drowning factor in the cases which are being recovered with advance putrefaction. No doubt this exercise becomes more difficult when the deceased person is reported to be unknown and no last alive history is available.

Nevertheless the analysis of both co-existing evidences viz: maggots and diatoms which are being associated together with putrefied corpses may reveal to draw fairly sound conclusions relate to PMI and drowning mode of death.

MAGGOTS EVIDENCE

Over the last two decades there has been a resurgence of interest in using forensic entomology in medicolegal field. We have already established that during earlier stages of decomposition (i.e. within first two weeks). Flies of family Calliphoridae, Muscidae, and Sarcophagidae are important postmortem invaders [1-3]. However we have also reported about the use of coleopteran or Beetles the main entomologic evidence. (*D. maculatus* Deeger, Necrobia) encountered on the corpses in the later stage of decomposition [4]

Among Calliphoridae the use of Chrysomya flies has emerged as important evidence in forensic entomology in recent years.

C. rufifacies and *C. megacephala* is the most common among Chrysomya flies, which can be used as a prominent entomological evidence in medicolegal field for estimating PMI [5]

More recently two elaborated text on forensic entomology has been published which can be used by professionals to update their knowledge on the subject. [6, 7]

DIATOMS

Diatoms are microscopic unicellular water algae with a rigid case composed of silica which belong to class *Bacillariophyceae* and said to enter the pulmonary circulation during drowning. There are numerous forms of diatoms found in different shape and size both in fresh water and sea (Salt) water. [8, 9]

When the body (dead or alive) falls in water the drowning fluid and particles like diatoms and planktons passes down the air passages to the lungs. If the life is still present the heart will be beating and will transport diatom which penetrate the lungs living to distant parts of the body (Brain, bone marrow, liver other viscera and skeletal muscles) . This phenomenon could be happened only a live body but in a corpse (Dead body), this

can not occur, thus presence of diatom in bone marrow is the surest sign of ante-mortem drowning [8 & 9]

In our practice we received usually about 500 cases per year in which bone marrow of long bones such as femur, tibia, humerus or sternum are being examined for diatoms.

However in cases of drowning death to differentiate the ante-mortem and postmortem death particularly when the bodies are being recovered in state of advance decomposition or when only bony skeletons are found, the presence of diatoms in bone marrow is quite significant as the sign of drowning will not be found, may be minimal or absent, if there is delay since death.

Thus diatom examination is a reliable and practical method that is used to identify whether deceased drowned before his/her death or was thrown into water after his/her death specifically when corpse is putrefied [10].

METHODS TO USE MAGGOTS FOR PMI ESTIMATION

Collection and preservation of entomological evidence present on corpses have been discussed in detail by Kulshrestha & Chandra [1].

Among two methods pertinent in using the entomological evidence first is measurement of larvae, which provides very useful findings for forensic estimations. The development of body length (In millimeters) of fly larvae over corresponding days has been recorded at different temperatures and humidity. On the basis of variation in the length of larvae, a scale relating to their maturation in prevailing environment can be drawn, which shall certainly be used as an aid in estimating the age of larval growth by studying the specimens.

The second method adopted for study was the rearing of fly larvae in to adults, to calculate the 'Time Since Death' of infested body on the basis of total developmental time.

This method enable the examiner the confirm the identification of species and to calculate egg deposition day which will indicate the PMI assuming that eggs of flies concerned are laid soon after death. [1]

METHOD FOR DIATOM TEST

About 5g of material (Bone marrow sample or water sample from the site of drowning) are taken in a test tube, to digest the material. It is essential that surface contamination should be eliminated completely. Analytical grade concentrated hydrochloric acid and concentrated nitric acid in 1:3 ratio is to be added. All care should be taken with corrosive liquids. In ordinary course where there is no urgency the material is allowed for digestion over night at room temperature. However in urgent cases the acid may be heated in a water bath in a fume cupboard. The digestion being carried out in Kjeldal flasks [11]

A Can instrument for destruction of organic material is use for the diatom examination has also been discussed by Yange et al. [10] they have successfully developed the said can for the destruction of organic material, which is ideal for forensic diatom examination.

When digestion is complete a dark liquid will remain after partly changed due to the action of the acid on organic material. The material is boiled and transferred to a centrifuge tube. The material is centrifuged for 3 minutes at the rate of 3000 rpm. The supernatant is removed and deposit is retained which is further washed thrice with distilled water. After the final supernatant is thrown out and remaining deposit has obtained for final examination.

About 5 drops of the deposit is taken over a slide with the help of a clean pipette. The material is then allowed to dry by gentle heating over a hot plate. It is then mounted with DPX and examined for diatom under microscope: dark background or phase contrast is the most effective for the demonstration of diatoms.

CASE STUDY – I

On 20th June 2003 the body of male boy aged 10 years was referred for postmortem examination from near by district of Bhopal. The deceased reported to be seen last alive since 10th June 2003 evening and his body was recovered from a well on 17th June 2003 morning.

The body was in advance stage of decomposition, hence the autopsy surgeon could not ascertain any cause of death, and however, no bony injuries were evident.

ENTOMOLOGICAL EVIDENCE AND PMI ESTIMATION

Number of 15-16 millimeters post feeding *C. megacephala* maggots were collected from the corpse and further put for rearing. During successful rearing the pupae observed next day on 21st June 2003, the adults found emerged on 24th June 2003 in the environment of average temperature 28.4 ºC and average humidity 50%.

On the basis of control rearing experiment determined for *C. megacephala* (reference range average temperature 27.4 ºC and average humidity 72%) which is nearest to the present case prevailing environment, the development period from egg to adult observed as 10 days.

In this case the successful rearing results indicate that adult found emerged on 24th June 2003. This finding gives the conclusion that body was likely to be available to flies for oviposition on 14th June 2003. The simple calculation by subtracting 10 days from adult emergence date (i.e. 24th June 2003). As these flies takes 1-2 days (Maximum) to deposit eggs after death. Thus the likely dates come out as 12th or 13the June 2003 on which incidence might have taken place. The autopsy surgeon has given PMI one to three weeks, whereas entomological findings confirms 7-8 days PMI, which further narrow, the PMI estimation range and suggest that his lower limit one week estimation about PMI is more accurate.

DIATOM EVIDENCE AND RESULT

As body recovered from well, the autopsy surgeon has preserved tibia bone and water sample from the site of drowning, were referred to the diatom lab for examination. Diatom test found positive in both bone and water, which indicate about ante-mortem drowning.

CASE STUDY – II

A male corpse aged about 30 years referred from near by district of Bhopal for postmortem examination on 7th August 2003. The deceased reported to be seen last alive on 3rd August 2003 and the body was recovered from a well in advance stage of decomposition. Hence autopsy surgeon was unable to draw any inference relating to the cause of death. Nevertheless no evident injuries were observed in available parts.

ENTOMOLGOICAL EVIDENCE AND PMI ESTIMATION

Sarcophagidae (Flesh flies) maggots measuring 5-7 millimeters collected from the corpse. The collected maggots have further put for rearing; the feeding substrate was the liver tissue of same infested body. The pupation observed on 15th August 2003 and adults found emerged on 26th August 2003 in the environment of average temperature 26.4 ºC and humidity 28%.

The control rearing experiment determined for Sarcophagidae flies (reference range average temperature 26 ºC and humidity 86%) which is closest to the present case prevailing environment revealed that total egg (Larviparous) to adult development period is 21 days.

In this case, adult found emerged on 26th August 2003 during the successful rearing of collected maggots in pupae and adult. This indicates that flies deposited eggs (larviparous) on the body likely on 5th August. Therefore incidence might have taken place either on 2nd or 3rd August 2003 which has been further corroborated with fact that deceased person was seen last alive on 3rd August 2003. The autopsy surgeon has given PMI 5-7 days whereas entomological finding confirms 4-5 days, which has corroborated with known facts of case too. Thus five days PMI estimation of autopsy surgeon was more accurate.

DIATOM EVIDENCE AND RESULT

Autopsy surgeon has preserved tibia bone and subsequently police has sent water sample of well from which body was recovered. Diatom test found positive in both bone and water, which indicate about ante-mortem drowning.

CONCLUSION

The present case studies successfully demonstrated that both maggots and diatoms conjointly have proved to be important evidence particularly in the cases where body is recovered in advance stage of putrefaction.

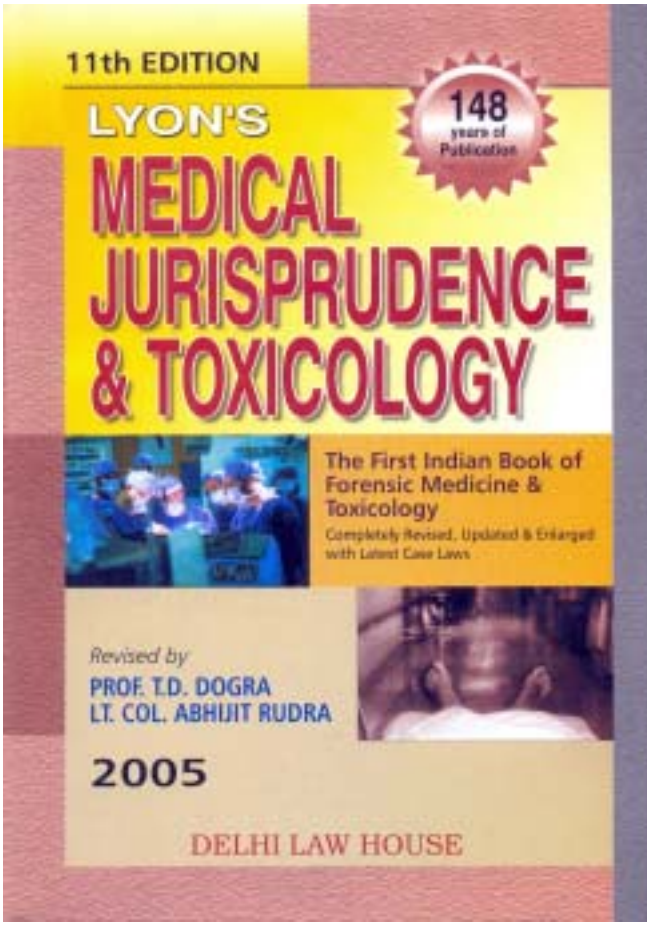
The present findings emphasize that in both two cases, due to decomposition the cause of death and as PMI estimation could be a difficult task to be ascertained. However, simultaneous analysis of both maggots and diatoms may reveal fairly sound conclusions relating to PMI and drowning mode of death specifically in decomposed cases.

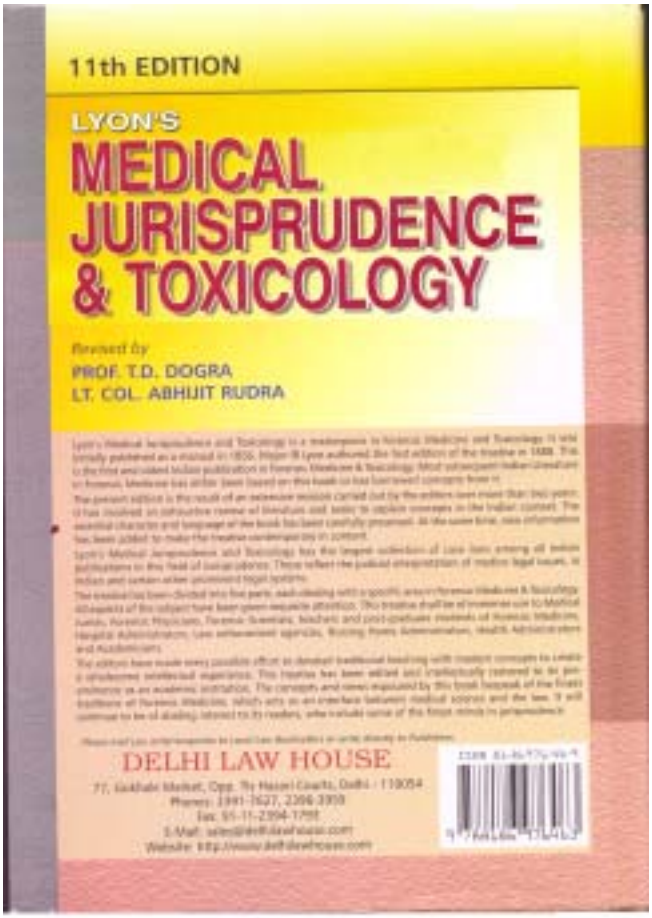
REFERENCES

1. Kulshrestha P, Chandra H: Time since Death - An Entomological Study on Corpses. Am. J. For. Med. Path. 1987; 8 (3): 233-238.

2. Kulshrestha P, Satpathy DK, Dubey BP: Role of *Synthegiougia nudiseta* (Muscidae) in Forensic Entomology. In: C Waksugi (Eds) Proceedings of the Third Internationals Symposium on Advances in Legal Medicine, Osaka Japan 1997; pp 159-161.
3. Kulshrestha P, Satpathy DK: Significance of *Chrysomya migrates* in Forensic Entomology. Abstract Published in Proceeding of IAFS, 15the triennial meeting LA California USA, 1999; pp.170.
4. Kulshrestha P, Satpathy DK: Use of Beetles in Forensic entomology. For. Sci. Int. Elsevier Science Ireland Ltd. 2001; 120: 18-27.
5. Kulshrestha P, Satpathy DK: *C. rufifacies* Development and Forensci Entomology - Recent Case Studies. Journal of IAFM, 2002; 24(1): 6-9.
6. Byrd JH, Castner JL (Ed): Forensic Entomology - The Utility of Arthropods in Legal Investigation. CRC Press New York, Washington DC USA. 2001.
7. Greenberg B, Kunich JC. Entomology and the Law: Flies as Forensic Indicators. Cambridge University Press UK 2002.
8. Knight B. Lawyer's Guide to Forensic Medicine. Handbook for Court and Chambers. William Heinemann Medical Books ltd. London 1982; pp82-86.
9. Reddy N. The Essentials of Forensic Medicine and Toxicology. 15th Edition 1995; pp 303.
10. Li Yange, Hu Chuauying Wang, Chengyino wan Yu: Development of Can for Destruction of Organics Material in Use for Forensic Diatom Examination. For.Sc.Int. 1999; 101 (3):163-166
11. Knight B. The coroner's autopsy. Churchill Living Stone 1983; pp 286-288.

BOOK REVIEW





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Dr.R.K.Gorea

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