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## Contents

**From the Editor's Desk** 97

### Editorial

- **Union Govt., Court, CBI and Members of the MCI/IMA/Medical Fraternity on the Dock!** 98

### Originals and Papers

- **Estimation of Stature by anthropometric measurements of Inter-acromial Length** 101  
*Vishal Veer Vasu, Swapnil Sudhir Agarwal, Shashidhar Channamallapa Mestri*
- **Significance of sacral index in estimation of sex in sacra of cadavers in Punjab** 104  
*Anterpreet Kaur Arora, Pankaj Gupta, Shashi Mahajan, Sonney Singh Kapoor*
- **An Epidemiological study of Organophosphorus Poisoning at Manipal Teaching Hospital, Pokhara, Nepal** 108  
*S. M. Kar, Sidartha Timsinha, Prashant Agrawal*
- **Study of road traffic accidental deaths (RTA) in and around Bastar region of Chattisgarh** 110  
*Dhaval J Patel, Gopinath Agnihotram*
- **Estimation of age in the living municipal employees in the age group of 25-45 years by physical and radiological examination** 113  
*A. T. Shendarker, R. Kharat, W.F. Vaz, F.R. Karjodkar, K.R. Rede*
- **Age assessment from radiological cranial suture closure in fourth to seventh decades: (A Jaipur based study)** 120  
*Rajesh Kumar Verma, Mukesh K. Goyal, Shiv Kochar*
- **Noble ideas and approaches to learning medical sciences** 124  
*Chandra Prakesh, Bhavana Srivastava, Sanjay Gaur, Ajay Kumar Sinha*
- **Histopathology examination in medicolegal autopsy: Pros and cons** 128  
*Akhilesh Pathak, H.M. Mangal*
- **Pattern of renal pathology in fatal envenomation by Indian Cobra (Naja naja)** 132  
*Partha Pratim Mukhopadhyay, Sulekha Ghosh, Tapan Kumar Ghosh*
- **A study of homicidal deaths by mechanical injuries in Surat, Gujarat** 134  
*Pranav Prajapati, M.I. Sheikh, Shyam Patel*
- **Incidence of snake bites in Belgaum** 139  
*Ashok Kumar Shetty, Prasanna S. Jirli*
- **Decay in intact DNA recovery in blood samples kept at room temperature** 142  
*Imran Sabri, J.A. Usmani, S.A. Hanif, A.U.Khan*

- **Pattern of fatal blunt head injury: A two year retrospective/prospective medicolegal autopsy study** 144  
*Amit M. Patil, Walter F. Vaz*
- **Profile of medicolegal cases at Adesh Institute of Medical Sciences & Research, Bhatinda, Punjab** 150  
*Vishal Garg, S.K. Verma*
- **Medical ethics, duties and medical negligence awareness among the practitioners in a teaching medical college, hospital-A Survey** 153  
*Shreemanta Kumar Dash*
- **A comparative study of clinical & autopsy findings (clinical audit) in 100 cases died of trauma** 157  
*Geetha O, S. Girish*

### Case Reports

- **Adult choroid plexus papilloma: Cause of sudden death** 160  
*S. Ranjan Bajpai, D.S. Badkur, Reeni Malik, Arneet Arora, Jayanthi Yadav*
- **Suicide by para-phenylenediamine poisoning** 163  
*Sushil Kumar*
- **Acute Myocardial infarction related to blunt thoracic trauma: Review of literature with two case reports** 165  
*Amit Sharma*
- **Importance of scene of crime visit, it may be late but it is never too late** 168  
*U.S. Sinha, A.K. Singh, Y.K. Pathak*
- **Fatal multiple painless intussusceptions: A case report** 172  
*Nilesh Keshav Tumram, Rajesh Vajjnathrao Bardale, Manish B Shrigiriwar*
- **Fatal unintentional Carbon Monoxide Poisoning inside a Garage: A case report** 174  
*Avishek Kumar, Ravi Rautji*
- **A Rare Case Report: Poland's Syndrome with unilateral Amastia in alleged victim of Rape** 176  
*Kalpsree Bhawmik, Nibedita Shyam, K.C. Das*

### Review Articles

- **Operational difficulties in M.B.B.S. 2<sup>nd</sup> Professional course due to MCI regulations: Is MCI listening?** 179  
*Rajiv Mahjan, Parmod Kumar Goyal, Mukesh Yadav*
- **The Medicolegal Autopsy-Its Social and Religious Attitudes** 183  
*Putul Mohanta*

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## **From Editor's Desk**

# **JIAFM**

**A Quarterly Publication**

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I feel immense pleasure to present before you the second issue of 2010. I assure you about the quality of research papers and quality of printing in future issues. Your valuable suggestions are always encouraging me and I heartily welcome for future suggestions. On behalf of Executive Committee of IAFM for the years 2010-2011, I took resolution to further improve the quality and status of our Journal. We always learn from mistakes and try to improve upon these. I am thankful to the advertisers who have provided additional financial resources for improving the quality of this issue.

***Dr. Mukesh Yadav***

***Editor***

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***Editor***

**Editorial****Union Govt., Court, CBI and Members of the MCI/IMA/Medical fraternity on the Dock!**

Current affairs of medical education and health care in India involves important issue of good governance by the Modern State, discharge of statutory duties by the 'public servant' and protection of fundamental rights by the Court, constitutional mandate of division of jurisdiction between Judiciary, Executive and Legislature, three wings in a democratic setup. Issue of public faith and confidence in a welfare state like India becomes more important when it involves most cherished fundamental right of every citizen i.e. Right to life which includes Right to adequate health care enshrined in the Article 21 of the Indian Constitution.

In the cacophony of the IPL saga, a more serious scam has just surfaced, more serious, because, it involves health and lives of more than 1.3 billion Indians. In terms of money it does not match up to the IPL rip off, but its effects, fallout and ramifications are much wider and more somber. The Medical Council of India (MCI) chief and two of his cohorts were arrested today by CBI on charges of corruption. This is sure to bring down the prestige of MCI by quite a few notches, as will it bring shame and self-disgust to every ethical practitioner of medicine.

**Issue of good leadership of IMA:**

It is an issue of participatory democracy, medical law and ethics vital for maintaining nobility of the medical profession. Issue raises serious challenges before the leadership of India's largest body of Allopathic Medical Professionals i.e. Indian Medical Association (IMA). It is also an issue of good leadership among the whole Medical Fraternity of India.

Instead of opposing the move of Union Government to revamp the MCI and defending the actions of corrupt and rotten system of MCI prevailing and putting the nobility as stake, leadership of IMA should participate in a constructive way. It is shocking that nowhere IMA office bearers both local and national made any official statement against prevailing corrupt practices.

If we blame illiterates and rural population for helm of current affairs of the India on the issue of corruption, it may sound true but what about the so called intellectual urban population of medical fraternity not taking lead to improve the situation of their noble profession. It raises serious doubts about the whole education system of India particularly higher education (professional medical education).

**Reasons for Attraction to Medical Profession:**

The potential for earnings through the medical profession and the prestige which goes with the profession attracts large number of youngsters towards the profession all over the India. There is a scramble for seats in medical colleges. Some of the medical colleges had been charging fabulous amounts running into lacs of rupees by way of **capitation fee** for allotting seats to students. This led to a spurt in the number of medical colleges. Medical colleges are seen as **money spinning business propositions**. This in turn has **increased the burden of the MCI**. Its functions like granting permission to run medical college, recognition, withdrawal of recognition and the power to regulate the number of seats in medical colleges have **put the MCI in a very powerful position**.

This makes it almost imperative that the MCI should have as its members, persons of integrity and high professional standards with values of honesty and probity.

**Issue of participatory democracy:**

Unfortunately institutions meant to improve professional standards are passed into hands of unscrupulous persons day by day. A stage has come when on account of politicking and manipulative tactics of such persons like Ketan Desai in institutions meant to maintain professional standards, no good or eminent person with stature wants to serve such institutions. This results in institutions being controlled by undeserving persons.

**Role, Responsibility and powers of MCI:**

The role of MCI has assumed great importance in course of time. The MCI is charged with the responsibility of maintaining high levels of medical education and professional standards by the medical practitioners. The MCI not only lays down the academic standards for various medical courses including post graduate and diploma courses but also ensures that proper infrastructure is available in the medical colleges for imparting education and training. The MCI enjoys vast powers for its control over medical colleges; it gets the colleges inspected through its own teams of inspectors. The inspection reports can lead to refusal of permission to start medical colleges and withdrawal of recognition to already recognised medical colleges. The MCI regulates admissions to medical colleges in as much as if colleges are to increase the number of seats, its approval is required.

### **Role of Office bearers of MCI:**

The Medical Council Act was brought into force with laudable objectives. The MC was envisaged under the Act as an Apex Body to control and regulate the medical profession. Whether any legislation is able to achieve its objectives depends on persons who occupy important offices under the respective statutes and whose responsibility it is to implement the statutes. The role of human beings becomes all important. If human beings who are to implement the statutes are unfit for the job, they can subvert the spirit behind the statutory provisions.

A beneficial statute can be converted into a tool of oppression by incompetent and/or unscrupulous persons. President of the Medical Council plays a pivotal role. It is he who is really responsible for the entire functioning of the Council. The role of the President of the Medical Council of India in working out the statute is the main issue before us. As per the case of the petitioner in the writ petition, present case is an example of subversion of the Indian Medical Council Act by the present incumbent on the post of President of the Council.

### **Various Issues involved:**

- Failure of the Central Government to constitute the Medical Council of India timely in accordance with section 3 of the IMA Act of 1956.
- The eligibility of various office bearers, to seek election as President, Vice-President and Members both elected and nominated one of the MCI and to hold office as such.
- Thirdly allegations have been made of misuse of office by office bearers by indulging in corrupt practices which disentitle him to continue to hold office of the MCI.
- Proper transparent and accountable system of grievance redressal whenever any discrepancy come to the notice of the anyone interested in the system of quality of medical education.

### **Role of Higher Courts**

Although the Indian Medical Council (Professional Conduct, Ethics and Etiquettes) Regulations-2002 at point 1.7 of Chapter I casts a statutory duty on every registered medical practitioner to expose the unscrupulous practices indulged by fellow colleague without fear or favour. But there are very few who can dare to follow this statutory requirement, reason being not sure of enforcement of these regulations by the regulatory body itself i.e. MCI/ SMC and no hope of reprieve from even higher judiciary at the level of the High Courts or even Apex Court of the India. Thus, true mandate of establishing the democratic welfare state as envisioned by founder forefathers of the Indian Constitution. As it is well said that justice delayed means justice denied. Many cases are pending in various High Courts in many states and in the Supreme Court for years together. Those who can dare to move these courts either oppressed by the authorities by various ways or lose interest after loosing money before unscrupulous advocate's hands in gloves with opposite parties

### **Role of CBI:**

This time CBI has put on its website a request to public to let it know any "specific complaint regarding demand of money by MCI officials or giving approval/permission to any such college without having the required infrastructure due to corrupt practices by the Inspection Team or MCI officials".

Contents of CBI Public Notice read as "CBI has registered a case related to corruption in Medical Council of India (MCI), which conducts inspections for permission to start new Medical Colleges or to introduce new medical courses including Post Graduate Course and also for renewal of permissions, etc. If you have any specific complaint regarding demand of money by MCI officials or giving approval/permission to any such college without having the required infrastructure due to corrupt practices by the Inspection Team or MCI officials, please contact: **Dr. M.M. Oberoi, HoB/AC-III, CBI, New Delhi** Tel. No.: 011-24361515 or send email at [hobac3del@cbi.gov.in](mailto:hobac3del@cbi.gov.in)".

### **How to achieve laudable objectives of statute?**

Delhi High Court in 2001 observed that:

- "We are of the considered view that facts of this case call for exercise of power under Article 226 of the Constitution of India to prevent abuse and misuse of statutory office by the present incumbent.
- We have observed earlier that legislative measures are backed by best of intentions and laudable objectives.
- It falls on persons who exercise powers under the statutes, as to how they implement the statutory objectives.
- Court concluded in following words that "In other words, ultimately it all depends on persons who are charged with the duty to act under the respective statutes."
- If there are right persons for the jobs, the objectives will be achieved.
- If there are wrong persons, the statutes will be misused for oppression and corruption.

### **Role of Board of Governors and New MCI Members:**

It is well said that “A person is known not only by the company he keeps but also by the company he avoids”. This is well suited about the role and conduct of past MCI members well evident from CBI Report, MCI Minutes, court judgments on many previous occasions. Many past members are on pay role of private management holding double posts in MCI various committees any molding MCI rules and regulations with impunity. RTI use by many public spirited doctors found that CBI and CVO find many of them indulged in corrupt practices and recommended various disciplinary actions against them including secretary of MCI and one of the Vice-Chancellor of a Private University and many of them holding posts even after completing 65 years.

The Indian Medical Council (Amendment) Ordinance, 2010 (Ordinance 2 of 2010) was promulgated by the President Pratibha Devi Singh Patil on 15<sup>th</sup> May 2010, came into force with immediate effect that empowers the Central Government to supersede the MCI.

Whereas upon the supersession of the MCI and until a new Council is reconstituted within a period of one year, as a **first step**, the Central Government exercising its power under Section 3A (4) of the IMC Act, 1956, has now created a six-member “**Board of Governors**”, to exercise the powers and perform the functions of the MCI under newly inserted Section 3A (2) of the Ordinance 2010.

### **Need for restoring the public confidence in the MCI:**

We all hope and trust that the Board of Governors and present Administrators shall restore the public confidence in the MCI and bring the Medical Council back on its feet so that it is able to discharge its statutory functions in accordance with the spirit and object of setting up the MCI.

**To ensure and restore the credibility of highest medical education regulating body following steps are recommended:**

**Firstly, Auditing** of MCI activities by third parties which can appropriately assess the performance. Secondly, ensuring **Transparency** in the accreditation and inspection system of educational institutions by publicly displaying information of complaints against medical institutions and their effective time bound redressal. Central Government should ensure regular, free and fair elections of key office-bearers especially from the medical teaching category, under the supervision of court’s observers. The role of the Central and State Governments is immense in ensuring nominated members who are honest, efficient and public-minded especially from medical teaching background by defining criteria about qualifications and experience through a search committee as in case of appointment of Vice-Chancellors of the University.

Central Government intends to separate the **two functions of the MCI: medical education and registration of medical practitioners** and hand them over to new institutions. Medical Education will come under the ambit of the **National Commission for Higher Education and Research (NCHER)**, which, in turn, will be overseen by the **Ministry of Human Resource Development (MHRD)**, and the registration of medical practitioners under the **National Council for Human Resources in Health (NCHRH)**, to be overseen by the **Ministry of Health and Family Welfare**.

The Central Government’s focus on MCI’s affairs is, therefore, quite welcome step. But creating new institutions is not necessarily the best way of correcting the manifold problems of the health sector. The health sector, it is well known, requires an overall perspective and accountability that only a single entity devoted to the sector can provide. One should not forget that there was a reason why the MCI was formed as an independent, professional regulator. The health sector requires the creation of in-depth expertise which, if not available, has devastating ramifications. Only health sector experts have the necessary understanding of the professional and technical issues involved in health care to design and implement appropriate regulations. This is well recognised and consequently, all over the world, it is professionally-run medical associations that are in charge of such matters.

Also, the NCHER under the MHRD will be working across different sectors; there is generalized apprehension that India’s bureaucracy will be put in charge of a technical area, so that the cure becomes worse than the original malady. **The world over, the trend is to provide greater powers to sector experts who have the necessary understanding of their sector and profession.**

This is the right time before all of us including responsible government authorities, higher judiciary, and leadership of medical fraternity to come forward and play their much desired role in a largest democracy of the globe in participatory manner to save and serve the humanity.

*Editor*



## Original research paper

# Estimation of Stature by Anthropometric Measurements of Inter-Acromial Length

\*Dr. Vishal Veerbasu Koulapur, MD, \*\*Dr. Swapnil Sudhirkumar Agarwal, MD, DNB, \*\*\*Dr. Shashidhar Channamallapa Mestri, MD

### Abstract

Stature is an important parameter to establish identity of an unknown corpse. It is being used by medicolegal experts when either complete or parts of human body are recovered. A lot of criteria are available that can be used depending upon the part of the body recovered. To add to these criteria, a study was done with the objective of deriving a regression equation for estimating stature from the inter-acromial length. A cross-sectional study was done during one year period wherein 150 subjects in age group around 23 years were studied. Three sets of regression equations were derived after statistical analysis of the data. The study revealed that there exist a positive and significant correlation between stature and inter-acromial length in both the sexes and that stature can be estimated with the inter-acromial length when only upper parts of the trunk are available.

**Key Words:** Forensic Anthropology, Identity, Inter-Acromial Length, Stature, Regression Equation

### Introduction:

Skeletal material present in the mutilated or amputated limbs, trunk etc. has obvious significance in the personal identification in the event of the murders, accidents or natural disasters. Studies on 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, Trotter and Glesser. The Indian perspective of the problem of stature estimation has been studied by the Athwale et al, Patel et al, Joshi et al, Lal and Lala etc (Jasuja OP and Singh G, 2004). [2]

When a complete dead body is found, stature estimation is rather an easy task; but in cases in which only some parts of the body are available, the determination of stature of the individual is difficult.

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Thus it is necessary to have different formulae for the determination of stature from the lengths of different body parts in different population groups as they vary from population to population (Kroeber AL, 1976). [3]

Although a number of studies have been done on stature estimation by using different body parts, very few of them are by using inter-acromial length. Inter-acromial length is the distance between two bony landmarks, i.e. acromial processes of scapula on each side. Acromion is the most lateral point on the lateral margin of the acromial process when the subject stands in normal position with his arms hanging by the sides (Nath S et. al, 2005). [6] The present study is taken up to fill the above lacuna. In addition, inter-acromial length being a macro measurement, is easy to measure. In this study, an effort was done to establish the relationship between statures of different persons of North Karnataka region of India and their inter-acromial lengths and to develop regression equation formulae from these two variables by simple regression analysis. The formula thus obtained could be used for the determination of stature of an individual of North Karnataka region of India from his inter-acromial length. Ethical issues involved in the study were minimal and no invasive methods were used.

### Material and Methods:

A cross-sectional study was done over a period of one year from 1<sup>st</sup> November 2006 to 31<sup>st</sup> October 2007. During this period, one hundred and fifty individuals i.e. 75 males and 75 females, born and brought up in the North Karnataka region of

India (Districts included were Belgaum, Dharwad, Bijapur, Gulbarga, Bagalkot, Gadag & Haveri) in the age group 23 years were chosen for the study. Age 23 years was chosen for the reason that by this age nearly all secondary centres fuse with the respective shafts. Those who were not born and brought up here were excluded. To minimize error, cases of dwarfism, gigantism and those having skeletal abnormality of spine and long bones were excluded from the study.

After taking their written informed consent and recording their full particulars like name, age, sex and place to which they belong, the stature of each individual was measured in centimeters with the subject standing against a vertical background surface in normal erect position, the shoulders, buttocks and heels lightly touching the background/wall. An anthropometric rod set was used for taking the above measurements. The measurement from the vertex of head to the ground was taken after bringing down the adjustable cross-bar to the head and the measurement was read from the vertical scale. The inter-acromial length was measured in centimeters with the person in the same erect position (Momonchand A and Devi TM, 1999). [5]

After taking the measurements, statistical analysis was done using statistical equations as given below:

$$\sum y = Na + b \sum x$$

$$\sum xy = a \sum x + b \sum x^2$$

Where  $\sum$  = Sum value

y = Value of stature

N = Number of cases studied

x = Value of inter-acromial length

a = Unit greater than x value by y value

b = Regression coefficient

From the above equations, regression formulae, standard errors and co-efficient of correlations were developed to fulfill the aims and objectives of the study. After statistical analysis of the results, three regression equation formulae were obtained from the relationship between statures and inter-acromial lengths of females, males and males & females combined.

### Observation and Findings:

The maximum, minimum and average statures of different sexes along with their maximum, minimum and average inter-acromial lengths were calculated and tabulated as shown in Table I.

The regression formulae, standard errors, standard deviations and coefficient of co-relations of the above data were computed using statistical methods by presuming X as an independent variable and Y as dependent variable.

### Results:

Then regression formulae, standard errors, coefficient of correlations of the study have been computed and presented in Table No. II.

### Discussion:

Population variations in anthropometric dimensions do exist and are attributed to genetic, dietary habits and environmental factors. This indicates that specific formulae or regression equations used in prediction of stature are only applicable to the population from which the data were collected (Malek AKA et. al, 1990). [4]

Various researchers with variable degree of success have attempted the estimation of stature from various long bones, by using different statistical methods such as regression equations and multiplication factors for a very long time. The difficulty in availability of adequate quantities of bones, in the choice of bones, then cleaning and the need of trained personnel are encountered while correlating bone dimensions with stature (Dikshit PC et. al, 2005). [1] But very little work has been reported on the use of these statistical methods to calculate the stature from the inter-acromial length.

The standard errors came out to be  $\pm 8$  cm (males) and  $\pm 5$  cm (females) in a study done by Momonchand A and Meera Devi T (Momonchand A and Devi TM, 1999). These standard errors were  $\pm 6$  (males) and  $\pm 4$  (females) in our study. There is a difference is of  $\pm 2$  cm in males and  $\pm 1$  cm in females which is better than earlier study.

In both the studies, the error is more in males as compared to females. This can be attributed to the reason that females, being thin and lean; bony projections are easily palpable and more accurately taken for measurement as compared to muscular males where it is not so easy to mark out the bony projections.

Both the studies have been done in India but one can clearly find a notable difference in the regression equations in both the studies. In first study done by Momonchand A and Meera Devi T (Momonchand A and Devi TM, 1999), [5] the regression equations were  $y = 1.7x + 84$  in females and  $y = 2x + 69$  in males, while that in this study, it has come out to be  $y = 103.62 + 1.6x$  in females and  $y = 167.50 + 0.20x$ . When inter-acromial lengths taken from the population study were used to find out stature from regression formulae developed by Momonchand A and Meera Devi T, there was a significant error in stature calculated. This implies that these formulae can be used for estimating the stature in the given population from which they have been developed. This also proposes the need to have similar studies on different populations so that similar equations can be evolved for different population groups and the differences can be studied further.

**Conclusion:**

There exists a significant correlation of height with the inter-acromial length of an individual in both the sexes and that stature can be estimated with the inter-acromial length when only upper part of the trunk is available. The correlation matrix of the present study shows that the use of a single regression equation to predict stature from the measurements of inter-acromial length does not make a great difference from individual measurement equations based on sex. In the present study, the regression equation developed for stature estimation from the inter-acromial length by regression equation formulae  $y = 167.50+0.20x$  in males and  $y = 103.62+1.6x$  in females can be useful in estimating stature of the population of North Karnataka region and whether these equations are useful with other population needs to be researched.

Similar studies need to be done on dead bodies in mortuary, where it is easier to mark bony projections accurately as they can be felt more prominently, even by rough manipulation without pain factor, which is a hindrance in living subjects. Also no ethical issues are involved here. May be in these studies the standard of error can be minimized and these regression equations can be made more useful.

More studies need to be conducted to estimate the stature from inter-acromial length among

other racial groups and of different geographical areas, as it can be extremely useful to estimate the stature when mutilated upper part of trunks are available.

**Acknowledgement**

Acknowledgments are due to Mr. M. D. Mallapur [M.Sc.], Lecturer in Statistics, Department of Community Medicine, KLE University's Jawaharlal Nehru Medical College, Belgaum for his valuable help in the statistical analysis of this study and all the subjects, who have whole heartedly participated in the study.

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**Table No. I**

Characters	Males	Females
Maximum stature	184.2	167.9
Minimum stature	160.2	140.4
Average stature	170.3	157.3
Maximum inter-acromial length	40.2	33
Minimum inter-acromial length	30.2	25.6
Average inter-acromial length	34.2	29.9

The above table shows sex wise distribution of maximum, minimum and average statures and inter-acromial lengths in cms

**Table No. II**

Characters	Regression formulae	Standard error	Coefficient of correlation
Males & Females together	$y = 103.82+2.1x$	± 5 cm	0.7
Males only	$y = 167.50+0.20x$	± 6 cm	0.5
Females only	$y = 103.62+1.6x$	± 4 cm	0.6

The above table shows regression formulae, standard errors, and coefficient correlations; where 'y' is stature and 'x' is inter-acromial length in cms

## Original research paper

# Significance of Sacral Index in Estimation of Sex in Sacra of Cadavers in Punjab

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### Abstract

In the identification of sex in human skeletal remains, Sacrum is an important bone for identification of sex in human skeletal system. Since it is a component of axial skeleton and because of its contribution to the pelvic girdle and in turn to the functional differences in the region between the sexes, it has an applied importance in determining sex with the help of measurements carried upon it. Over the years different authors had carried various types of measurements on human sacra of different races and regions. A study for sexing of sacra was carried on 40 sacra (20 male & 20 female sacra) in Punjab. The method used was sacral index. The measuring instrument used was sliding vernier calliper. All the sacra taken were normal. The sacral index of sacra its mean and standard deviations were calculated. Then calculated range (mean  $\pm$  3S.D.) and demarking points (DP) of both the parameters and the percentage of bones in which sex could be identified by them was also calculated. The results were compared with the available literature. It was found that D.P of sacral index was very reliable in sexing of sacra.

**Keywords:** Sacra, Sacral Index, Demarking Points, Anthropometry

### Introduction:

The best indicators of sex in the skeleton are to be found in the pelvis. This is because one of the major biological differences between men and women, that of having babies, largely determines the shape of that part of the body. This can be seen that from the sacral index, and sex can usually be determined even if part of the pelvis is destroyed. The ability to determine sex from unknown skeletal remains is vital, and methods to do this on the various bones of the human skeleton have been researched extensively.

Many researchers have emphasized the need for population specific data for methods which are based on measurements, as there are vast differences in body size in various populations.

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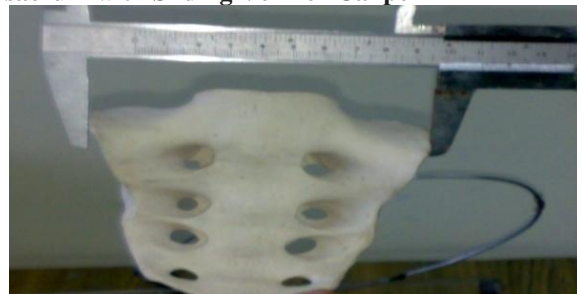
The well known method for determination of male type sacrum or female type sacrum has always ideally been the Sacral Index method.

The formula for Sacral Index is; Sacral Index = Width of Sacrum X 100 / Height of Sacrum.

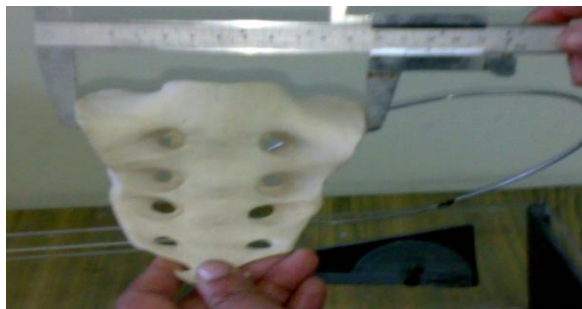
### Materials and Methods:

The materials for the present study consisted of 40 human adult sacra obtained from Dept. Of Anatomy, SGRDIMSAR, Amritsar. The use of sliding vernier calliper was incorporated to determine the sacral index of sacrum. Therefore sacral index was measured by taking the breadth and length of individual sacrum with the help of vernier calliper. The stem of calliper was applied to middle of promontory and middle of anteroinferior border of fifth sacral vertebra for the length (height) photograph- 2 and measurement of maximum breadth was taken across the greatest expanse of lateral masses of the bone as shown in Photograph1 (a) (b).

**Photograph-1(a, b) to measure the width of sacrum with Sliding Vernier Caliper**



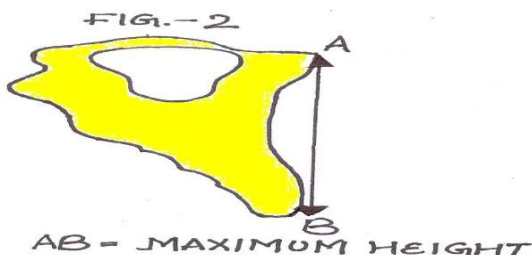
(a)



(b)

Anterior straight breadth of sacrum: measured with sliding calliper as the distance between the anterior projection of left and right anterior surfaces. Instrument used is sliding calliper.

**Photograph No. 2**



**(To measure the height of sacrum)**

The maximum height or length was measured by applying the sliding calliper to the middle of promontory and middle of antero-inferior border of fifth sacral vertebra as shown in Photograph-2. Instrument used is sliding calliper.

**Sacral Index:**

Thus, sacral index was calculated as  $\text{Width (Maximum Breadth)} \times 100 / \text{Maximum H}$ . Mean and standard deviations were calculated for the ranges of each parameter of both the sexes. Using these values 'calculated range' was arrived at by the formula 'mean  $\pm$  3SD'. For a given male, calculated range of 'a to b' and female calculated 'x to y', values of 'a' (minimum in male range) and 'y' (maximum in female range) were chosen as 'demarking points' (DP) [3], [4], [5] for females and males respectively. The range, mean, calculated range (mean  $\pm$  3S.D.) and demarking points (DP) of various parameters and the percentage of bones in

which sex could be identified by them, are given in table-2

**Results:**

The mean value of the width was higher in female sacra than that in the male sacra and the mean of maximum height was higher in male sacra than that in the females. The mean value of sacral index was higher in females.

The differences in the mean values of males and females were analyzed statistically and their significance is shown in Table-1.

Table-1 shows that the width of sacrum and sacral index are important parameters as far as the sex determination of sacrum is concerned because 45% of male bones and 40% of female bones could be identified by using the D.P. for the sacral index.

The observations showed that in case of the sacral index method; the range for males was **58.9-128.38** and in case of females it was **90.94- 159.76**; mean for males was **93.685** and for females it was **125.35**, as shown in Table-1. Thus by using mean  $\pm$  3S.D. the demarking point for males was **<90.94** and for females was **>128.38**. The present study had found 9 readings of male falling within the demarking point and 8 readings of female falling within the demarking point. Therefore, the percentage beyond demarking point for males was 45% and for females was 40% with an accuracy of 99.75% as shown in table

The 't' value for sacral index was **3.68** and 'p' value was **< 0.0001** and it was considered highly significant.

**Discussion:**

It has widely been recognized that skeletal characteristics vary among populations [6-8], and due to this regional variability that each population should have specific standards to optimize the accuracy of identification. Several studies using a variety of measurements and characteristics of the pelvic bones have therefore been conducted from all over the world, with varying degrees of accuracy.

The sacral index is lower in males than in females, but in poorly preserved series they are virtually useless, since these parts of the pelvis are most susceptible to post-mortem erosion. In the past, many workers have evolved various metrical parameters and indices for sexing. [9] MacLaughlin and Bruce in 1986 attempted to improve methods of skeletal identification through development of new methods of determining sex or fine-tuning of existing methods on various parts of the skeleton so that it can be admissible in court. [10][11]

The reports concerning results and accuracies of studies in the metric characteristics of male and female sacra also seem to be quite different,

with some authors finding it usable and others less. [12] [13] [14] [15]

Singh and Singh [16] have shown that demarking point should be calculated separately for different regions of population because the mean of a parameter differs in values in different regions. [12]

Other researchers also had also emphasised that to be certain in identification, calculated range has to be considered, which is worked out by adding and subtracting 3 X standard deviations (SD) to and from the mean of any parameter. Jit and Singh [4] have called the limiting point of such calculated range as demarking points, which identify sex with 100% accuracy [18] from any given region.[5] The demarking points of various parameters, if crossed by any sacrum will identify the sex with certainty, which is of paramount importance in medicolegal cases. However, it is not necessary for any bone to cross the D.Ps of all the parameters before sex could be identified. Any single D.P. for any of the parameters, if crossed would detect the sex with 100% accuracy) [3]

Flander [13] had showed the univariate and multivariate methods for sexing the sacrum. She had used numerous new osteometric dimensions (around 15 dimensions), the method she had followed was rather complex. Flander's study was useful because she had developed a technique to assess sex and race simultaneously by using sacra from American Blacks and Whites (50 each sex-race).Two discriminant functions were developed by her. The first one assumed that race was known. The accuracy of determination based on a total of six measurements ranged from an average of 84% for Whites to 91% for Blacks. The most discriminating variables were the anteroposterior dimension of the S1 body and transverse breadth of the S1 body for both races in known races. In the second function, she had assumed race to be unknown. Classification accuracy ranged from 54% to 78%. Weisbach in his essay "REPORT ON THE BONES OF THE HUMAN SKELETON", reported [18] measurements of sixteen pelvis. The sacral index in his specimens, on his mode of measurement, is as follows :-Czechs 1026, Italians 1009, Ruthenians 1008, Magyars 991, Gipsies 973, South Slavs 965, Germans 9.5, Poles 949, Roumanians 94.5, Slowsaks 90. [19]

Stradalova, [14] had also shown a complex method for sexing of sacra using 15 dimensions and her sample females were from Charles University, Prague. The accuracy ranged from 86.5% to 88.5%, depending on the number of measurements taken.

The mean sacral index of the male sacra of the present series 93.68 falls under dolichohieric group (narrow sacrum). Similar observations were reported by Jana et al. [20] in their study of sacra of West Bengal (mean sacral index of male being 95.7)

and Singh et al. [21] in Jammu region. However, Davivongs [22] and the Raju et al. [5] reported that the male sacra of their study fall under sub-platyhieric group. The mean sacral index of the female bone of the present series (125.35) falls under platyhieric group, which is similar to the observations of Raju et al. [5] and Davivongs [22]. Martin [23] reported that in the European sacrum both male and female means fall into the platyhieric group, being 112.4 in the male and 114.8 in the female. Any way an attempt to use the sacral index for ethnic discrimination is very doubtful (Davivongs, [22])

However, its importance in sex determination cannot be denied since the differences between the males and females are highly significant, statistically. Kimura [15] had presented a base-wing index and his samples included Japanese sacra (52 males and 51 females) from the Yokohama city Medical school, American Whites (50 males and 50 females), and American Blacks (49 males and 48 females) from the Terry collection.

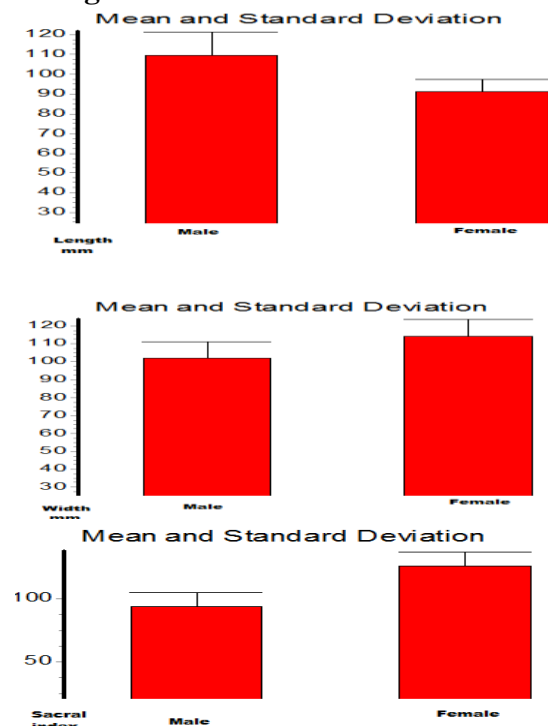
Measurements and the index obtained from these collections included the transverse width of the sacral base (i.e. the transverse width of superior surface of first sacral vertebra), and transverse width of the wing (lateral margin of the base to the most lateral border of the wing i.e. ala of sacrum) and the index was calculated as width of the wing X 100 / width of base i.e. Kimura's index = Width of wing X 100 / Width of base.

Mishra et al [12], showed in their study that while using sacral index method, 39.2% of male sacra were identified and 80.1% of female sacra were identified by demarking point. The percentage of bone identified by demarking point by using sacral index according to Mishra et al was shown as graphical representation and also percentage of bone identified by demarking point by using sacral index and according to the present study was also represented in the form of graphs. Similarly the Present study showed that according to sacral index method; 45% of male sacra were identified (demarking point) and 40% of female sacra (demarking point) were identified. Thus 9 readings out of 20 males sacra confirmed male type and 8 reading out of 20 female sacra confirmed female type by using Sacral index method. In this study also the females are classified with more accuracy than males.

### **Conclusion:**

The present study therefore revealed that for sexing of sacrum, the readings obtained by sacral index method were relevant and more significant.

**Histograms:**



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**Table I**  
**Parameters of Sacrum for Sexing N = 40 (20+20)**

Sr. No.	Parameter	Sex	Mean	S.D.	't' value	'p' value	Calculated range Mean ± 3 S.D.	D P	% of bone identified by D. P.
1	Length of Sacrum (mm)	Male	109.74	11.66	6.235 With 38 degrees of freedom.	<0.0001*	74.76 – 144.72	>110.24	60
		Female	91.22	6.348			72.2- 110.24	<74.76	0
2	Width of Sacrum (mm)	Male	101.94	8.96	4.134 With 38 degrees of freedom.	<0.0002*	75.14- 128.74	<85.12	0
		Female	114.13	9.67			85.12- 143.14	>128.74	0
3	Sacral index	Male	93.685	11.57	8.688 With 38 degrees of freedom	< 0.0001*	58.9- 128.38	<90.94	45
		Female	125.35	11.47			90.94- 159.76	>128.38	40

'P' values in all the parameters are highly significant

## Original research paper

# An Epidemiological study of Organophosphorus Poisoning at Manipal Teaching Hospital, Pokhara, Nepal

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### Abstract

Organophosphorus compounds are chemical compounds containing carbon-phosphorus bonds (apart from phosphate and phosphite esters), primarily used in pest control and are often persistent organic pollutants. Acute poisoning by organophosphorus (OP) compounds is a major global clinical problem, with thousands of deaths occurring every year in Nepal. Most of these pesticide poisoning and subsequent deaths occur due to deliberate self ingestion of the poison.

Sixty five patients with severe organophosphorus poisoning were admitted to the emergency ward of Manipal Teaching Hospital, Pokhara, Nepal from January 2008 to December 2008. History of ingestion, clinical signs & symptoms and survival time in case of death was also recorded to diagnose the OP poisoning.

The mean age of patients was about 27 years. Most of the admitted cases were of suicidal in nature and women are the main victim.

Suicidal deaths due to ingestion of organophosphorus compound are very common in Nepal especially in women. The reason may be the increasing stress in the family and economic constraints. Further study should be needed by government and NGO to evaluate it.

**Key Words:** Organophosphorus, Poisoning, Nepal, Carbon-Phosphorus, Suicide

### Introduction:

Acute poisoning by organophosphorus (OP) compounds is a major global clinical problem, with thousands of deaths occurring every year. Most of these pesticide poisoning and subsequent deaths occur in developing countries following a deliberate self ingestion of the poison. Metacid (Methyl parathion) and Nuvan (Dichlorovos) are commonly ingested OP pesticides; Dimethoate, Profenofos, and Chlorpyrifos are other less frequently ingested compounds in Nepal.

Thirty one percent of all suicidal deaths in the country in 1999- 2000 were due to poisoning. [1]

Hospital- based studies from five major hospitals across the country in 1999-2000 showed OP compounds were the most common form of poisoning comprising 52% of total cases. [2]

Various isolated hospital-based studies also clearly demonstrate that OP compounds occupy the greatest burden of poisoning related morbidity and mortality in Nepal. [2]

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\*\*\*Lecturer

### Materials and Methods:

In this study 65 cases of organic phosphorus (OP) intoxication in the Western region of Nepal were investigated. Patients with OP intoxication admitted to the Emergency department of Manipal Teaching Hospital, Pokhara, Nepal during January 2008 to December 2008 were evaluated. This prospective cohort study included 21 male (M) and 44 female (F) consecutive patients.

History of ingestion, availability of bottles and typical clinical symptoms and signs help to diagnose the OP poisoning. Many organophosphorous agents have a characteristic petroleum or garlic – like odour, which may be helpful in establishing the diagnosis. The age, sex, cause of ingestion, compound involved, time elapsed between ingestion and admission to the hospital, duration of hospital stay, need for assisted ventilation, cardiac manifestations at the time of presentation, and during the in-hospital stay were recorded.

### Results and Discussion:

**Table No. 1**  
**Distribution of Sex amongst victims of OP poisoning**

Sex	Number	%
Male	21	32.31
Female	44	67.29
<b>Total</b>	<b>65</b>	<b>100</b>



Table No. 1 describes that out of total 65 studied cases females were dominant with 67.2%. The number of male victims was 21 (32.31%). Female predominance was also observed in Nepal by previous workers. [3-8] In Nepal females are main working group both indoor and outdoor field, hence prone for stress.

**Table No. 2**  
**Distribution of Age amongst victims of OP poisoning**

Age	Number	%
0-15	3	4.62
16-30	43	66.15
31-45	14	21.54
46-60	5	7.69
<b>Total</b>	<b>65</b>	<b>100</b>

Table No. 2 depicts that OP poisoning was very common in age group of 16-30 years (66.13%) followed by 31-45 years (21.54%). The reason may be that this is the main working age group and have the whole responsibility of their family and also exposed to OP compounds while working in cultivation.

**Table No. 3**  
**Seasonal variation in incidences of OP poisoning**

Season	Number	%
January-April	11	16.92
May-August	37	56.92
September-December	17	26.16
<b>Total</b>	<b>65</b>	<b>100</b>

Table No. 3 describes the seasonal variation in the incidences of OP poisoning. Results indicate that the incidences are very large in the month during May to August (56.92%). The reason may be that this is the main harvesting season in Nepal and the major insecticide used in field is OP compounds. Therefore due to the easy availability the material increases the incidence. No previous study has recorded till date on the seasonal incidences of insecticide poisoning in Nepal

**Table No. 4**  
**Types of different OP compounds consumed**

OP compounds	Number	%
Metacid (Methyl Parathion)	42	64.62
Baygon Spray	11	16.92
Malathion	3	4.62
Dichlorovos	6	9.23
Unknown	3	4.61
<b>Total</b>	<b>65</b>	<b>100</b>

As per the availability and use of different OP compounds in Nepal incidences of poisoning by those insecticides seen commonly. Methyl Parathion (patent name been Metacid) shows highest consumption (64.62%) for suicide.

**Table No. 5**  
**Manner of poisoning**

Manner of death	Number			
	Male	%	Female	%
Accidental	1	4.76	-	-
Suicidal	20	95.24	44	100
Homicidal	Nil	-	Nil	-
<b>Total</b>	<b>21</b>	<b>100</b>	<b>44</b>	<b>100</b>

Table No. 5 clearly indicated that the victims of OP poisoning used it for suicidal purpose (n=64). No homicidal case was recorded. Only one male child (6 years) was treated with a history of accidental poisoning

**Conclusion:**

As Nepal is an agricultural country. Now days they have introduced OP pesticides during cultivation and there is no restriction on its use in Nepal. Therefore the incidences of poisoning due to these compounds suddenly increase during harvesting season. Females are the main working mass in the society and face the stress more from daily activities in comparison to male. Therefore these pesticides are becoming main suicidal agents. Further detailed study is needed in different zones of Nepal to evaluate and control the incidence of poisoning cases by OP compounds.

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## Original research paper

# Study Of Road Traffic Accidental Deaths (RTA) in and Around Bastar Region of Chhattisgarh

\*Dr.Dhaval J. Patel, \*\*Gopinath Agnihotram

### Abstract

To analyze the magnitude of head injury in fatal RTA cases, present study was conducted in the department of Forensic Medicine Toxicology, Govt. Medical College, Jagdalpur (Chhattisgarh) in 2009 calendar year. The present study was undertaken on 105 victims of RTA who died due to head injuries, which autopsied at GMC, Jagdalpur (C.G). Most of the accidents occurred in the afternoon hours (12: 01 - 18:00). There was a clear male dominance (88.57%). The most affected age was middle age (21-40 yrs) & most commonly affected age group is 21-30 yrs. Vehicular occupants were commonly affected (63.80%) & amongst them two wheeler occupants most commonly involved. Fissure fracture of the skull was commonest (45.71%) & parietal region of head was mostly involved region of the head (27.61%). Among the intracranial hemorrhages, subdural hemorrhage (SDH) was commonest (31.42%). In relation duration of survival time 59.04% of victims died within 24 hrs of fatal accident.

**Key Words:** Road Traffic Accident (RTA), Head injury, Hemorrhage

### Introduction:

Accident constitutes a complex phenomenon of multiple causations. The causative factors classified into human & environmental (1). During 1990 RTA was 9<sup>th</sup> leading cause of death in the world. RTA may become 2<sup>nd</sup> commonest cause around 2020 (2). The total annual deaths due to road traffic accidents has crossed 1.18 lakh, according to latest report of National Crime Records Bureau, NCRB (3). Total no. of deaths were only 83,430 in 2003, it crossed 1.18 lakh in 2008, an increase of nearly 40%.

RTA had the maximum (37.10%) share of unnatural causes of accidental deaths in country. In 2009 rate of road deaths is 13 persons per hour. According to NCRB maximum cases reported between 15:00 – 18: 00 hrs in Asian countries 60-80% road traffic accidents occurs in urban & semi-urban regions. In India rate of RTA is 7.5 accidents per 1000 vehicles. [5]

In developing countries like India, all the above mentioned figures are due to lack of good quality roads, increase number of vehicles, careless driving by young people, unsafe traffic environment and lack of knowledge regarding traffic rules. So the present study is smallest attempt to understand the magnitude of problem.

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### Materials and Methods:

The present study was conducted in department of Forensic Medicine & Toxicology, Govt. Medical College, Jagdalpur (C.G). It includes the retrospective study & analysis of 105 cases in which cause of death was head injury due to RTA, over a period of one year from 01/01/2009 to 31/12/2009. The epidemiological data such as age, sex, time of accident, survival time, type of victim, type of vehicular occupants & all pathological features as type & site of skull fracture, type of intracranial hemorrhage were noted at the actual autopsy examination with related history as well.

### Observations:

Total 105 cases studied during one year period. Male comprised (88.57%) and female (11.42%) makes M: F ratio almost 8:1. Age groups divided in to 10 years period ranging from 0 -70 years. The youngest victim was 10 years old boy and oldest was 69 years male. Highest victims of RTA found in 21 – 30 years group (32.38%) and least in both extreme age group, 0 – 10 and 61 – 70, one victim each. [Table No.1]

Highest no. of RTA cases occurred during 12:01 -18:00 hrs, (43.80%) and least no. of cases during 00:01- 06:00 hrs (10.47%). [Table No.2]

In present study pedestrians (36.19%) and vehicular occupants (63.80%) involved and make a ratio of 1:1.75. [Table No. 3]

Two wheeler occupants are mostly (65.67%), involved in RTA death, which is very high in comparison to deaths by LMV (14.92%) and HMV (19.40%). [Table No.4]

The study shows fissure fracture was commonest (45.71%), where as comminuted,

depressed and multiple type (>1) were seen in 19.04%, 14.28% and 20.95% respectively. [Table No.5]

Most commonly affected site is parietal region (27.61%), which is followed by multiple site >1 involvement (23.80%). The least affected site is occipital region (7.61%). [Table No.6]

Ours study shows SDH was commonest type of intra cranial hemorrhage (31.42%), which is followed by multiple type (23.80%). The least observed hemorrhage was intraventricular (3.80%). [Table No.7]

Most of the RTA victims died within 24hrs (59.04%) and only 7.61% can survive for more than a week. [Table No.8]

**Discussion:**

Head injury is still the major cause of death in RTA cases. The reason behind this may be urbanization, more industrial growth in smaller towns as well as population growth & increasing number of two wheelers. These factors causes tremendous over crowding of vehicles on roads which eventually leads to more accidents.

In present study, male dominance with M: F ratio 8:1, because males are more mobile due to going to work, studies etc. and so more prone to accident. [6, 7, 12] In present study, third and fourth decades were commonly affected. This corresponds with other studies. [7, 9, 11] This age group mainly consists of working people and students, who usually traveled by own vehicles or other public transportation. This leads to involvement of this age group more commonly in RTA.

Vehicular occupants were more involved than pedestrians. This corresponds with other studies. [10, 12] It is due to careless driving mainly by younger age group. Some of the studies also showed the more involvement of pedestrians than vehicular occupants. [8, 9, 10]

In our study most of the accidents were in afternoon hours (12:01-18:00hrs) followed by morning hours (06:00-12:00hrs). It may be due to heavy traffic during peak hours.

Most common type of intra cranial hemorrhage was subdural hemorrhage (31.42%). This corresponds with other study. [6] This is followed by multiple type of hemorrhage (>1 type), where as in other studies second most common type of hemorrhage was subarachnoid hemorrhage. [10]

Extra dural, intra cerebral and intra ventricular hemorrhages found in very less number of cases, which corresponds with other studies. [9, 10]

In present study, 62% of RTA victims died on the spot or within 24 hours of accident. This corresponds with other studies. [13, 14]

**Conclusion:**

From present study males of middle age group (21- 40yrs) are involved in accidents during afternoon hours (12:01-18:00). More accidents in two wheeler occupants than other vehicles and subdural hemorrhage (SDH) were commonest. The almost same type of conclusion observed in so many other studies due to using the same parameters for the study. It's necessary to do much more studies on RTAs and strict implementation of the already existing rules.

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**Table No. 1**  
**Age and Sex distribution**

Age (years)	No. of cases		
	Male	Female	Total
0 – 10	01	00	01
11 – 20	16	02	18
21 -30	30	04	34
31 – 40	28	02	30
41 – 50	13	03	16
51 – 60	04	01	05
61 – 70	01	00	01
<b>Total</b>	<b>93</b>	<b>12</b>	<b>105</b>

**Table No. 2**  
**Time of Accident**

Interval(hrs)	No. of cases (%)
00:01 – 06:00	11 (10.47%)
06:01 – 12:00	32 (30.47%)
12:01 – 18:00	46 (43.80%)
18:01 – 24:00	16 (15.23%)
<b>Total</b>	<b>105 (100%)</b>

**Table No. 3**  
**Distribution according to Type of Victim**

Type of victim	No. of cases (%)
Pedestrians	38 (36.19%)
Vehicular occupants (Two Wheeler, LMV, HMV)	67 (63.80%)
<b>Total</b>	<b>105 (100%)</b>

**Table No. 4**  
**Distribution according to Type of Vehicular Occupants**

Type of vehicle	No. of cases (%)
Two wheeler	44 (65.67%)
Light motor vehicles (LMV)	10 (14.92%)
Heavy motor vehicles (HMV)	13 (19.40%)
<b>Total</b>	<b>67 (100%)</b>

**Table No. 5**  
**Distribution according to Type of Skull Fracture**

Type of skull fracture	No. of cases (%)
Fissured	48 (45.71%)
Comminuted	20 (19.04%)
Depressed	15 (14.28%)
Multiple type (>1)	22 (20.95%)
<b>Total</b>	<b>105(100%)</b>

**Table No. 6**  
**Site of Skull Fracture**

Site	No. of cases (%)
Frontal	20 (19.04%)
Temporal	23 (21.90%)
Parietal	29 (27.61%)
Occipital	08 (07.61%)
Multiple(>1 site)	25 (23.80%)
<b>Total</b>	<b>105(100%)</b>

**Table No.7**  
**Distribution according to Type of Intracranial hemorrhage**

Type of hemorrhage	No. of cases (%)
Extradural (EDH)	21 (20.00%)
Subdural (SDH)	33 (31.42%)
Subarachnoid (SAH)	16 (15.23%)
Intracerebral	06 (05.71%)
Intraventricular	04 (03.80%)
Multiple(>1)	25 (23.80%)
<b>Total</b>	<b>105(100%)</b>

**Table No.8**  
**Duration of Survival time**

Duration	No. of cases (%)
0 – 24hrs	62 (59.04%)
24 – 48hrs	13 (12.38%)
2 – 7days	22 (20.95%)
> 7days	08 (07.61%)
<b>Total</b>	<b>105 (100%)</b>

## Original research paper

# Estimation of Age in the Living Municipal Employees in the Age Group of 25-45 Years by Physical and Radiological Examination

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### Abstract

Employees from government and local self-government bodies come to Departments of Forensic Medicine for age estimation for the purpose of permanent employment. According to the rules and regulations of the Municipal Corporation of Greater Mumbai (MCGM) and court orders, they are confirmed as permanent employees after a specified duration of temporary service. The age criterion is very important as regards their dates of retirement and service benefits. But because of low socioeconomic status & illiteracy, most of these employees have no documentary evidence of their birth dates. Their age, therefore, remains a mystery to be solved.

The human body develops very fast in the first 20 years of life, but growth slows thereafter. There is precious little information on the estimation of age in the later years, resulting in the lack of reliable methods for this purpose.

A sincere attempt to arrive at a fairly conclusive range of age with respect to changes in physical features, especially graying of hair, wrinkling of skin and radiological evaluations of fusion of components of the sternum and changes in the teeth and mandible with respect to mandibular canal seen in an oral orthopantomogram was contemplated.

**Key Words:** Orthopantomogram, Sternebral Fusion, Xiphisternum, Manubrio-Sternal Fusion, Regression Formula

### Introduction:

The current study was conducted in the Department of Forensic Medicine and Toxicology of a municipal medical institution in Mumbai, on 64 male municipal employees. Of these, 32 were temporary hands, randomly selected as the study group from a among 140 sent by the Section Officer, Solid Waste Management, G North, MCGM for the purpose of estimation of their ages prior to conferring permanent status upon them.

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Another 32, whose ages were known from legitimate birth certificates, were chosen as controls.

The project was undertaken with the objectives of simultaneously fulfilling the requirement by the MCGM of certification of age of its temporary employees and the development of a simple, yet reasonably accurate, and reliable method for estimation of age in the living between the ages of 25 and 45 years.

All the subjects were physically examined, with special reference to graying of scalp, body and pubic hair and wrinkling of skin of the forehead, temporal region and below the eyes (all of which were assessed subjectively). They were then subjected to routine radiological examination for fusion of the sternal components as seen in a right lateral view of the chest, and an oral orthopantomogram (OPG) to view parameters that were anticipated to be useful in the estimation of age. Fusion of the components of the sternum could be easily determined by naked-eye scrutiny of the roentgenograms of the chest, while the OPGs were separately assessed by three independent observers.

### Materials and Methods:

#### 1. Study Group:

Thirty two temporary municipal employees sent by the Section Officer, Solid Waste

Management, for examination and certification of age, divided into four age groups, viz, 25 + to 30 years (Sa), 30 + to 35 years (Sb), 35 + to 40 years (Sc) and 40 + to 45 years (Sd), on the basis of their own statements.

## 2. Control Group:

Thirty two permanent municipal employees whose age is known from documentary proof, belonging to the four age groups as described above (denoted as Ca, Cb, Cc and Cd).

Express written informed consent, duly witnessed by a disinterested third party, was obtained from all subjects (both sample and control groups).

## 3. Equipment / Instruments:

- Orthopantomogram (OPG) machine PLANMECA Proline CC PM 2002 CC equipped with standard positioning device), using variable kVp 60-80 at 4-12 mA and constant exposure time of 18 seconds, Kodak Ektavision (USA) 6" x 12" cassette, Rare Earth regular extra-oral imaging screen, O-matt 6" x 12" OPG film
- X-Ray machine : Hiliophos D,500 mA, kVp 30-120 Siemens, India, Film Indu, Hindustan Photoprints, 12"x15", Kiran regular screen, O Matt 12"x15".
- X-Ray view box
- Tracing paper
- Faber-Castell glass scale graduated in mm & cm
- Faber-Castell acrylic protractor graduated in degrees
- Magnifying lens

## 1. Physical Examination:

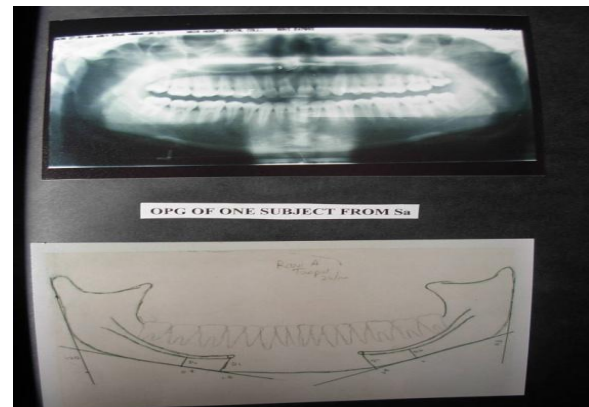
- Visual examination of colour of scalp, body and pubic hair.
- Visual assessment of wrinkling of skin over the forehead, temporal regions and below the eyes.

## 2. Radiological Examination:

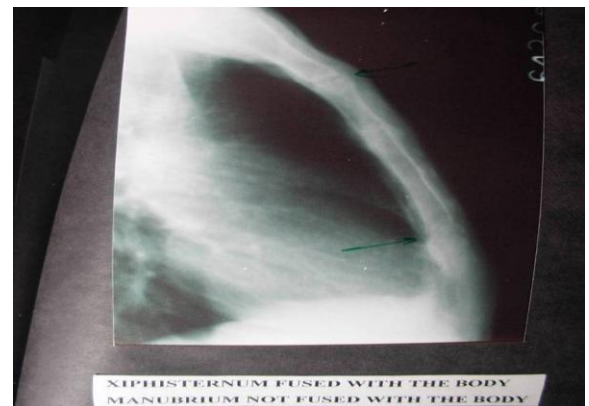
- Measurement by scale and protractor of the following parameters in tracings of orthopantomographic plates of both jaws (Figure 1):
  - Perpendicular distance (D1) of the mental foramina from tangents drawn along the lower borders of the body of the mandible.
  - Least perpendicular distance (D2) of the mandibular canals from tangents drawn along the lower borders of the body of the mandible.

III. Angle between tangents drawn along the posterior borders of the rami of the mandible and the lower borders of the body of the mandible (A).

- Visual assessment of the fusion (or not) of the xiphoid process and manubrium sterni with the body of the sternum on right lateral radiographic views of the chest (Figure 2).



**FIGURE 1**  
OPG PLATE OF BOTH JAWS, AND TRACING OF MANDIBLE FOR MEASUREMENT OF D1, D2 & A)



**FIGURE 2**  
LATERAL VIEW OF CHEST FOR FUSION OF MANUBRIUM & XIPHOID PROCESS WITH THE BODY OF THE STERNUM

## Analysis of Results:

- Method of selection of subjects (both study and control groups): Simple random sampling
- For graying of hair, wrinkling of skin and fusion of xiphoid process and manubrium with the body of the sternum and for measurements of D1, D2 and A the AM (The American Institute for Research and John Cohen) Statistical Software Beta

Version – 0.06.02 was used for the execution of the regression command and for preparation of a prediction equation for the age estimation.

### Observations and Results:

The observations made in the 32 subjects in each group were recorded in a master chart. Group-wise observations of each parameter are displayed in the Tables.

It was seen (Table No.1) that the scalp hair of 2 subjects in the control group of age group 25-30 years (Ca) had grayed, while this was seen in only 1 subject from this study group (Sa). None of the subjects from either control or study groups had graying of hair over the body or pubic area at this age.

In the age group of 31-35 years, graying of scalp hair was noticed in 2 subjects each in the control group (Cb) and study group (Sb). Neither group had any subject with gray body or pubic hair. 7 subjects in the control group in the age range of 36-40 years (Cc) had gray scalp hair and 2 showed graying of body hair, but their pubic hair was still black in colour. In the study group (Sc), there were 7 subjects with gray scalp hair, 3 with gray body hair and none with gray pubic hair.

In the last age group (41-45 years) 8 subjects in the control group (Cd) unmistakably had gray scalp hair and 6 of them had gray body hair. However, none of them had graying of pubic hair. In the study group (Sd), 8 subjects had evident graying of scalp hair, 8 had gray body hair and only one of them showed graying of pubic hair.

The first composite variable, i.e., “Combined Hair Score” (CHS) was derived from Table No. 2 by allocating a linear addition of 1 point each for the presence (0 for absence) of graying of hair at the three different sites, viz., scalp, body and pubis. Thus the total score ranged from a minimum of 0 to a maximum of 3.

Table No. 2 shows the observations of wrinkling of the skin. None of the subjects in the control group (Ca) in the age group of 25-30 years had wrinkles on either the forehead or over the temporal region, but only one had wrinkles below his eyes. In the study group (Sa) none of the subjects had wrinkles in any of these locations.

In the second age group (31-35) years, none of the subjects in the control group (Cb) had wrinkles over the forehead, 2 of them had overt wrinkles over the temporal region and none of them had wrinkling of skin below the eyes. In the study group (Sb), 1 subject was spotted with wrinkles over the forehead, two with wrinkles over the temporal region and one with wrinkles below the eyes.

In the age group of 36-40 years, five subjects in the control group (Cc), had wrinkles over

the forehead, seven wrinkles over the temporal region and two wrinkles below the eyes. In the study group (Sc), wrinkles over forehead were observed in six subjects, wrinkles over the temporal region in seven, and wrinkles below the eyes in five.

Eight subjects from the control group (Cd) in the age range of 41-45 years undeniably had wrinkling of skin over the forehead, eight over the temporal region and six below the eyes. In the study group (Sd), wrinkling of skin was noted in eight subjects each at the three sites.

A “Combined Skin Score” (CSS) was calculated from this data, also by linear addition of one point each for presence (0 for the absence) of wrinkled skin at three different sites, viz., forehead, temporal region and below the eyes, with a total score range from 0 to 3.

The combined skin score was found to be 2.562, with a standard error of 0.613 and a statistically significant  $p > t$  value of 0.000. It was, therefore, used for the equation for estimation of age in a prediction model.

It is evident from Table No. 3 that neither the xiphoid process nor the manubrium had fused with the body of sternum in either control group (Ca) or study group (Sa) in the age group of 25-30 years. Similarly, in the age group of 31-35 years, the study of skiagrams did not display such fusion in any of the subjects in the control group (Cb). In the study group (Sb), however, the xiphoid process of one subject had fused with the body of the sternum. Fusion of the manubrium with the body of the sternum was not seen in any of them.

Fusion of neither the xiphoid process nor manubrium with the body of the sternum had occurred in any subject in the control group in the age group of 36-40 years (Cc). On the other hand, in the study group (Sc), the skiagrams of five subjects manifested fusion of xiphoid process with the body of the sternum, but manubrio-sternal fusion had not taken place in even one of them.

The xiphoid process had fused with the body of the sternum in eight subjects from the control group (Cd) in the age group of 41-45 years; in none of them had the manubrium fused with the body of the sternum. In the study group (Sd), eight subjects had radiological evidence of xiphoid-sternal fusion, but in none of them had the manubrium fused with the body of sternum.

From this data, a Combined Bone Fusion Score (CBFS) was calculated by linear addition of 1 point each for the presence (0 point for the absence) of the fusion to the body of the sternum of its two other components, viz., the manubrium and the xiphisternum. Thus the total score of the CBFS could range from a minimum of 0 to a maximum of 2.

The combined bone fusion score was found to be 3.514 with a standard error of 1.284, and a p > I t I value of 0.01. It was found to be statistically significant, and was used for the equation for estimation of age in the prediction model.

The oral orthopantomograms (OPGs) were examined for changes in the mandible, namely the perpendicular distance of the mental foramen from lower border of body of the mandible (D1), the least perpendicular distance of the mandibular canals from the tangents drawn along the lower borders of the body of the mandible (D2), and the angle between the tangents drawn along the posterior border of the rami of the mandible and the lower borders of the body of the mandible.

The mean values of each measurement on each side of each group (control and study) were then calculated, and are shown in Table 5, above.

**Linear Regression:**

Using the relevant data of cases, viz., the nine independent variables of Combined Hair Score, Combined Skin Score, Combined Bone Fusion Score, Mandible Right D1, Mandible Right D2, Mandible Right Angle, Mandible Left D1, Mandible Left D2, and Mandible Left Angle were linearly regressed against the known dependent variable ‘Age’ to develop a prediction Model for Age estimation.

AM (The American Institute for Research and John Cohen) Statistical Software Beta Version – 0.06.02 was used for the execution of the regression command.

The 32 cases of the control group, whose ages were known, were used for the Regression (Prediction Model).

Adjusted Wald Test
F(9,23)=46.2231
P(F> f) = 1.2913e-012
Extremely Significant

Dependent Variable: Age
R=0.936
R-Square = 0.877

Ratio of the mean square, i.e., the F Statistic, was very high, and was extremely significant, as can be seen from the p value (< 10<sup>-11</sup>) in the Wald test.

There was very high correlation between the predicted values and the observed values of the dependent variable (Age) given by the regression model (Correlation Coefficient = 0.936)

Around 88% of the variation in the dependent variable (Age) can be explained by the independent variables.

**This showed very high fitness of this prediction model (88%).**

The following variables proved to be significantly associated with, and more important in the estimation of age:

1. Combined Skin Score
2. Combined Bone Fusion Score
3. Mandible Right D2
4. Mandible Right Angle
5. Mandible Left Angle

The standardized estimates clearly demonstrated that the most important of these were the Mandible Right Angle and the Combined Skin Score.

**The model thus yielded the following regression equation:**

<b>Age=2.562 (combined skin score)</b> <b>+3.514 (combined bone fusion score)</b> <b>+8.687 (mandible right D2)</b> <b>+0.436 (mandible right angle)</b> <b>-0.263 (mandible left angle)</b> <b>-+8.442 (constant)</b>
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**As the model used the data from subjects between 25 to 45 years of age, this equation can be used for this age group, and holds true with 88% accuracy.**

Using this regression equation, the age of the 32 subjects in the study group was estimated as shown in Table 6.

**Discussion:**

Hair on the head tends to become gray usually after 40 years of age and silvery white in advanced old age. [1, 2] Graying of the hair was found to be of no statistical significance for the estimation of age. This was due to the fact that the patterns of graying of hair are very unreliable. Many factors have been held responsible for this, among them nutrition, shock, [3] cosmetics and black or red coloring for concealment of age, and artificial coloring according to the dictates of current fashion (either darkened by using henna, phenylenedioamine, metallic salts of lead, bismuth or silver, or bleaching with chlorine, hydrogen peroxide, dilute nitric acid or nitrohydrochloric acid). Colour changes due to occupation have also been observed, e.g., a greenish hue in ebony turners and copper smelters, and a bluish tinge in indigo workers. [1] A plethora of hereditary factors (autosomal dominant conditions such as progeria, Werner’s syndrome, myotonic dystrophy, Book’s syndrome, Fisch’s syndrome, Rothmund-Thomson syndrome, Waardenburg syndrome, ataxia telangiectasia, Seckel’s syndrome, cri-du-chat syndrome, multiple lentiginos syndrome), autoimmune disorders like pernicious anaemia, hypothyroidism, hyperthyroidism, sympathetic conditions (facial hemiatrophy), infections (e.g., HIV), certain metabolic defects like oculocutaneous albinism or albinoidism, Hemansky-Pudlack syndrome, Cross-McCusick-Breen syndrome, Tietz



syndrome (all of them are generally due to defective melanin production) and last, but not the least, drugs such as chloroquine, triparanol, flurobutyrophenone, mephenesin and dixyrazine, all play a greater or lesser role in the early or delayed graying of hair. [4]

The statistically significant variables, as already mentioned in the results, are skin changes, fusion of the components of sternum, position of the mandibular canal and the angle of the mandible on the right side, and the left angle of the mandible. Of these, the skin changes are of least reliable, because of the variety of factors affecting it, viz. heredity (aging genes, cellular senescence, telomere shortening, longevity genes, and nonenzymatic glycosylation), nutrition, oxidative stress, amino acid racemisation, exposure to sunlight, (Photoageing -- one of the most crucial factors in the Indian subcontinent), smoking, treatments like photoprotection, trans-retinoic acid, alpha-hydroxy acid, antioxidants or Hormone therapy, caloric restriction, application of cosmetics and, more recently, injection of medicines into the skin and muscles (Botox / Dysport / Myobloc -- the Botulinum toxin A and Botulinum toxin B preparations) [5] as a remedy for wrinkles of the skin.

The manubrio-sternal joint, which lies between the manubrium and sterna body is usually a symphysis, the bony surfaces are covered by hyaline cartilage and are connected by a fibrocartilage which may ossify in the aged. [6, 7, 8] The fusion of the components of the sternum, [6, 9] as visualized in right lateral views of X-rays of the chest, were found to be useful enough for the estimation of age in this particular age group.

The first practical method for estimation of age at death of individuals from their teeth was presented by Gustafson. [10] The mandibular canal and mental foramen are standard anatomical landmarks. [7] Changes in the mandible, [2, 6, 8, 11] as seen in oral orthopantomogram, particularly on the right side, were determined to be of greater value for age estimation than those on the left side. The reasons for such a difference are thought to be a missing tooth / missing teeth on either side, artificial dentures on either side, chewing habits, malocclusion of a tooth / teeth, non-eruption of a tooth / teeth, and the handedness of the person. (The handedness of the person is related to the dominance of the cerebral hemisphere. Therefore, in a right-handed person, as is the case with majority of the population, [12, 13] use of the dominant hand, e.g., the right hand for brushing the teeth will exert more pressure on the right side of the mandible while brushing the teeth than a left-handed person, who will induce more age-related changes on the left side than the right.

## Conclusion:

The observations and results of the study confirmed the presumption made before it was commenced that subjective assessment of graying of hair was of little or no help in the estimation of age because of the host of factors that were involved in when it commenced or why it never appeared at all. This was emphasised by statistical analysis of a Combined Hair Score (CHS) that had been developed.

Although a roughly equivalent number of factors played a role in changes in the skin, wrinkling at the three locations mentioned above proved more significant in that regard when converted into a Combined Skin Score (CSS).

Of all the parameters studied, a review of literature suggested that the least criterion affected by external and internal factors was fusion of the manubrium and xiphoid process with the body of the sternum, however uncertain the ages at which these phenomena occur might be. The degree of their reliability in the estimation of age was borne out by statistical analysis of the data, which yielded a high significance and highest coefficient of a Combined Bone Fusion Score (CBFS) in the equation for the assessment of age in the later years.

Among the age changes in the mandible, the right and left angles (MRA & MLA) and the least perpendicular distance between the mandibular canal on the right side and a tangent drawn along the lower border of the body of the mandible (MRD2) turned out to be the most reliable parameters in the assessment of age in the later years, and were therefore incorporated into the equation developed for that purpose.

Using statistical analysis of the data, linear regressions graphs were prepared on a specially developed software program by plotting five significant variables (CSS, CBFS, MRD2, MRA and MLA) against the dependent variable of age. The following equation for estimation of age between the ages of 25 and 45 years was derived from these graphs:

$$\text{Age} = 2.562(\text{CSS}) + 3.514(\text{CBFS}) \\ + 8.687(\text{MRD2}) + 0.436(\text{MRA}) \\ - 0.263(\text{MLA}) + 8.442$$

From a statistical standpoint, the fitness of the formula (i.e., its accuracy) was very high (88%). Using this formula, the ages of the 32 subjects in the study group were predicted, and were found to tally almost exactly with the ages as claimed by 22 (69%) of them.

In conclusion, it may be said that this particular study has succeeded in most instances in predicting the ages of the study group, and in arriving at a formula for age estimation between the ages of 25 and 45 years without using any invasive, costly,

time-consuming, or troublesome method, thereby filling the lacuna in previous studies of a definitive method of estimation. However, as the sample size was small, more detailed research using a larger sample, a variety of populations, and adequate consideration of the numerous factors affecting the parameters employed is called for. This pioneering effort was a plunge into the sea of knowledge in the sincere hope of bringing up a pearl. We anticipate that the ripples created by it will widen with time, so that more studies will be conducted in this neglected field.

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**Table No. 1**  
**Greying of Hair**

FEATURE	CONTROL GROUP				STUDY GROUP			
	Ca	Cb	Cc	Cd	Sa	Sb	Sc	Sd
<i>Scalp</i>	2	2	7	8	1	2	7	8
<i>Body</i>	0	0	2	6	0	0	3	8
<i>Pubic</i>	0	0	0	0	0	0	0	1

**Table No. 2**  
**Wrinkling of Skin**

FEATURE	CONTROL GROUP				STUDY GROUP			
	Ca	Cb	Cc	Cd	Sa	Sb	Sc	Sd
<i>Forehead</i>	0	0	5	8	0	1	6	8
<i>Temporal Region</i>	0	2	7	8	0	2	7	8
<i>Below eyes</i>	1	0	2	6	0	1	5	8

**Table No. 3**  
**Fusion in the Sternum**

FEATURE	CONTROL GROUP				STUDY GROUP			
	Ca	Cb	Cc	Cd	Sa	Sb	Sc	Sd
<i>Xiphoid Process</i>	0	0	0	8	0	1	5	8
<i>Manubrium</i>	0	0	0	0	0	0	0	0

**Table 4**  
**Mean Values of Changes in the Mandible as Observed in an Orthopantomogram**

		CONTROL GROUP				STUDY GROUP			
		Ca	Cb	Cc	Cd	Sa	Sb	Sc	Sd
<b>RIGHT</b>	D1	1.612	1.450	1.612	1.512	1.487	1.475	1.562	1.487
	D2	1.087	1.012	1.125	0.950	0.925	1.000	0.975	0.875
	A	116.25	121.87	124.62	120.12	118.25	119.37	116.87	125.12
<b>LEFT</b>	D1	1.637	1.337	1.550	1.512	1.562	1.437	1.500	1.487
	D2	1.112	0.975	1.025	0.962	0.987	1.137	0.975	0.875
	A	118.12	120.37	123.12	118.87	120.50	120.62	116.87	125.12

**Table 5**  
**Coefficients**

Parameter name	Estimate	Standard Error	Standardized estimate	t-Statistic	P >  t
	8.442	9.764	----	0.865	0.394
Combined hair score	1.397	0.731	0.187	1.912	0.065
<b>Combined skin score</b>	<b>2.562</b>	<b>0.613</b>	<b>0.527</b>	<b>4.181</b>	<b>0.000</b>
<b>Combined bone fusion score</b>	<b>3.514</b>	<b>1.284</b>	<b>0.257</b>	<b>2.738</b>	<b>0.01</b>
Mandible Right D1	-0.827	2.626	-0.03	-0.315	0.755
<b>Mandible Right D2</b>	<b>8.687</b>	<b>1.721</b>	<b>0.352</b>	<b>5.049</b>	<b>0.000</b>
<b>Mandible Right angle</b>	<b>0.436</b>	<b>0.122</b>	<b>0.61</b>	<b>3.562</b>	<b>0.001</b>
Mandible Left D1	-1.976	2.805	-0.072	-0.704	0.486
Mandible Left D2	-5.128	2.567	-0.178	-1.998	0.055
<b>Mandible Left angle</b>	<b>-0.263</b>	<b>0.095</b>	<b>-0.369</b>	<b>-2.783</b>	<b>0.009</b>
Mean Square Error	4.305	--	--	--	--

**Table 6**

Serial Numbers of Subjects in the Study Group	Predicted Age	Serial Numbers of Subjects in the Study Group	Predicted Age
Sa1	35.4497	Sc1	44.6703
Sa2	37.0137	Sc2	42.3354
Sa3	37.8923	Sc3	41.972
Sa4	37.875	Sc4	47.2286
Sa5	39.5504	Sc5	44.1653
Sa6	37.7127	Sc6	44.4044
Sa7	41.7598	Sc7	47.5464
Sa8	35.3663	Sc8	44.9016
Sb1	37.1033	Sd1	48.3966
Sb2	38.1376	Sd2	45.2616
Sb3	38.685	Sd3	47.2686
Sb4	40.0517	Sd4	48.7904
Sb5	39.107	Sd5	48.783
Sb6	46.1132	Sd6	49.352
Sb7	37.5856	Sd7	46.03
Sb8	38.0723	Sd8	51.193

## Original research paper

# Age Assessment from Radiological Cranial Suture closure in Fourth to Seventh decades (A Jaipur Based Study)

\*Dr. Rajesh Kumar Verma, \*\*Dr Mukesh K Goyal, \*\*\*Dr Shiv. Kochar

### Abstract

Reasonably a correct estimation of age is important in Legal, Medical, Social and Administrative matters i.e. regularization of temporary employee, retirement from service or superannuation, re-employment in services, settlement of pension cases, distribution of old age pension, potency certification, for relaxation in imprisonment on the grounds of old age and good behavior of a prisoner, to provide senior citizen benefits etc.

In the dead person the age estimation at the time of autopsy is done to help the Investigating Officer. In India and other countries the task of scientific confirmation of disputed age issue of civil and criminal nature is the domain of Forensic Expert. This study is done to determine the age of individual in the fourth decade to seventh decades by correlating radiological finding of various views of skull along with the other physical findings. Maximum Number of cases was in the age group of 51-55 yrs (17%). Female to male ratio was 1:2.2, 66% cases were urban and 34% were rural, 72% Hindu and 73% were from Middle class.

**Key Words:** Cranial Coronal and Squamosal Suture, Age Estimation, Fourth to Seventh decades

### Introduction:

The assessment of age is done by anthropologist, archeologist, anatomist and person engaged in medico-legal or forensic case works. Among all these, the work of forensic experts requires special attention because his findings are directly related to the administration of law, and his conclusions are debated in court of law. The needs of age determination vary from intra-uterine life to old age for different purpose. Sometimes even when the age of person is known by horoscope, hospital records and birth certificate, but still its scientific confirmation is required by court of law and certain administrative department. In India and many other countries the task of scientific conversion of disputed age issue of civil and criminal nature is the domain of Forensic expert.

The scientific estimation of age is not an easy task especially in adult age group.

Usually the age estimation up to 25yrs is done by physical examination, appearance of secondary sexual characters, data from dental eruption, and maturity of bones, appearance and fusion of various ossification centers. However these data to some extent are influenced by heredity, climate, race, diet, hormone level, disease process, etc.

After 25 yrs of age, other scientific methods like tooth microscopy, Gustafson's methods (applicable to dead persons only), study of pubic symphysis, study of union of parts of sternum, lipping of joints and closure of cranial suture are considered for age estimation of the individual. Suture are analogous to the epiphysio-diaphysis plane in which both are loci of age on radiological changes in cranial suture may be done scientifically in the post adult age group and elderly persons.

### Aims and Objectives:

The Present study was undertaken with a view to draw a define criteria of estimation of age on the basis of radiological closure of various suture of skull of living persons in the known age group of 40-70 yrs. This study was done with following aims and objectives:

1. To study the patterns of closure of various suture of skull.
2. To find out the average age of fusion of various sutures of skull.
3. To find out the earliest age of fusion of individual sutures of the skull.
4. Comparative study of patterns of closure of skull suture region wise with available data of

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previous work of different workers in India and abroad.

### Methodology:

This prospective study was conducted in department of Forensic Medicine and Toxicology of S.M.S. Medical College & Associate Hospital, Jaipur, i.e. Feb-2000 to March-2002. The person selected for the study were in the age group 30-35yrs, 36-40yrs, 41-45yrs, 46-50yrs, 51-55yrs, 56-60yrs, 61-65yrs, 66-70yrs, 71-75yrs, 76-Onwards. After taking proper history in relation to determination of age, availability of certificate indicating date of birth, horoscope or any such document, physical examination, skiagraphy were carried out after obtaining their informed consent and the cases were classified into two groups.

- Group I: Subject with confirmed age as per birth certificate/ horoscope/service records.
- Group II: Subject without any age proof, whose age was labelled from their statement with correctness within six month to two years.
- Cases that had any major endocrinological or metabolic diseases were excluded from the study.

### Observations:

All findings which were recorded in specially designed Performa which were than reduced to tables and subjected to computer aided statistical analysis.

### Discussion and Conclusion:

In this study we have used radiological obliteration of cranial suture for age estimation along with other accessory criteria viz. greying of hair, appearance of lines and furrow on face (Facial aging), arcus senilis and appearance of menopause in females. These criterion were not considered by Yadav S.S. and Puri P.R. (1971) [1] Patil T.L. (1981), [2] Bhagwat S.S.(1983) [3] and Chandrashekhara P. (1985). [4] The fusion process of cranial suture at autopsy has been modified as 0, 1 and 2 by Moondra A.K.(2000), [5] in contrast to Fredric rating scale 0, 1, 2, 3, 4. Since our study is radiological study in living subject. Four Cranial Sutures-Saggital, Coronal, Lambdoid and Squamosal have been studied and their progression towards fusion has been divided in three categories: 1- Not commenced, 2- In process of fusion and 3-Fused.

The development and consolidation of the bones of the skeleton, which ossify in cartilages occurs, as a rule, about two yrs earlier in females than in males, but obliteration of sutures of vault of skull sets in a little later and proceeds slowly in females than in males i.e. the obliteration of vault suture occur earlier in males than in females Rentoul and Smith, H.(1963), [6] similar observation were also made by Yadav S.S., Puri R.R. (1971), Vyas,

P.c.(1996), [7] Moondra A.K.(2000). [5] We too are in agreement with their observation. Nandy A. (1986), [8] has also found that ossification activity occur earlier in western population, than Indian population, which is attributed to racial difference, food habits and nutritional status, in the present study

Findings are also in accordance. The worker who has studied the autopsy specimen for study of process of ossification and suture fusion Krogman(1978). [9] Rentoul & Smith (1973) [6] has concluded that the study of ectocranial fusion is less significant than endocranial fusion viz. Dwight (1890), [10] Patil (1981) [2]. Robert Shapiro (1960) [11] because suture along the outer table are more or less serrated while at inner table they are combatively straight, whereas the process is speedy and more uniform and complete in the endocranial surface. The phenomenon of lapsed union is more common in the ectocranial surface, Todd & Lyon (1924). [12] Our study is based on the radiological facts of the fusion process where the difference between ecto and endocranium is not possible on x-ray of skull.

### Conclusion:

In this study we have Important Inference regarding Male subjects (67%) are that Coronal Suture the fusion occurred in the lower part of this of suture at the age of 42-44 yrs and then proceed to upper 1/2 part at the age of 52yrs. Squamosal Suture - This suture is visualized in lateral view of skull x-ray only, it get fused at the age of 80 yrs. Important Inference regarding Female subjects (33%) are that Coronal Suture - the lower 1/2 part of this suture get fused at the age of 42-44 yrs and is followed by upper 1/2 part, which is found fused at the age of 56 yrs. Squamosal Suture-appreciable fusion occur at the age of 81 yrs.

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**Table No. 1**  
**Age and Gender wise Distribution of Cases**

Age in years	Male	Female	Total
	Number (%)	Number (%)	Number (%)
30 – 35	9 (9)	2 (2)	11 (11)
36 – 40	3 (3)	4 (4)	7 (7)
41 – 45	11 (11)	5 (5)	16 (16)
46 – 50	7 (7)	2 (2)	9 (9)
51 -55	11 (11)	6 (6)	17 (17)
56 – 60	6 (6)	5 (5)	11 (11)
61 – 65	9 (9)	6 (6)	15 (15)
66 – 70	2 (2)	- (-)	2 (2)
71- 75	3 (3)	2 (2)	5 (5)
76 Onwards	3 (3)	2 (2)	5 (5)
Total	67 (-)	33 (-)	100 (100)

**Table No. 2**  
**Fusion process of Coronal Suture in Male**

Age	No of cases	Upper ½						Lower ½					
		Not Commenced		In Process		Fused		Not Commenced		In Process		Fused	
		No	%	No	%	No	%	No	%	No	%	No	%
30-35	9	9	100					9	100				
36-40	3	3	100							3	100		
41-45	11	10	90.1	1	9.9					1	9.9	10	90.1
46-50	7			7	100							7	100
51-55	11			1	9.9	10	90.1					11	100
56-60	6					6	100					6	100
61-65	9					9	100					9	100
66-70	2					2	100					2	100
71-75	6					6	100					6	100
76- on	3					3	100					2	100

**Table No. 3**  
**Fusion process of Coronal Suture in Females**

Age	No of cases	Upper ½						Lower ½					
		Not Commenced		In Process		Fused		Not Commenced		In Process		Fused	
		No	%	No	%	No	%	No	%	No	%	No	%
30-35	2	2	100					2	100				
36-40	4	4	100					4	100				
41-45	5	5	100							5	100		
46-50	2	2	100									2	100
51-55	6	1	16.6	5	83.3							6	100
56-60	5			2	40	3	60					5	100
61-65	6			-	-	6	100					6	100
66-70	-			-	-	-	-					-	-
71-75	1			-	-	1	100					1	100
76- on	2			-	-	3	100					3	100

**Table No. 4**  
**Fusion process of Squamosal Suture**

Age	No of cases	Male						Female					
		Not Commenced		In Process		Fused		Not Commenced		In Process		Fused	
		No	%	No	%	No	%	No	%	No	%	No	%
30-35	11	9	100					2	100				
36-40	7	3	100					4	100				
41-45	16	11	100					5	100				
46-50	9	7	100					2	100				
51-55	17	11	100					6	100				
56-60	11	6	100					5	100				
61-65	15	9	100					6	100				
66-70	2	2	100					-	-				
71-75	7	4	66.6	2	33.3			1	100			1	100
76- on	5	3		1	33.3	2	66.6	0	0	1	50	1	50

**Table No.5**  
**Closure of the sutures reported by various authors**

S. No.	Workers/ Authors	Coronal	Squamosal
1.	Todd & Lyon (1924)	26-50 23-25	--
2.	Reddy (1990)	40	--
3.	Parikh (1990)	40-60	--
4.	Apurba Nandy(1995)	25-45	--
5.	Robert Shapiro & Janzen (1960)	24-38	--
6.	Werner & Fisher, Text book	25	--
7.	Vyas P.C M F	45-60	--
		50-60	--
8.	Moondra A.K	M Endocranium	46-50
		F	56-60
		M Ectocranium	51-55
		F	56-60
		F	50-60
			Above 75

## Original research paper

### Novel Ideas and Approaches to Learning Medical Sciences

\*Dr. Chandra Prakash, \*\*Dr Bhavana Srivastava, \*\*\*Dr Sanjay Gaur, \*\*\*\*Dr Ajay Kumar Sinha

#### Abstract

Medicine is a progressive discipline for medical students who are going to be future doctors. Therefore to determine the opinion of students regarding the 2<sup>nd</sup> Professional M.B.B.S. subject, teaching methodology, reforms to be introduced, computer and Internet use and its application in teaching learning process this study was done.

475 students were given a questionnaire which consisted of 2-5 options. Questionnaire consisted of 2 parts. First part was about demographic characteristic, second part was about the subject 465 students in the age group 19-24 yr with male female ration 1:1, mostly from northern India were included in the study. Forensic Medicine emerged as the favorite subject followed by Pharmacology, Pathology and Microbiology. 40.86% (190) wanted more of clinically oriented classes, problem based learning and use of audiovisual aids. 72.04% (335) wanted integrated teaching curriculum. So in our opinion we can adopt a curriculum which is clinically oriented, integrated, revised pattern with computer application and internet use. This will make the teaching learning process in the medical sciences more effective and relevant to the health of the society.

**Key Words:** Problem Based Learning, Integrated Curriculum, Teaching Methodology, Computer, Internet

#### Introduction:

Medicine is a progressive discipline for medical students who are going to be future doctors. It is important that medical students have proper orientation towards signs and symptoms, cases of foul play, various forms of suspicious or unnatural death, pharmacological principles, and toxicological knowledge and apply them in the practice of medicine. [2]

In many medical colleges the teaching is very teacher and student centered, with emphasis on acquiring detail knowledge about the signs and symptoms and that does not train the students on clinical aspects, therapeutics and hidden evidences. In the past decade or so a number of education programmes have been developed in different institution.

Problem Based Learning (PBL) has been widely used and some medical colleges have completely switched over to PBL while others use PBL in conjunction with Lecture Base Learning (LBL). [3]

At the newly established U.F.H.T. Medical College, Haldwani, India, we have 475 students who have gone through 2<sup>nd</sup> professional. Teaching takes places through didactic lectures, PBL, spotting, group discussion, seminars, post mortem examination, histo-pathological examination, and demonstration of procedures, poison detection and its management.

Each subject has 2-3 lectures and 1-2 practical sessions of two hours each every week. Students are divided into small batches of 20 and then further divided into groups of five. [4]

Each group is given a specific case and then discussion on important aspect is done. The student solve problem using the concept taught in lecture and with the help of books from the library. A project work is allotted to each student and they are expected to submit it within two months based on case reports, postmortem examination histo-pathological examination, poisoning pharmacovigilance, toxicology, adverse drug reactions etc.

The conventional undergraduate practical are deficient and suggestions regarding clinically useful procedures and research orientation have been emphasized by the clinician experts and medical council of India.

To obtain opinion and suggestion of the students on the teaching and learning, to make appropriate changes in the methodology and introduce reforms this study was done.

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**Material and Method:****Study area:**

The study was carried out in the Uttarakhand Forest Hospital Trust, Medical College, Haldwani, Nainital.

**Subject:**

This included 475 students who have done II professional MBBS course. There were 237 girls and 238 boys.

**Method of Data Collection:**

Using the retrospective method, 475 questionnaires were distributed to students of which 10 were not properly answered and so rejected. The questionnaire included questions about demographic characteristic, 2<sup>nd</sup> Professional subjects, teaching methodology and suggested reforms to be introduced. Each question had 2-5 options and students were asked to select the option which they felt was the best. The questionnaires were collected immediately after completion to minimize interpersonal communication amongst the subjects and to prevent the influence of friends on individual responses. The informed consent of the student was also obtained.

**Statistically Analysis:**

The result were analysed and percentage calculated and tabulated.

**Result:****Demographic Characteristic:**

Out of the 465 students who answered the questions there were 237 girls and 238 boys in the age group of 19-24 years 80.64% (375) were from English medium schools and rest 19.35% (90) from non English schools. 55.55% (50/90) from non-English schools did not find any difficulty in understanding the subject while 5.55% (5/90) found difficulty in writing and 16.66% (15/90) found difficulty in understanding. No were ready to take any classes in English either writing or speaking.

Most come from educated middle class background 80% (372) of the students were from Uttarakhand state and rest 20% (93) from other states. 64.51% (300) of the students joined the medical college out of their interest and the rest took admission because of the parents or social pressure.

**Opinion regarding 2<sup>nd</sup> professional subjects**

50.53% (235) considered the subjects useful, 22.58% (105) considered it interesting and 22.58% (105) found it difficult whereas 5.31% (20) found it useless.

**Opinion regarding teaching methodology and reforms: (Table 1)**

36.98% (172) found practical to be most interesting 18.27% (85) found lecture to be

interesting 29.98% (158) found group discussion as interesting. Surprisingly it was found that only 5.31% (20) students considered the students seminars to be of use. 59.13% (275) found the duration of the course sufficient while 40.87% (190) found it not sufficient and wanted few more months. 82.79% (385) students wanted more emphasis on objective structured practical examination and problem based learning than didactic lecture.

**Opinion regarding learning strategies: (Table 2)**

60.21% (280) of the students studied the subject from text book and lectures. 32.25% (150) studied the subject regularly because it was interesting, 32.25% (150) studied during exam while 26.88% (125) studied only occasionally. 55.91% (260) of the students found their grasping power fair, 27.95% (130) considered it good while 16.12% (75) found it poor.

**Opinion regarding examination:**

81.72% (380) students were satisfied with the marks allotted to the subject and the rest unsatisfied. 55.91% (260) considered the assessment system fair and 32.25% (150) considered it satisfactory whereas 11.84% (55) considered it unfair. 33.33% (155) of the students felt very anxious during examination while 29.03% (135) felt it moderately and another 29.03% (135) felt little anxious, nearly all felt anxious.

Regarding cheating 52.68% (245) said there is no cheating in the examination; while 23.65% (110) said it occurs sometimes in practical 15.05% (70) said it occurs sometimes in theory.

**Opinion regarding teachers:**

89.24% (415) of the students affirmed that the teachers inculcate in them a process of self learning through problem based learning, group discussion tutorial, seminars, post mortem examination and histo-pathological examination.

They were of the opinion that the good teacher should be friendly who can motivate and guide the students, remove fear from their minds, knowledgeable that could make the subject easy, interesting and comprehensive.

**Discussion:**

In India students enter medical college after twelve years of schooling. The 2<sup>nd</sup> Professional M.B.B.S. students at UFHT medical College, Haldwani (UK) are in the age group of 19-24 years. 80.64% (375) of the students from English medium schools had fair grasping power of the subject. Students from non English medium school had some problem in writing and understanding the subject because medical education is in English.

Hopefully by final professional this problem will may be overcome. 64.51% (300) of the students

joined the course because of their interest in medical sciences and the rest took admission because of parents or social pressure.. Forensic Medicine emerged as the favourite subject followed by Pharmacology, Pathology and Microbiology (**Fig.1**). The postmortem examination, case report studies, photographs, poison identification, fire arms identifications , Problem Based Learning where the favourite with the students. [5], [6]

72.04% (335) of the students wanted some sort of integration of the subject with the final professional course (**Fig.2.**). In the study done by Woodman OL et al, they proposed features of an integrated curriculum that facilitate the learning of in a situation where problem based learning and integration set the curriculum framework. [7]

40.86% (190) opined for clinically oriented lectures with PBL and the use of audiovisual aids. While the use of blackboard as teaching medium is also liked by substantial number of students (**Fig.3**). Studies have shown that problem based curriculum encourages a shift to deeper approaches and reduces learning pathologies. [8]

Authors opined that the students not only found the PBL interesting but they actively participated by way of discussion and case presentation. Unnecessary burden of memorizing detail can be avoided. Clinically oriented study is thus fast catching up and students are thus interested in clinical and applied aspect of subjects. A report from the University of Arkansas, College of Medicine (USA) outlines changes in student attendance from poor to high following changes in the teaching style [9]

These changes if included will, encourage independent learning, reduced lecture time and increased problem solving exercises. 72.04% (335) wanted total integrated methodology with clinical subject taught in 3<sup>rd</sup> professional. So a change to this pattern will be welcome by the student Surprisingly only 5.31 % (20) students found seminars to be of any use so it was felt by the faculty to make it more clinically oriented and interesting [9] It is interesting to note that most of the students 50.53 % (235) considered the subject useful and important 41% (190)

60.21% (280) of students studied from textbooks and lectures regularly for gaining knowledge and had good grasping power. Thus regularity and dedication does bear fruits and these facts cannot be ignored. Students were satisfied with the marks allotted to the subject and considered the assessment system fair 55.91% (260) (**Fig. 4**). [10]

Students felt some sort of anxiety during examination, so making a friendly intervention between students and teachers were recommended. In a study regarding student's exam showed that

90.9% of the students had anxiety. To relieve anxiety consultation intervention by specialist, relaxation, counseling and using comic and jokes in exams will be useful [11]

A considerable amount of students 38.70% (180) said there were some sorts of cheating in examination. In our opinion there is no such thing but paying attention to this aspect is very essential. Finding the cause, eliminating it and positive guidance will help in removing this problem. This was also stressed by few studies. [12, 13]

Maximum number of the students 89.24% (450) said that the teacher inculcated in them a process of self-learning by case report study, postmortem examination, problem based learning, group discussion and seminars. They considered their teachers at par or above other subject teachers and wanted them to be friendly, imbuing confidence, knowledge, impartial, motivating and understanding.

### **Conclusion:**

Students wanted more of clinically oriented classes, postmortem examination, case report and PBL. They advocated the use of audiovisual aids, integrated methodology and more frequent use of computer and internet. So in our opinion we can adopt a curriculum which is clinically oriented, integrated, revised pattern with refresher courses in computer application and internet use. [1] This will make the teaching learning process in the medical sciences more effective and relevant to the health of the society.

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Fig.1. 2<sup>nd</sup> Professional Course

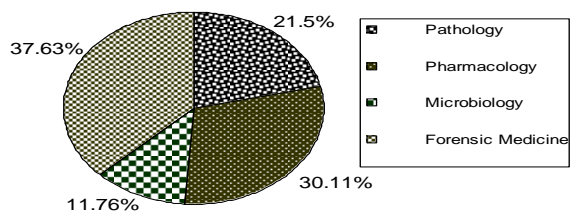


Fig. 2. Integration in clinical subject

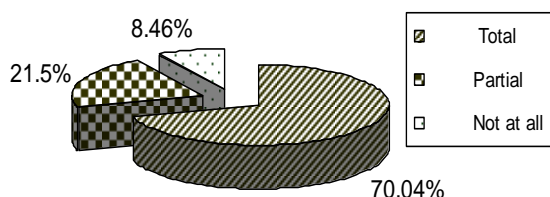


Fig. 3. Lectures to be done

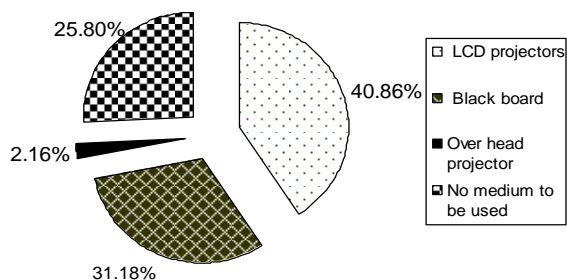


Table1.

Opinion regarding teaching Methodology and reforms

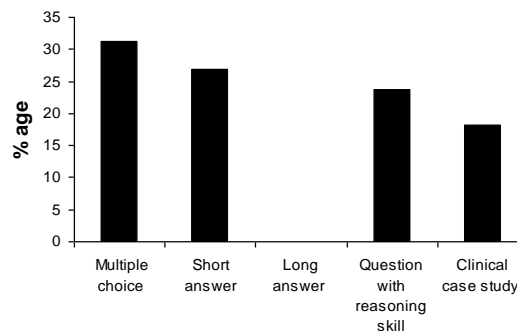
Parameter	% of students(n)
<b>Most interesting</b>	
1. Lecture	18.27 % (85)
2. Practical	36.98 % (172)
3. Seminars	5.31 % (20)
4. Tutorial	8.46 % (30)
5. Group discussion	29.98 % (158)
<b>Duration of the course Sufficient</b>	
1 Yes	59.13 % (275)
2 No	40.87 % (190)
<b>Objective structured practical examination</b>	
1 Yes	82.79 % (385)
2 No	17.21 % (80)

Table 2

Opinion regarding learning Strategies

Parameter	% of students (n)
<b>Study subjects from</b>	
1. Lecture only	6.53 % (35)
2. Textbook only	21.50 % (100)
3. Textbook + Lecture	60.21 % (280)
4. Own notes	11.76 % (50)
<b>Pattern of study</b>	
1. Regularly	32.25 % (150)
2. Occasionally	26.88 % (125)
3. Only during exams	32.25 % (150)
4. Do not study	8.62 % (40)
<b>Grasping power of the subject</b>	
1. Good	27.95 % (130)
2. Fair	55.91 % (260)
3. Poor	16.12 % (75)

Fig.4. Method of Assessment



## Original research paper

# Histo-Pathology Examination in Medico-legal Autopsy Pros & Cons

\*Dr. Akhilesh Pathak, \*\* Dr. H.M. Mangal

### Abstract

Medico legal autopsy examination is performed by the forensic expert with a view to searching primarily for the cause of death. It is performed on the instructions of legal authority in circumstances relating to suspicious, sudden, obscure, unnatural, litigious or criminal deaths and the information so derived, to be applied for legal purpose to assist the course of justice. Medico legal autopsies differ in the purpose and procedure from pathological autopsies but sometimes they overlap with each other at various levels. Histopathology examination is commonly asked by autopsy surgeon to establish the cause of death when he recognizes any morbid anatomical changes in tissues and suspect that it may be the reason for cessation of vital functions of deceased. During the period of three years from 2005-2007, a retrospective study was conducted at PDU Medical College, Rajkot to know whether routine histo-pathological examination is essential in medico legal autopsies or it is creating only an extra burden over the pathologists, autopsy surgeon and law enforcing agencies in any way.

**Key Words:** - Autopsy, Histopathology, Cause of death, Medicolegal

### Introduction:

An Autopsy, literally meaning self study of a dead body, is carried out for clinical as well as medico-legal purposes. Clinical autopsy, loosely termed as pathological autopsy, is carried out to diagnose the disease which has caused the mortality when ante-mortem efforts have failed. Many a times clinical autopsy is done despite the cause of death having been established ante mortem, to study the disease process in situ, thus enriching medical knowledge. Medico-legal autopsy is performed with the aim of providing answers to questions about the identity, cause of death, time of death, circumstances of death, etc. thus helping the law enforcing agencies to solve the crime.

Although the procedure of both the autopsies is same, they differ from each other in many aspects. Usually the clinical autopsy is performed by the pathologist and Medico-legal autopsy by a Forensic expert.

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However on occasions, especially in Armed Forces Medical Services (AFMS) setup and in Malaysia, the pathologist may have to perform a Medico-legal autopsy. On the other hand an autopsy started as Medico-legal autopsy by a forensic expert may turn out to be a purely clinical autopsy, e.g. in cases of sudden death [1].

Forensic histopathology is a very important branch of Forensic Medicine. It deals with the microscopic analysis of various changes at cellular/tissue level throwing light on cause of death, solving a crime mystery. It is microscopic study of tissues of the deceased. To be complete histopathologist, one has to be competent in handling microscopes and histo-techniques [2].

The utility of histopathological findings in death due to electrocution and poisoning has been reported by various authors[3,4,5] while the other authors[6,7] believe that histopathological examination is not of much useful modality in cases of medicolegal postmortem examination. Gupta et al [6] and Jani et al [7] have reported in their studies that histopathology examination in postmortem examination should be used in a manner which is more rational and not defensive. Mollina et al [8] have reviewed brain, heart, and liver, kidney, and lung sections on 189 routine forensic cases and compared the results to the gross anatomic findings. They have also reported almost same conclusion in her study in which microscopic examination affected the cause of death in only 1 case out of 189 studied cases, while in no case the manner of death was affected by it.

## Material and Method:

Rajkot is a district in Gujarat with population of 10 lacs as per 1991 census in an area of 13,582 Sq. Km. We have conducted a retrospective study in the Department of Forensic Medicine, P.D.U. Medical College Rajkot, during the period of 3 years from 1<sup>st</sup> January 2005 to 31<sup>st</sup> December 2007. All cases of autopsy, in which histopathology examination was requested, were selected for the present study and routine viscera were preserved for histopathology examination in 10% formalin solution, which were sent to pathology department of same institute for further proceedings.

We reviewed the histopathological findings of five major organs e.g. Brain, Heart, Lungs, Liver, Kidneys and compared the results with gross anatomical findings observed during post-mortem examination. We tried to find out whether histopathology examination is affecting the cause of death and legal status of the case in any way or it can be avoided in routine autopsy examination. The comparison was carried out with other such similar types of studies (Indian and foreign authors) and fruitful conclusions were hence drawn.

## Results:

Age and sex wise distribution of cases shows that the incidences were higher in 3<sup>rd</sup> and 4<sup>th</sup> decades of life. Males were more prone to death by diseases (63.33%) as compared to females (36.67%). Our study shows that in maximum cases the pathology was detected either in Cardio-Vascular System (40% cases) or in Respiratory System (30% cases). The other systems were less commonly involved as shown in Table-2. Table-3 shows the comparative study of the pathological findings observed during autopsy examination and histopathological examination.

On comparison of these findings, congestion was observed in maximum number of cases during autopsy which was also noticed during histopathology examination in different ratio as shown in table three. Atherosclerosis with narrowing of coronary arteries was observed during autopsy in 23.33% cases which was also confirmed by histopathology in almost same number of cases (25.55%). Lungs edema was noticed during autopsy in 37.78% cases and confirmed by histopathology in 33% cases.

Tubercular changes in lungs were noticed in 8.89% cases and confirmed by histopathology in 13.33% cases. Pneumonic changes were observed in lungs during autopsy in 31.11% cases while confirmed by histopathology in only 24.44% cases. After conducting autopsy we could make out the cause of death in 82.22% cases by combining effects of history, inquest papers and postmortem

examination, while in 17.78% cases the cause of death could not be revealed by all efforts. In all these cases the sample of routine viscera were sent for the histo-pathology examination.

After receiving the histopathology examination report no discrepancy was found regarding the cause of death in 94.44% while in only 5.56% cases it was found. Table-5 shows the effect of histo-pathology examination on legal status of the case. It shows that even after receiving the histopathology examination report, the legal status of all autopsy cases whether it was Natural or UN-Natural, remained same as it was during the autopsy examination.

## Discussion:

Medicolegal autopsies are commonly conducted in cases of sudden and unexpected deaths primarily to establish the cause of death in cases where such deaths have occurred in apparently healthy individuals under suspicious circumstances. The outcome may quite often reveal some natural disease, the presence of which may trigger issues like association of the disease with trauma, work, crime etc. and its relative contribution towards death [9].

About 1800-1900 postmortems per year are going on in Mortuary of P. D. U. Medical College, Rajkot. During the span of 3 years (2005-2007) histopathology examination was requested by autopsy surgeon in total 90 cases and all these cases were selected for the present study. Age and sex wise distribution of cases show that the incidences were higher in Males as compared to female during 3<sup>rd</sup> and 4<sup>th</sup> decades of life, similar to others [6,7]. In maximum cases major pathology was detected either in Cardio-Vascular System (40% cases) or in Respiratory System (30% cases) as compared to other systems, which was also mentioned by other authors [9, 10].

We reviewed the histopathological findings of five major viscera (Brain, Heart, Lungs, Liver and Kidneys) and compared the results with gross anatomical findings of autopsy examination, which shows that the morbid anatomical features observed in viscera during autopsy examination were also noticed in majority of the cases during histopathology examination. Table-4 shows that during autopsy we could reveal the cause of death in 82.22% cases by combining effects of history, inquest papers and postmortem examination of the deceased while in 17.78% cases the cause of death could not be revealed by all efforts during autopsy. After comparison of histopathology report with gross findings of autopsy no discrepancy was found regarding the apparent cause of death in 94.44% while in only 5.56% cases some discrepancy was found.

It shows that in very few cases (5.56%) histo-pathology examination was helpful to affect the apparent cause of death in autopsy. Molina et al [8] has also reported almost same conclusion in her study done on 189 routine Forensic cases. Table-5 shows that histopathology examination did not affect the legal status of all studied cases by any means whether it was a Natural or UN-Natural death. It shows that the legal status of the cause of death in any of the case is not changing even after the histo-pathology examination, which is well supported by other author's also. [6, 7, 8]

In few of the cases studied, we have noticed that morbid anatomical findings observed during autopsy examination were not supported by histo-pathology examination further, which creates an unwanted contradiction in the opinions of two experts and it also provides a valid ground to get some legal benefit by the accuse party.

Because of such bitter experiences in court and advanced knowledge in postmortem to diagnose the pathology may help the forensic experts to avoid the histo-pathology examination in routine autopsy cases. In most of the pathological deaths legal authorities prefer to conduct the medicolegal autopsy of the deceased to rule out the causes of death other than pathology and once it is established during autopsy that it is a case of pathological death (Natural death) then they are also not interested to know the exact pathology and its significance as it will not affect the legal status of case in future.

There may be number of reasons of this contradiction between autopsy and histopathology examinations, few of them are discussed here:

- Improper sampling/ preservation of tissues during autopsy.
- Autolysis of the tissues is quite common.
- Sections for histo-pathological examination may be taken from the site where lesion is not present.
- Necrosed tissues which are visible during gross examination in autopsy may slough out during preservation or during processing of tissues for microscopic examination.
- Most of the tissues received for histo-pathological examination show non specific findings e.g. congestion, cloudy swelling, inflammatory cells etc., which may not be helpful to establish the cause of death.
- Insufficient priority given to histo-pathological examination of autopsy specimens by technical staff and pathologist already burdened with increasing workload of surgical resections, biopsies and cytology.
- Some pathologists do not want to indulge themselves in medicolegal complications and to

avoid legal queries further they may not write any specific opinion about the pathology found.

### Conclusion:

An autopsy can be helpful to the family and relatives to understand about the cause of death of their loved one and it might also benefit future generations of the family, if deceased person died because of an inherited disorder. On the other hand it facilitates doctors and law enforcing agencies to reply on various facts of the death especially when it is a case of sudden death, where the deceased is usually a healthy person and died because of some unknown reason. Our study shows that the autopsy should be carried out to a much higher standard and it should be directed to answering the specific questions asked by the law enforcing agencies in relation to the legal matters not about the pathology.

Therefore, now the trends are changing regarding the utility of histopathology examination where the autopsy surgeons are inclined to address the specific questions asked by legal authorities in regard to cause of death not to know the exact pathology and its future use. Autolysis of tissues, improper sampling and non-specific or incomplete information in histopathology report etc. may be the reasons to support them further. Thus, we feel that routine microscopic examination in forensic autopsy is avoidable and should rather be used rationally as and when the circumstances are indicating its worth and demand.

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**Table-1**  
**Age and sex wise distribution of cases**

Age Group	Male	Female	Total
0-10	04	01	05
11-20	04	04	08
21-30	11	12	23
31-40	17	07	24
41-50	08	03	11
51-60	07	01	08
61&above	06	05	11
<b>Total</b>	<b>57</b>	<b>33</b>	<b>90</b>

**Table-2**  
**Distribution of cases according to major system involved**

System Involved	Number of Cases
Nervous System	04 (4.44%)
Cardio-Vascular System	36 (40.0%)
Respiratory System	27 (30.0%)
Gastro-Intestinal System	06 (6.67%)
Renal System	01 (1.11%)
Genito-Urinary System	09 (10.0%)
Not Known (Negative Autopsy)	07 (7.78%)
<b>Total</b>	<b>90</b>

**Table-4**  
**Effect of histo-pathology examination on cause of death**

	Cause of Death	No. of Cases
After Autopsy	Apparent	74 (82.22%)
	Not Apparent	16 (17.78%)
After HistoPathology Examination	Discrepancy Found	05 (5.56%)
	Discrepancy Not Found	85 (94.44%)
<b>Total</b>		<b>90 (100%)</b>

**Table-3**  
**Distribution of cases according to pathology observed**

Organs	Pathology Observed	During Histo-Pathology Examination	
		No. of Cases (%)	No. of Cases (%)
Brain	Congestion	70 (77.7%)	38 (42.2%)
	Oedema	09 (10.0%)	03 (03.3%)
Lungs	Congestion	72 (80.0%)	52 (57.7%)
	Oedema	34 (37.7%)	30 (33.3%)
	Pneumonia	28 (31.1%)	22 (24.4%)
	Tuberculosis	08 (8.89%)	12 (13.3%)
Heart	Coronary Atherosclerosis	21 (23.3%)	23 (25.5%)
	Valvular Heart Disease	04 (4.44%)	04 (04.4%)
	Myocardial Infraction	00 (00%)	08 (08.8%)
Liver	Congestion	63 (70.0%)	44 (48.8%)
	Fatty Changes	05 (5.55%)	08 (08.8%)
	Necrosis & Inflammation	02 (2.22%)	06 (06.6%)
	Cirrhotic Changes	01 (1.11%)	02 (02.2%)
Kidneys	Congestion	63 (70.0%)	42 (46.6%)
	Coagulative Necrosis	04 (4.44%)	38 (42.2%)
	Changes of Renal Failure	03 (3.33%)	03 (03.3%)
Sample	AUTOLYSED	11 (12.2%)	11 (12.2%)

**Table-5**  
**Effect of histo-pathology examination on legal status of cause of death**

	Legal Status of Case	No. of Cases
After Autopsy	Natural	66 (73.33%)
	UN-Natural	24 (26.67%)
After Histo Pathology Examination	Natural	66 (73.33%)
	UN-Natural	24 (26.67%)
<b>Total</b>		<b>90 (100%)</b>

## Original research paper

# Pattern of Renal Pathology in Fatal Envenomation by Indian Cobra (*Naja naja*)

\*Dr. Partha Pratim Mukhopadhyay M.D., Ph.D., \*\*Dr.Sulekha Ghosh D.C.P, M.D., \*\*\*Dr.T. K.Ghosh, D.C.P.

### Abstract

Deaths due to poisonous snakebite are a significant health related problem especially the rural heartland of in tropical countries. Renal involvement in snakebite is well documented especially so in bites by the Viperidae group. The Elapidae family consisting of cobra and kraits among other varieties are mainly considered neurotoxic. The venom of neurotoxic variety predominantly has direct depressing action on the respiratory center and neuromuscular junction. We investigated the renal changes at autopsy and histology of fatal cobra bites.

This series included autopsy examination of 14 cases of fatal cobra bite in our hospital-based study. Dissected kidneys were sectioned, stained with hematoxylin & eosin stain and histological examination was done under light microscope. Five cases from head injury subject were used as control. The study reveals renal involvement in 64.28 %of fatal bites by Indian cobra (*Naja naja*) primarily considered neurotoxic. The major renal changes were tubular necrosis 1(7.14%), cortical necrosis 3 (21.42%) and interstitial nephritis 3(21.42%). This fact is worth giving due consideration during management and monitoring of cases of envenomation by cobra.

**Key Words:** Snake Bite, Renal Pathology, Indian Cobra, Cortical Necrosis, Glomerulopathy, Autopsy

### Introduction:

Death due to poisonous snakebite is a significant health related problem especially in the rural heartland of South Asian countries. [1, 2] The incidence of renal failure in poisonous snakebite varies from 13% to 22%. [3, 4] Renal involvement in snakebite is well documented. [5, 6, 7] Bites by the Viperidae group are the main cause of renal failure. [8, 9] The Elapidae family consisting of cobra and kraits among other varieties are mainly considered neurotoxic.

For clinical convenience poisonous snakes are broadly grouped into haemotoxic (Vipers) and neurotoxic (Cobra and Kraits). [10] The venom of neurotoxic variety predominantly has direct depressing action on the respiratory center and neuromuscular junction. Snake venom contains the enzymes and non –enzyme proteins that mediate the tissue reactions. The treatment however involves commonly polyvalent anti-serum. The present work was designed to examine the incidence, pattern and spectrum of renal lesion in snakebite by Indian cobra (*Naja naja*) from the autopsy sample.

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### Materials and Methods:

In India snakebites are unnatural deaths that need to be examined at autopsy (medico-legal) according to statutory rules. The series included autopsy examination of 14 cases of fatal cobra bite in our hospital-based study. All the cases were from the surrounding area under the jurisdiction of the local police administration. The sample consisted of all fatal cobra bite cases examined at complete forensic autopsy by the first author in 2009 during his routine medico legal postmortem work. The cases included all known deaths due to cobra bite. The subjects were from those admitted to the hospital and received treatment at Emergency ward.

The snake type was retrieved from records, police inquest, history or the offending snake captured /killed and examined. Unknown bites were excluded. Brought dead subjects with history of snakebite were also excluded from the study. Autopsy was concluded within six hours of death. Any case with overt local necrotic changes and evidence of couagulopathy were summarily excluded.

At complete autopsy all findings were recorded in a standard protocol. Only the morphological changes in the kidneys were considered for the present study. Dimensions and weight of the kidneys were recorded. Macroscopic and microscopic studies were done. Dissected kidneys were sectioned, stained with hematoxylin & eosin stain and histological examination was done under light microscope. Five cases from head injury subject were used as control.



The pathologists noted histopathological findings. The slides were coded and blinding was done to keep the type of snake unknown to the observers (other authors). The results were pooled and analyzed.

### Observation / Results:

In the present series of 14 cases of fatal bites by *Naja naja* the mean and standard deviation of age at death was 26.5 and 8.92 respectively. The macroscopic examination of the kidneys showed bilateral congestion in all the 14 cases. Bilateral sub capsular pinpoint hemorrhages were noted in one female subject. On section (longitudinal) all the kidneys showed congestion of cortex and medulla. Intense medullary congestion was seen in five cases. Cortical hemorrhage (pin point) was found in one case (7.14%).

The pattern of renal changes (histopathological findings) is seen from Table 1. 64.28% of cobra bites had some renal lesion apart from congestion. The major renal changes at histology found in the neurotoxic group were tubular necrosis 1(7.14%), cortical necrosis 3 (21.42%) and interstitial nephritis 3(21.42%). Focal cortical necrosis was seen in 2(14.28%) cases. Glomerular changes (glomerular collapse and fibrin deposition) were seen in 2(14.28%) cases of fatal cobra bite.

### Discussion:

In the present study 9 (64.28%) of the cobra bites showed distinct renal lesions at autopsy (confirmed and classified by histopathology). It clearly indicates acute renal failure as the leading mechanism of death in snakebite. Our findings are not in consonance with earlier documented studies. [3, 4, 5] The spectrums of renal lesions were also not consistent with previous published works. [6, 7, 8] This finding of the present work is distinct from early works [8, 9] where haemotoxic bites were only reported to cause nephropathy.

The study highlights the renal involvement in cobra bite cases contrary to the known fact that those are mainly neurotoxic. This observation can be explained by two possible mechanisms. Firstly all snake venoms are mixed toxins that have intrinsic activity on the kidneys. Secondly there is a high possibility of immunologically mediated nephropathy in snakebite. The interstitial nephritis (21.42%) observed in this series supports our contention (Fig 1). Some earlier workers [7] however have refuted this. Another mechanism of renal involvement in common neurotoxic bites is ischaemia induced nephropathy especially cortical and tubular lesions. This work is our preliminary observation based on our experience of the prominent renal morphological change at autopsy in fatal cases of cobra bite.

This fact is worth giving due consideration during management and monitoring of cases of envenomation by cobra. Also there is ample scope of special investigation on the biochemical and immunological components of the venom of this. This prompts further large-scale investigations with more detailed pathology of cobra bite with ultrastructural and molecular studies. The predominant mechanisms mediating the changes in kidney may be different but the organ damage found at autopsy is significant for planning management. Polyvalent antivenom is still the mainstay of therapy in most countries. The major organ failure needs close monitoring and support. Renal involvement that has been less frequently reported in known neurotoxic bites is indeed a problem to reckon with in emergency care. This is particularly important in rural areas of South Asian countries where prevalence of snakebite is alarmingly high.

**Table 1:**

#### Major histo-pathological changes found in the fatal cases of snakebite (*Naja naja naja*) (n=14)

Sr. No.	Lesions	No. of cases (%)
1.	No Renal change	5(35.7%)
2.	Glomerular change	2(14.28)
3.	Tubular necrosis	1(7.14)
4.	Cortical necrosis	3(21.42)
5.	Interstitial nephritis	3(21.42)

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## Original research paper

# A study of homicidal deaths by mechanical injuries in Surat, Gujarat

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### Abstract:

Violence has been always an integral part of the human civilization since its inception. Human beings have been progressively become expert in producing various type of weapons both for offensive and defensive purposes. This study was aimed to evaluate the mechanical injuries in homicidal cases of different motives and also to find out the most vulnerable portion of the body so as to minimize the loss of human life and common weapon used in such cases.

The present study was carried out on 166 cases of homicidal deaths due to mechanical injuries during the year 2004 -05. Incidence of homicidal death due to mechanical injuries was averagely 83 cases per year. Mechanical injuries were quite common in homicidal deaths involving 130 males and 36 female victims. Majority of victims were in the age group of 21-40 years include 104 cases (62.65%). Stab injuries were commonly seen on the abdomen and chest due to sharp cutting weapons. Blunt force was the most commonly employed method in 80 cases (48.19%). Incidence of firearm was quite rare. Lungs were commonly involved internal organ. Male group was dominant over female group in defensive mechanism.

**Key Words:** Violence, Defense Wound, Homicidal Injury, Hard, Blunt Weapon

### Introduction:

Homicide is the death of one human being as a result of the conduct of another. Homicide is an expression of aggression in its most extreme form. Amongst the strongest factors that predict aggression and violence in a poor family atmosphere as reflected in is rejection, punitiveness, hostility, permissiveness and aggression. Factors weakly related to aggression are a male gender, neuropsychological deficits, having a muscular physique, high plasma testosterone levels and being raised in an urban environment.

In addition to factors that trigger or provoke aggression. There are other elements of a potentially aggressive situation that facilitate the expression of the behavior. These facilitators include the presence of weapons and seeing other people acting violently; which may either simply increase arousal or they may suggest to the observer that violence is an acceptable option. [1, 2]

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Injuries are a leading cause of death in all age groups and both sexes (sex). Violence and injuries account for 9% of the global mortality and 12% of all disability adjusted life years (DALYs). [3] It is estimated that 5.8 million people worldwide die each year as a result of some form of injury. [4] Globally, around 520,000 people die each year as a result of interpersonal violence, which equates to 1400 deaths every single day. [5]

The crime is now days propagated through the most advanced audio-visual apparatus through television transmission, modern motives and crime fiction stories without any inhibition and control over quality and variety of material in them. Killing of human being is very common; a death being flashed in the columns of the popular newspapers every day. It is still a challengeable task for investigating agency to reveal the mystery and for judiciary to award a deterrent sentence to the guilty. The circumstances become more complex when such exercise also involves socio-economic factors in addition to medico legal ingredients of a case.

Homicide investigation can never be complete without a detailed postmortem examination. The detailed analysis and scientific interpretation of autopsy finding is imperative to reconstruct the crime. The *medical* criterion of homicide is conclusive demonstration that death was violent, i.e. caused by injury. Demonstration that the lethal violence arouse from an unlawful act, agency,

procurement or culpable omission of another person, satisfies the *legal* requirement. [5]

### Material and Methods:

The present study was carried out on homicide victims, consisting of 193 cases brought for medico legal postmortem examination to Forensic Medicine & Toxicology Department of Government Medical College and New Civil Hospital, Surat from January 2004 to December 2005 and Surat Municipal Institute of Medical Education and Research (SMIMER) from June 2005 to December 2005 (five police station area were being authorized to SMIMER for doing postmortem examination from 1<sup>st</sup> June 2005).

The study was conducted for two year period during which 4680 medico legal postmortem were conducted. Out of them 193 cases were of homicide. 166 cases showed homicidal mechanical injuries. All cases of homicidal victims either confirmed by investigating police officer or suspected or found to be homicide at postmortem.

Every case of this study was examined to determine age, sex, type of mechanical injury, type of weapons to be used, involvement of organs and blood vessels, and type of defense wound.

### Observations:

Scientifically significant data of medico legal nature are highlighted in table mentioning below. The figure in **bold letters** in tables highlights the higher incidence or important parameters.

In this study, 78.31% of total cases were of male and only 21.69% were of female. The percentage of homicide by mechanical injuries among males was 3.61 times more than females. **(Table 1)**

In homicidal deaths, male group received more mechanical injuries than the female group. 18 male victims showed more than 20 injuries. **(Table 3)**

Sharp cutting injuries (Chop and incised wounds) as well as blunt injuries were commonly seen over head. Head (22.65%) was the target region for mechanical injuries followed by chest (21.48%) and abdomen (16.15%). Most of the stab wounds were due to single edged sharp cutting weapon and target region for stab injuries were abdomen and chest as evident from **(Table 4)**.

Majority of the victims were of age group 21-30 years (37.95%) followed by age group 31-40 years age group (24.70%). The least incidences were seen in above 61 years of age groups. **(Table 2)**

Amongst 166 cases of homicide due to mechanical injuries, 74 victims showed stab injuries. 55 cases (74.32%) were of male while only 19 victims (25.68%) were female. Three stab wounds were found in 25 cases (33.76%). **(Table 5)**

In 80 cases (48.19%), hard & blunt weapons/objects were likely to be used for

mechanical injuries in this study which was followed by sharp cutting weapons (39.16%). Incidence of using firearms (4.22%) was quite rare. **(Table 6)**

On examination of mechanical injuries over body, 93 cases (56.02%) showed both superficial and deep injuries followed by deep injuries (24.10%) alone. **(Table 7)**

Internal injuries affecting the viscera and blood vessels were produced by sharp cutting weapons (66.00%). 147 cases showed involvement of internal organs and blood vessels. Lungs were most frequently involved internal organ seen in 34 cases (23.13%) followed by major blood vessels, heart and small intestines. **(Table 8)**

Only 54 cases (32.53%) showed defense injuries over right and left arm, forearm and hand. Males (88.89%) were eight times more defensive than female (11.11%). Most defensive group is 20-29 years (40.74%) followed by 30-39 years (27.78%). **(Table 9)**

The most common type of injury in defense wounds was incised wound (48.30%) followed by contusion (18.52%) and lacerated wound (16.67%). **(Table 10)**

### Discussion:

Day by day, incidences of homicides are increasing in Surat city due to industrialization, urbanization and migration of people. As it is crime against human by human, various epidemiological, social and geographical factors of human life affect the pattern. Only in two year, 193 cases (4.12%) of homicide which were lower than observed by Dikshit *et. al* [6]– 28%, Khanagwal & Paliwal [7]– 10%, Tosayonand[8] – 7.7% but higher than O.Ghambhir [9] -2.89%.

Male victims were commonly involved in homicides due to mechanical injuries. In this regard the present study is in the same line with most of the authors. The male predominance may be explained by the fact that males by nature indulge in more violent activities as compared to females. In society, revenge is also usually aimed at males, women and children being generally spared. Higher incidence of homicide was seen in the age group of 21–40 years, 104 cases, (62.65%). Persons in this age group are more active, violent, and more vulnerable to the fast changing social trends and culture, and usually they get married by this age. Most importantly they are the main earning member of the family. However, Kominato *et al* [10] reported 46–55 years to be the most commonly involved age group.

Male victims also showed presence of more multiple injuries as compared to the female victims. As the majority of the external injuries were due to blunt force, they appear mostly either superficial or superficial and deep. There are many reasons for multiplicity of injury. One of them is firm

determination on the part of the perpetrator to make doubly sure that the victim is dead or will not recover later on. Another reason may be the theory of an extreme hatred and frenzy resulting into over killing. It may also be simply due to involvement of multiple assailants or just because the victim goes on fighting for a longer duration.

This study reflects that the commonest weapon of choice for mechanical injuries is hard and blunt weapon like stone, wooden stick, iron pipe, axe, spade in the majority of cases because when any person comes in heat of passion at any place, he find all these types of hard and blunt objects from concern field work which are easily available without any preparation. This finding is consistence with finding of Kominato *et.al.*[10] Dikshit *et.al.* [6] but contrast to the findings of Moh. Zahir basir *et al* [2], Sheikh M [11], Upadhyay *et al*, [12] in which, sharp cutting weapon occupied the top most position. Murphy [13] Sinha *et.al* [14] and Fimate *et.al* [15] observed fire arms as the most commonly used weapons in homicide with a similar explanation of easy availability of license and non license fire arms in their respective study areas.

In this study maximum numbers of external injuries were seen over the head (174 external injuries, 22.65%). It was followed by the chest bearing as many as 165 external injuries (21.48%). Most of the external injuries over head were contusion, lacerated wounds by hard and blunt force followed by chop and incised wounds by sharp cutting weapons. Modi [16] also quoted a similar observation that in India most of the scalp injuries are generally produced by hard and blunt weapon /objects. Adelson [17] gives some sound reasons for this dominance of head injuries.

1. The head is the target of choice in the great majority of assaults involving blunt trauma.
2. When the victim is pushed or knocked to the ground, he often strikes his head.
3. The brain and its coverings are vulnerable degrees of blunt trauma that would rarely be lethal if applied to other areas.

Stab injuries were the most common wounds. Out of the 219 stab injuries, 204 injuries were due to single edged sharp cutting weapons. Among them, 95 stab injuries were over abdomen followed by 88 stab injuries over chest. The reason for choosing abdomen and chest to be the elective sites for stabbing may be explained by the general common believe perpetuated amongst people that chest and abdomen contain vital organs of the body and so chances of death of the person is almost sure. At the same time it is easier for a sharp weapon to penetrate the chest or abdomen with a fatal outcome. The third common site for the stabbing in the present study was the neck region (18 cases). It was usually

associated with stab injuries at other sites on the body. External jugular vein, carotid artery or air passage was commonly involved with death on the spot. Though the site is narrow and short, it is protected by the chin.

Involvement of viscera and/or major blood vessels was seen in 147 cases (88.55%). Sharp and pointed weapons were the first to affects the internal vital organs in 97 cases (66%) while only in 11 cases (7.48%) where both sharp cutting and hard & blunt weapons were used. Different type of injuries found over body suggesting that possibility of more than one accused can not be ruled out and hence such cases need real expertise to quantify and correlate accused and their respective culpability at the time of trial. Lungs were involved in as many as 34 cases (23.13%) followed by injury to the major blood vessels (20.41%), heart (12.93%) and small intestine (10.88%). Aim of the accused to kill the person at any cost, make him to injure the person over most vital organs of the body. Vital organs like heart, lungs, liver are the target of sharp cutting weapons in this study to end the life of victims.

Defense wounds are the results of the immediate and instinctive reaction of the victim to save himself. Defense wounds in homicidal deaths resulting from raising the arm to ward off the attack from the assailant or by grasping the weapon. Out of 166 cases, only 54 cases (32.53%) showed defense wounds. Male victims were more defensive than the female victims. Both in male and female, 20-39 years groups were more defensive because of younger age and more willpower. In the present study, incised wounds were most commonly found over upper and lower extremities as defense wound which are possible only by sharp cutting weapon. From this it appeared that when assailants attack with sharp weapon, victim known the risk of life and try to seize the weapon.

### Conclusions:

1. Total 193 cases of homicidal deaths in this study, 166 (86.01%) cases belong to deaths due to mechanical injuries.
2. Younger age group (3<sup>rd</sup> and 4<sup>th</sup> decade) showed more involvement in violent activity and more defensive.
3. Involvement of male group was 3.6 times higher than female group in homicidal mechanical injuries.
4. Male group was eight times more defensive than female group.
5. Hard and blunt objects were the commonest weapon to be used for mechanical injuries.
6. Vital organs like lungs, heart and major blood vessels were the most affected in this study by sharp cutting weapons.

7. Abdomen and chest were the target regions for stabbing by the accused using sharp cutting weapons.
8. For homicidal purpose, Head is the target region.
9. Most of the stab injuries were possible by using single edged sharp cutting weapons.

In court of law, the forensic expert will have to answer certain questions concerning mechanical injuries found over the body of victim as well as accused. Most of the questions are about the type of weapon used by assailant, position of assailant and victim, number of assailants involved, nature of injuries, time of injury etc. In the present study we have tried to explain various relevant and scientific issues concern with homicide deaths, but still we feel that continuous research in this field is need of hours to constitute strategies to foil unlawful human killings.

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**Table: 1: Sex wise distribution of homicidal cases**

Year	Male	Female	Total (%)
2004	68	20	88 (53.01)
2005	62	16	78 (46.99)
<b>Total</b>	130 (78.31%)	36 (21.69%)	166 (100)

**Table: 2: Age and sex wise distribution**

Age (years)	Male	Female	Total (%)
0-10	1	6	7 (4.21)
11-20	19	4	23 (13.86)
<b>21-30</b>	<b>59</b>	<b>4</b>	<b>63 (37.95)</b>
<b>31-40</b>	<b>31</b>	<b>10</b>	<b>41 (24.70)</b>
41-50	11	6	17 (10.24)
51-60	4	2	6 (3.61)
61-70	0	4	4 (2.40)
>70	5	0	5 (3.01)
<b>Total</b>	130	36	166 (100)

**Table: 3: Distribution of mechanical injuries according to number**

No. of mechanical injuries over body	No. of cases		Total (%)
	Male	Female	
1	8	2	10 (6.02)
2	18	4	22 (13.25)
3	23	3	26 (15.66)
4	12	7	19 (11.45)
5	15	5	20 (12.05)
6-10	33	9	42 (25.30)
11-15	2	Nil	2 (1.20)
16-20	1	2	3 (1.82)
>20	18	4	22 (13.25)
<b>Total</b>	130	36	166 (100)

**Table: 5: Sex wise distribution of stab injuries**

Stab injury	Male	Female	Total (%)
1	10	6	16 (21.63)
2	12	7	19 (25.68)
<b>3</b>	<b>21</b>	<b>4</b>	<b>25 (33.76)</b>
>5	12	2	14 (18.93)
<b>Total</b>	55 (74.32)	19 (25.68)	74 (100)

**Table: 6: Year wise distribution of weapons to be used**

Type of weapon	2004	2005	Total (%)
Sharp	33	32	65 (39.16)
<b>Blunt</b>	<b>43</b>	<b>37</b>	<b>80 (48.19)</b>
Sharp and Blunt	9	5	14 (8.43)
Firearm	3	4	7 (4.22)
<b>Total</b>	88	78	166 (100)

**Table: 7: Gross appearances of wounds**

Gross appearance	No. of cases	Percentage
Superficial	33	19.88
Deep	40	24.10
<b>Superficial anddeep</b>	<b>93</b>	<b>56.02</b>
<b>Total</b>	166	100

**Table 9: Age and sex wise distribution of cases with defense wounds**

Age group	Cases with Defense wounds		Total (%)
	Male	Female	
0-9	1	0	1 (1.85)
10-19	5	0	5 (9.25)
<b>20-29</b>	<b>20</b>	<b>2</b>	<b>22 (40.74)</b>
30-39	12	3	15 (27.78)
40-49	8	0	8 (14.81)
50-59	2	1	2 (3.70)
60-69	0	0	0
70-79	1	0	1 (1.85)
<b>Total</b>	<b>48 (88.89)</b>	<b>6 (11.11)</b>	<b>54 (100)</b>

**Table 10: Analysis of type of defense wound wounds**

Type of defensive injury	No. of cases	%
Contusion	10	18.52
<b>Incised wound</b>	<b>25</b>	<b>46.30</b>
Lacerated wound	9	16.67
Stab wound	2	3.70
Contusion+ Incised Wound	2	3.70
Contusion +Lacerated Wound	2	3.70
Stab W + Incised Wound	3	5.56
Stab W +Lacerated W + Contusion	1	1.85
<b>Total</b>	<b>54</b>	<b>100</b>

**Table 4: Distribution of injuries according to the region of body**

A- Abrasion, Co- Contusion, LW- Lacerated wound, M- Multiple.

(For accuracy of calculation, abrasions were excluded which were multiple in number)

Region	Sharp injury			Total (%)	Blunt injury				Total (%)	Grand Total (%)
	Chop/ incised	Stab			A	Co	LW	Crush		
		Single edge	Double edge							
<b>Head</b>	<b>76</b>	-	-	<b>76 (16.93)</b>	-	<b>56</b>	<b>36</b>	<b>6</b>	<b>98 (30.72)</b>	<b>174 (22.65)</b>
Face	32	4	-	36 (8.02)	M	16	47	-	63 (19.75)	99 (12.89)
Neck	27	16	2	45 (10.02)	M	29	2	-	31 (9.72)	76 (9.90)
<b>Chest</b>	<b>23</b>	<b>81</b>	<b>7</b>	<b>111 (24.72)</b>	<b>M</b>	<b>42</b>	<b>12</b>	-	<b>54 (16.93)</b>	<b>165 (21.48)</b>
Abdomen	7	90	5	102 (22.72)	M	22	-	-	22 (6.90)	124 (16.15)
Upper limbs	60	3	-	63 (14.03)	M	8	10	-	18 (5.64)	81 (10.55)
Lower limbs	4	10	1	15 (3.34)	M	30	3	-	33 (10.34)	48 (6.25)
Genital	1	0	0	1 (0.22)	-	-	-	-	0	1 (0.13)
<b>Total</b>	<b>230</b>	<b>204</b>	<b>15</b>	<b>449 (100)</b>	<b>M</b>	<b>203</b>	<b>110</b>	<b>6</b>	<b>319 (100)</b>	<b>768 (100)</b>

**Table 8****Involvement of viscera and blood vessels**

Viscera & Bld. vessel	Sharp cutting weapon	Hard & Blunt weapon/object	Sharp & Blunt weapons	Firearm	Total (%)
Brain	1	7	1	0	9 (6.12)
<b>Lungs</b>	<b>22</b>	<b>6</b>	<b>2</b>	<b>4</b>	<b>34 (23.13)</b>
<b>Heart</b>	<b>15</b>	<b>0</b>	<b>1</b>	<b>3</b>	<b>19 (12.93)</b>
Liver	7	3	1	2	13 (8.84)
Spleen	4	3	1	0	8 (5.44)
Kidney	5	1	1	0	7 (4.76)
Stomach	0	0	0	0	0
S. Intestines	10	3	2	1	16 (10.88)
L. Intestines	2	0	0	0	2 (1.36)
<b>M. Blood vessels</b>	<b>26</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>30 (20.41)</b>
O. Generation	0	2	0	1	3 (2.05)
Vertebral Column	5	0	0	1	6 (4.08)
<b>Total</b>	<b>97(66.00)</b>	<b>26 (17.68)</b>	<b>11(7.48)</b>	<b>13 (8.84)</b>	<b>147(100)</b>

## Original research paper

# Incidence of Snake Bites in Belgaum

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### Abstract

Belgaum is surrounded by rivers and ever-green dense forests and is home for many wild creatures. People here usually come in contact with these wild creatures, specially snakes. Hence a prospective study was undertaken to find out incidence of snake bites which were admitted to District Hospital, Belgaum over a period of one year from September 2000 to August 2001. District Hospital, Belgaum is a referral hospital which caters to the needs of public within a radius of 100 km.

Out of 290 poisoning cases, 40 were snake bites. Among them 25 cases were poisonous snakebites. The maximum number of patients were in the age group of 21 to 40 years and least were above 40 years. Males predominated, females in the ratio 3: 2. The bites were most commonly found on the lower limbs. Maximum snake bite cases were observed in monsoon. Maximum victims were agricultural workers who work in out-fields. The maximum victims belonged to rural areas.

**Key Words:** Snake bite, Agricultural Workers, Rural Areas, Mansoon

### Introduction:

Snakes are long, thin reptiles which do not have legs and slither along the ground. There are about 2400 species of snakes in the world. They live almost everywhere, in deserts, forests, oceans, streams and lakes. They cannot survive in places where the ground stays frozen all the year round like the polar regions or at high mountain elevations. Snakes serve an important role as a predator in the ecosystem and snakes existing is a sign of healthy ecosystem. They help in maintaining population of rodents which are a curse for a farmer's yield.

Indian sub-continent boasts of housing approximately 10 percent of the total snake species found in the world. One can find snakes in almost all the habitats in India. In India, there are 216 species of snakes, of which only four are venomous snakes namely, the cobra, krait, Russell's viper and saw-scaled viper. Snake-bites are the common cause of morbidity and mortality in tropical countries.

It is a serious problem in many parts of the world, especially in South Asian countries. Snake-bites are the common cause of morbidity and mortality in tropical countries.

It is a serious problem in many parts of the world, especially in South Asian countries. In India only, almost 2,00,000 persons fall prey to snake bites per year and 35,000 to 50,000 of them die. West Bengal, Maharashtra, Uttar Pradesh, Tamil Nadu and Kerala record the largest number of snake bites in India.

Belgaum is situated in the foothills of the Western Ghats and is surrounded by rivers, hills and dense evergreen forests. People are mostly into agricultural occupation and coming in contact with snakes is a natural scenario. There has been an incredible increase in snake bite poisoning.

### Material and Methods:

All snake bite cases admitted at District Hospital, Belgaum from September 2000 to August 2001 form the material for the study. Out of 290 poisoning cases, 40 were snake bites. The data was obtained from hospital case records and also by direct interrogation from relatives, friends and others accompanying the deceased. A proforma was evolved to get uniform information from all the above mentioned sources.

The presence of two definite puncture wounds with progressive swelling, tenderness with persistent bleeding was taken as a poisonous bite. Inverted 'U' shaped or multiple teeth marks, non-progressive swelling with minimal bleeding was taken as a non-poisonous snake bite. Haematotoxic and neurotoxic signs and symptoms were also considered for differentiating poisonous and non-poisonous snake bites.

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### Observation and Results:

- Out of 290 poisoning cases, 40 were snake bites which constitutes 13.79 %
- Non-poisonous snake bites constitute 37.5 % and poisonous snake bites 62.5 %
- Maximum number of patients were in the age group of 21 to 40 years
- Males predominated females in the ratio 3: 2
- The bites were most commonly found on the lower limbs
- Maximum snake bite cases were observed in monsoon 62.5 %
- Maximum victims were agricultural workers who work in out-fields
- The maximum victims belonged to rural areas

**Table No. I**  
**Incidence of Snake Bites**

Snake Bite	No. Of cases	Percentage
Non-poisonous	15	37.5
Poisonous	25	62.5

**Table No. II**  
**Incidence of Age & Sex**

Age (years)	Male	Female	Total (%)
0 – 20	6	4	10 (25)
21 – 40	17	11	28(70)
41 – 60	0	1	1(2.5)
> 60	1	0	1(2.5)

**Table No. III**  
**Site of Bite**

Site	No. Of cases	Percentage
Upper limbs	7	17.5
Lower limbs	30	75
Others	3	7.5

**Table No. IV**  
**Season-Wise Incidence**

Season	No. of cases	Percentage
Summer (Feb. to May)	5	12.5
Monsoon (June to Sept.)	25	62.5
Winter (Oct. to Jan.)	10	25

**Table No. V**  
**Occupational Incidence**

Occupation	No. of cases	Percentage
Agricultural workers	31	77.5
Others	9	22.5

**Table No. VI**  
**Locality-Wise Incidence**

Locality	No. of cases	Percentage
Rural	29	72.5
Urban	11	27.5

### Discussion:

Snake bites can be deadly if not treated quickly. It is considered as a serious health hazard in many countries around the world, specially tropical and sub tropical countries where there is limited access to health care and antivenoms.

According to Ganneru Brunda and R.B.Shashidhar [1], majority of snake bite victims were in the age group of 21 to 50 years. Males predominated, females in the ratio 3: 1. The study is consistent with the present study.

As per study by D.P.Punde [2], majority people affected by snake bites were farmers and maximum were bitten by poisonous snakes during monsoons which is consistent with the present study.

Hansdak SG, Lallar KS, Pokharel P, Shyangwa P, Karki P, Koirala S [3] in their study showed that snake bites were 2.5 % more in males than in females and the body area maximum exposed for snake bites was the lower limbs and maximum incidence occurred during monsoons which is consistent with the present study, but the age group affected maximum by snake bites was 11-20 years which is contrast to the present study where maximum affected were in the age of 21-40 years.

The present study shows that maximum cases of snake bites were from rural areas and males predominated females which is consistent with the study of Hayat AS, Khan AH, Shaikh TZ, Ghouri RA, Shaikh N [4].

According to the study done by Sanjib K. Sharma, Francois Chappuis, Nilhambar Jha, Patrick A. Bovier, Louis Loutan and Shekhar Koirala [5], majority of the victims were males, maximum into agricultural occupation residing in rural areas and these incidences occurred most during the monsoons which is consistent with the present study.

As per the study by Albuquerque H.N., Fernandes A., Albuquerque I. C. S. [6], males were affected in majority, maximum victims were of age between 30 -39 years, lower limbs was the maximum affected area, victims belonged maximum to rural areas and snake bite cases were seen mainly during the rains which is consistent with the present study.

According to Pandey Deb Prasad [7], males were the maximum victims, bite marks were seen mainly on the lower extremities and the victims were mostly into agricultural occupation which is consistent with the present study. But the age of victims maximum affected was 10-20, maximum were bitten by non-



poisonous snakes and during summer which is contrast to the current study.

As per the study done by Eric K. I. Omogbai, Zuleikha A. M. Nworgu, Michael A. Imhafidon, Anwakang A. Ikpeme, David O. Ojo and Charles N. Nwako [8], males were the maximum victims and the body area commonly bitten was the lower limbs which is consistent with the present study but the peak age range of victims who got affected were mostly the youth who were in their early twenties which is a contrast study.

Panna Lal, Srihari Dutta, S. B. Rotti, M. Danabalan, Akshay Kumar [9], in their study pointed that the maximum affected victims were male, majority were agricultural workers and the season was monsoon which is consistent to the present study.

According to Nuchhi Udaykumar C, ShahRajan K, Reddy K. S. Narayan [10], males were affected the most, common age group was 20-29 years, the body site most bitten was the lower limbs, maximum number of bites were caused by poisonous snakes, maximum victims were agricultural labourers and maximum belonged to rural areas. This study is consistent with the present study.

### Conclusion:

The above study clearly showed that snake bites were more common in rural areas and among people who were engaged in agricultural works. Most common occurrences were during the monsoons. The lower limbs were affected the most and majority victims were males mostly bitten by poisonous snakes.

Avoiding snake bites specially during the peak season when agricultural works are in its full swing is a very tedious job. But some care can be taken like keeping the surrounding of the house premises clean, avoiding children play in between woods or leafy areas, avoid walking in areas of tall grass, do not disturb snakes intentionally, etc.

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## Original Research Paper

# Decay in Intact DNA Recovery in Blood Samples kept at Room Temperature

\*Sabri Imran, \*\*Usmani J.A., \*\*\*Hanif S.A., \*\*\*\*Khan A.U.

### Abstract

Blood Samples were kept at room temperature for a period of 3-6 months at room temperature to know the amount of quantitative DeoxyriboNucleic Acid [DNA] recovery from these samples. We are able to recover good amount of DNA for about first 3-6 weeks after which the DNA is decreased drastically and after two months there hardly any chance of intact DNA recovery from these samples. It has been concluded that blood samples recovered from scene of crime after about 1-2 months is a waste. The samples must be recovered as early as possible to recover intact DNA from them. The samples must be collected within 1-2 months from scene of crime until and unless the climate is cold enough to increases decay time. This study is very useful for the investigating authorities which can make errors while collecting blood samples for DNA analysis.

**Key Words**-Blood Sample, DNA, Scene of Crime

### Introduction:

Blood is the most important and most common Forensic Sample recovered from the scene of crime however the time of recovery may differ from fresh blood to many months. Most of the time blood was sent to the Forensic Laboratory for DNA isolation and the investigation agencies thought that it is a minor work to do, which is not so. Our study is based on the fact that the DNA yield decreases with time [1] but what is that time period after which we are unable to isolate the intact DNA from these samples.

Although there is no hard and fast rule that this is the time after which we are unable to recover intact DNA from the samples but our study just show chances of recovery. In the first phase of our study we took only one type of sample [liquid blood] so as to avoid any confusion. In normal conditions blood is found in various states like dried blood, clotted blood, liquid blood etc.

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But only liquid blood is taken so as to guide the investigating agencies about the chances of recovery of intact DNA from blood samples. A total of sixteen samples were taken to study.

### Material and Methods:

The Blood samples were obtained from blood bank of J.N. Medical College Hospital where they were stored at 4°C Centigrade Positive [3]. Zero Time was the time when the first recovery was done which was same or different from time of Sample collection from the subject or scene of crime. Before this time the time was be calculated as negative value i.e.: minus one hour or minus one day etc. 2.5 ml of blood was taken to isolate the DNA. After storage, it was processed for DNA analysis using phenol extraction method [2]. The optical density of isolated DNA was done by spectrophotometer.

**Volume of Blood Taken: 2.5 ml**

**Conc. of DNA (µg/ml) = OD260 X 50µg/ml X Dilution Factor X Total Vol. in ml**

Formula: OD260 x conversion factor = µg/ml of nucleic acid

OD260 Unit = 50µg/ml for dsDNA

Conc. = Concentration    OD = Optical Density  
Nm = Nano-Meter        50 = constant

Dilution Factor (Note: This is a ratio hence do not have unit) = Amount of water or buffer used for dilution / Amount of Sample (Isolated DNA dissolved in TE Buffer ).

### Observations and Discussion:

The yield of DNA decreases with time as lysis of DNA occurs in the samples as a result of enzymatic action so the amount of recovery is expected to be decreased with time. The question

arises is that what is the time [in Indian environment] after which we are unable to recover DNA from these samples. After a period of 12 weeks there is fewer chances to recover DNA from blood samples kept at room temperature. The curve becomes parallel showing some amount of recovery even after 12 weeks

**Summery and conclusion:**

The recovery of DNA in blood kept at room temperature decreases with time. After one month there is less chance of recovery of intact DNA from these samples. The study shows marked decrease in Recovery of intact DeoxyriboNucleic Acid [DNA] after a period of 1-2 months so we can conclude here is that there are hardly any chances of intact DNA recovery after a period of 2 months in samples found at room temperature by phenol-chloroform method [2] However there are protocols available to recover DNA from blood even after 3-4 months which are not included in our study. In the light of above study it has been concluded that blood samples recovered from scene of crime after about 1-2 months is a

waste. The samples must be recovered as early as possible to recover intact DNA from them. The samples must be collected within 1-2 months from scene of crime until and unless the climate is cold enough to increases decay time.

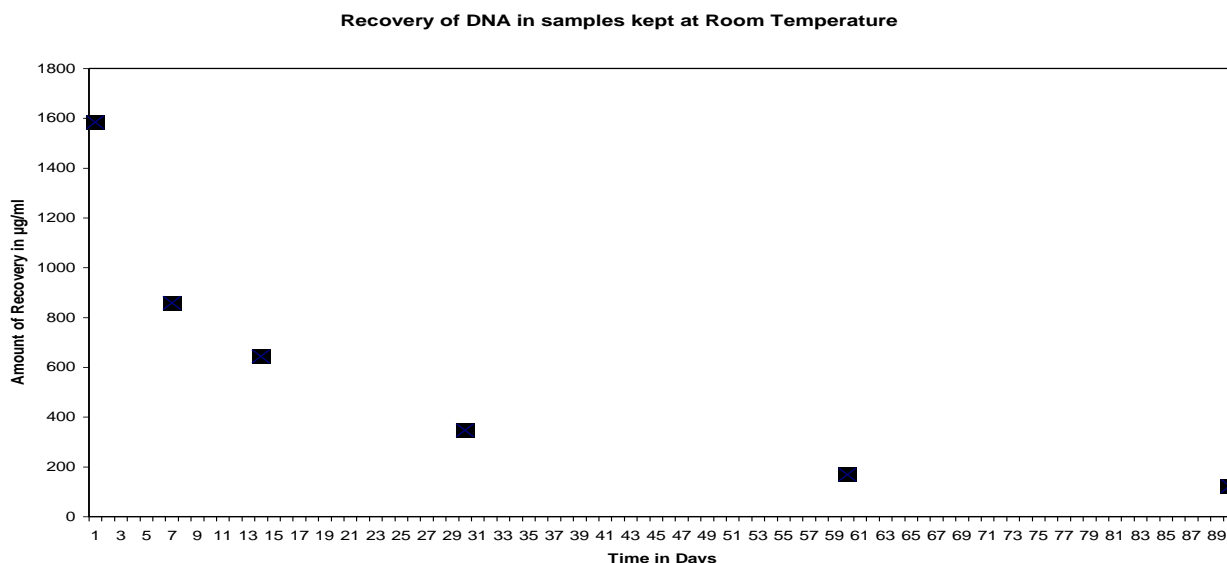
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**Table-I**  
**Showing yield of DeoxyriboNucleic Acid [DNA] blood samples at Room temperature over a period of twelve weeks time**

Sr. No.	Time	Mean DNA Yield in µg/ml [Mean ± S.D.]	Percent Decrease in DNA Yield
1	Zero	1027.35±361	
2	One Week	686 ± 309	33
3	Two Weeks	608 ± 158	41
4	Four Weeks	385 ± 151.5	62.5
5	8-10Weeks	378 ±147.75	63.2
6	11-12Weeks	299 ± 59.58	71

**Figure I**  
**DeoxyriboNucleic Acid [DNA] recovery at Room Temperature for different incubation period to see effect of Ageing on the intact DNA recovery**



## Original research paper

# Pattern of Fatal Blunt Head Injury: A Two Year Retrospective / Prospective Medico Legal Autopsy Study

\*Amit M Patil, \*\*Walter F Vaz

### Abstract:

The current study was conducted from 1 November 2002 to 31 October 2004 at Topiwala National Medical College & BYL Nair Charitable Hospital, Mumbai. A total of 189 victims of fatal blunt head injury were recorded and a complete medicolegal autopsy was conducted on each of these victims during this period. The postmortem study revealed that males were the most common victims with the highest number being in the age group of the third and fourth decades. Accidents were responsible for most of them, followed by homicidal deaths, with suicides recorded as the least. Of the accidents, railway accidents were responsible for the maximum number. The study revealed that the highest number of fatalities occurred during the peak hours of the day. The fissured fracture was the most common type of fracture observed. Among the specialized fractures of the base of the skull, type-1 hinge fracture was the most common. A combination of subdural and subarachnoid haemorrhages was the most common observation. Blunt cranio-cerebral injury was the primary cause of death in more than half of the victims.

**Key Words:** Head Injury, Fractures, Skull, Intracranial Haemorrhages

### Introduction:

Cranio-cerebral damage (commonly known as head injury) has been recognized since ages. [1] Brain damage as a result of head injury constitutes a major problem worldwide, and head injury is the most common emergency encountered in trauma units and casualty departments. Multiple trauma in which head injury plays an important role is also the leading cause of death in any given population, especially in people less than 45 years of age. [2]

Of all the regional injuries, it is cranio-cerebral injuries which are most important in forensic practice, as the incidence and severity of head injuries are increasing with burgeoning industrialization and more rapid methods of transportation. In the developed Western countries, head injuries are becoming the most common cause of death from trauma.

Head injuries are rapidly becoming a social problem too, because they frequently lead to loss of intellectual and other faculties, placing a great burden on both the family of the deceased and on society. Additionally, cranio-cerebral injury is a source of major disability and psychological burden, especially in the younger and reproductive age group.

Thus head injury forms an important aspect of both clinical and forensic work. From a medicolegal point of view, it is essential to determine whether death occurred due to head injury or its complications, and whether any resultant intracranial lesions were due to natural or unnatural causes.

The main purpose of conducting the present study was to collect data on patterns of head injury due to blunt trauma and to catalogue the circumstances under which they were sustained. It was also considered necessary to determine whether factors such as age, sex, time of incidence etc play any role in contributing or predisposing to such fatal cranio-cerebral injuries.

### Materials and Methods:

The study was conducted at the postmortem centre of Topiwala National Medical College and BYL Nair Ch Hospital, Mumbai from 01 November 2002 to 31 October 2004. The subjects for the study were all cases of head injury due to blunt trauma whether admitted to the hospital or not, brought for medicolegal autopsy during this period. Information was gathered from the relatives of the deceased or accompanying persons, police personnel, police inquest, hospital records and postmortem findings. History of the incidents was studied in detail and a

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complete meticulous medicolegal autopsy was conducted on each of these victims. When indicated, histopathological examination of stained sections of organs/tissues and chemical analysis of routine viscera and blood preserved at medicolegal autopsy were done and the results were analysed.

### Observations:

#### 1. Age and sex distribution:

The ages of the victims ranged from 2 1/2 months to 85 years, with an overall mean of 36.98 years. The mean age of male victims was 37.08 years, with a major peak in the 3<sup>rd</sup> decade and a slightly lesser peak in the 4<sup>th</sup> decade. The same feature was observed when victims of both sexes were taken into account. However, if females were considered individually (2 1/2 months to 80 years), their mean age was 29.37 years, with the major peak at 0+ to 10 years. Males outnumbered females (88.35% vs 11.15%, a ratio of 7.6 to 1).

#### 2. Age distribution of victims of road traffic accidents, vehicular accidents, railway accidents and in falls:

Pedestrians and riders of two wheelers in the age group of 30+ to 40 years were most commonly the victims of road traffic & motor vehicular accidents, followed by passengers aged 20+ to 30 years. The least incidence of blunt head injury was among drivers of motor vehicles. In railway accidents, a high incidence was observed in victims of third decade of life. In victims of falls, most were due to precipitation from a height, especially in the 3<sup>rd</sup> and 4<sup>th</sup> decades of life.

#### 3. Circumstances under which head injury was sustained:

Accidents constituted the most common circumstance under which head injury was sustained (91.5%), followed by other circumstances (5.3%) and homicides (2.1%). Suicidal blunt head injuries were the least common (1.1%).

#### 4. Time at which injury was sustained:

The maximum number of fatal head injuries due to blunt trauma were sustained between 0600 am and 1200 noon (29.6%) (the peak hours on the outward journey of a working day), and between 0600 pm and 1200 midnight (28.6%) (the peak hours of the return journey).

#### 5. Distribution of fractures of the skull according to location and type:

Fractures of the skull had occurred in 87.30% of the cases studied with combination of fractures (both cranial vault and base) more common than individual fractures. In the cranial

vault fracture, fissured fracture was the most common type (59.2%) followed by combination of fractures (31.2%). Among the specialized fracture of the base of skull, type 1 hinge fracture was the most common (78.8%), followed by type 2 (15.20%) and type 3 (6.00%).

#### 6. Primary and secondary intracranial lesions:

Primary intracranial lesions are those intracranial haemorrhages, cerebral contusions, lacerations and deep brain haemorrhages caused by direct primary impact. Isolated intracranial haemorrhages were present in 30.68% of the cases, while in combination, they were found in 83.6%, with the most common type being a combination of subdural haemorrhage (SDH) & subarachnoid haemorrhage (SAH) (59.8%). Cerebral contusions were found in 62.96% of cases, deep brain haemorrhages in 40.21% and lacerations in 26.45%

Secondary intracranial lesions (those caused by vascular compression due to general brain swelling or due to pressure by space occupying lesions, especially supratentorial or infection, that develop after primary impact) were found to contribute significantly to mortality in blunt cranio-cerebral trauma, being observed in 44.44% of cases. Cerebral infarction was found in 41.7%, raised intracranial tension in 40.5%, secondary intracranial haemorrhages in 9.5% and pyogenic meningitis in 8.3%. Chronic SDH as a secondary intracranial haemorrhage was seen in only 1.2%, while SAH was noted in 8.3%.

#### 7. Extradural haemorrhage (EDH):

Its distribution, location according to age, association with fractures and cerebral injury:

EDH was noted in 16.40% of the total cases. It was present alone only in 6.45% of the cases; in most, it was present in combination with others in 93.55%. Isolated EDH was unilateral in all instances. Fractures were found in all cases of EDH, whether alone or in combination. EDH was associated with cerebral injury in 70.96% of the cases.

#### 8. Subdural haemorrhage (SDH):

Its distribution, location according to age, association with fractures and cerebral injury:

SDH was noted in 66.13% of cases. It was present alone only in 6.4%, in most, it was found in combination with others (93.6%). Isolated SDH was unilateral in all instances. Fractures were associated with SDH in 85.6%, whether this haemorrhage had occurred alone or in

combination with others. SDH was associated with cerebral injury in 65.6% of the cases.

### **9. Subarachnoid haemorrhage (SAH):**

Its distribution, location according to age, association with fractures and cerebral injury:

This lesion was noted in 88.355 of the total cases. It was present alone in only 28.75% of the cases; in most, it was present in combination with others (71.25%). Isolated SAH was bilateral in all instances. Whether alone, or in combination, it was associated with fractures in 86.20%, and with cerebral injury in 69.46% of the cases.

### **10. Management of hospitalized cases and overall period of survival:**

Of the total cases, 67.27% were admitted in the hospital after sustaining injury and were managed either surgically (49.22%) or conservatively (50.78%). On analysis of period of survival, it is evident that 16.90% of the victims died on the spot. Of the remainder, 23.76% died within 24 hours of sustaining injury, 6.34 within 1-3 days, and 47.70% within 3-15 days. Only 5.3% survived for more than 15 days. None of the victims who were operated upon died within the first 24 hours after sustaining injury, and that more of them survived longer (49.22%) than those who were conservatively managed (32.81%).

### **11. Cause of death:**

Head injury was the sole cause of death in 51.35% of the cases. Pneumonia which developed subsequent to head injury was a contributory cause of death in 38.7%. Head injury associated with shock and haemorrhage in 4.20%. Pyogenic meningitis as a post traumatic complication was the cause of death in 3.7% while sepsis following head injury had caused death in only 2.1%.

### **Discussion:**

The observations and results of the present study were compared and contrasted with the work of preceding researchers.

Among the cases studied; males outnumbered females (88.35% vs 11.15% a ratio of 7.6 to 1). The age range of male victims were 8 –9 months to 85 years, with a mean of 37.08 years, while in females, the range was 21/2 months to 80 years, with a mean of 29.37 years. Male preponderance was observed in all age groups; a finding that has been reported in previous work conducted by various researchers [3, 4, 5, 8, 14, 15], and is attributed to the fact that males are more exposed to the outer world than females.

In the present study the highest number of victims who suffered blunt head injury were in the third and fourth decades of age. This observation was similar to the observation of researchers. [3, 7, 8] The high mortality observed in this age group may be because of 1) this being the most active period of life, persons in this age group are the most frequent users of roads, vehicles, the suburban railway and other modes of transportation and 2) they are more involved in outdoor activities. The low incidence observed at extremes of age can be attributed to the fact that both children and old people are confined to their homes; and hence the risk of exposure to the outer hazardous environment is low.

The highest number of blunt head injuries was accidental in nature (91.5%). In 5.3 % the circumstances was either not known or occurred under other circumstances. Homicidal head injury due to blunt trauma was next; suicidal head injury was recorded in the least number of cases (2 cases).

Of the accidents, railway accidents were responsible for the maximum number of fatal blunt head injuries (40.2%) (because the primary mode of transportation in the city of Mumbai is the suburban local train), followed by motor vehicle and road traffic accidents (27.5%) and falls (24.9%). Most of the fatalities among railway travelers (67.1%) occurred because they were knocked down by running trains while crossing the railway track illegally.

Pedestrian involvement (57.7%) was characteristic of motor vehicle and road traffic accidents. In the city of Mumbai, this is because 1) pedestrians are the frequent road users, 2) footpaths meant for their use are occupied by hawkers to such an extent that pedestrians are forced onto the roads, 3) traffic rules re: zebra crossings and waiting for green lights are ignored, and 4) drivers of vehicles flout signal and lane discipline, and exceed prescribed speed limits. Motorcyclists/riders of scooters accounted for 26.9% of victims, passengers of motor vehicle for 7.7%, those who fell from running buses for 5.8% and drivers of motor vehicles for 1.9%. These findings correlate with the works of other researchers. [3, 4, 5, 8, 10, 11, 12]

Falls causing fatal blunt head injury (whether accidental or suicidal) had occurred in 24.9% of cases. Falls from heights were responsible in 48.9%, slipping in bathrooms in 31.9% and from staircase or ladders in 19.2%. The reason for this might be the proliferation of highrise buildings in this city to accommodate a burgeoning population. The observations tallied more or less with those of other authors. [3, 8, 11, 14]

Regarding the time at which head injury was sustained, this study revealed that the highest number of fatalities (29.6%) occurred during the peak hours

of the day (0600 hrs to 1200 hrs) when most of the victims were on their way to work or involved in some outdoor activities, followed by a minimally lesser peak 28.6% between 1800 hrs to 2400 hrs, a time when people are returning home. Our observations closely match those of another researcher. [6]

Skull fractures were noted in 87.3% of cases. Fractures involving both the base and the vault were seen in 58.2%, while isolated fractures of the base and the vault were observed in 25.4% & 16.4% respectively. These observations were concordant with those of other researchers. [4, 8, 9, 10] The fissured fracture was the most common type of fracture observed (59.2%), followed by combinations of fractures (31.2%), depressed fractures (7.2%) and sutural fractures (2.4%). The above observations were consistent with the work of other authors. [7, 13, 15] Among the specialized fracture of the base of the skull, the type 1 hinge fracture was the most common (78.8%) followed by type 2 (15.20%) and type (36.0%). Unfortunately, no specific work on this aspect of cranial injuries was available for comparison, except that of Dimairo. [6]

Of the primary intracranial lesions, isolated intracranial haemorrhages were seen in 30.68%. Of these, SAH was the commonest (25.4%), SDH (4.23%) & EDH (1.05%). Combinations of intracranial haemorrhages were observed in 83.6%, the commonest being SAH & SDH (59.6%). Cerebral contusion was noted in 62.96% and laceration in 26.45%. Deep brain haemorrhages in the basal ganglia, pons and midbrain accounted for 40.25. The above observations were in accordance with the studies of other researchers. [6, 7, 8]

EDH was seen in 16.4%. Isolated EDHs were noted in 6.45% all were unilateral and in combination with other intracranial haemorrhages was observed in 93.55%. Fractures of the skull were noted in all cases, an observation also made by other authors

SDH was found in 66.13% of the total number of cases. It had occurred alone in 6.4%; all were unilaterally located. In combination with other ICHs, it was observed in 93.6%. SAH was the commonest intracranial haemorrhages observed 88.35%, seen alone in 28.75% and all bilaterally situated. SAH in combination with other ICHs was found in 71.25%. These findings compared well with those of others. [7, 8]

SAH was the commonest intracranial haemorrhage observed 88.35%, seen alone in 28.75% and all bilaterally situated. SAH in combination with other ICHs was found in 71.25%.

Secondary intracranial lesions were found in 44.44% of the total cases. Cerebral infarction

accounted for the highest percentage of these 41.70%.

The overall period of survival ranges from 0 (16.90%) to 35 days. In the first extreme, deaths had occurred on the spot, or on the way to the hospital, or in peripheral health care facilities and some of the victims were brought dead. Of the remaining 83.1% had survived for 0-6 hrs, 8.64% for 6+ - 24 hrs, 6.34% for 1+ - 3 days, 24.90% for 3+ - 7 days and 22.80% for 7+ 15 days. Only 5.3% of the cases lived for longer than 15 days after sustaining injury.

Of the total, 67.27% of cases were hospitalized and managed either surgically (with decompression procedures, trephination or craniotomies) (49.22%) or conservatively (50.78%). The observations that 17.98% of conservatively managed victims died within 24 hours, while none of the patients managed surgically died within 24 hours of operation, and that the survival period of the latter group were longer in all instances, bear out the conclusions of Tyagi et al. [8]

With regard to the cause of death, blunt traumatic craniocerebral injury was the primary cause of death in slightly more than the half of the victims (51.30%). If deaths due to the complication of head injury are included, the percentage increases to 57.14%. Both figures differ significantly from the results of Tyagi et al [8]; it was not possible to identify the reason for this.

### Summary and Conclusion:

The current study was conducted and the data generated were compared with the work done by previous researchers. The observations of the present tallied in almost all respects with the studies conducted by previous researchers, which recognized motor vehicle and road traffic accidents as the predominant cause of fatal head injury due to blunt trauma. But since this study was conducted in the city of Mumbai (where suburban local trains are the primary means of transportation), it was observed that railway accidents were responsible for the maximum number of fatalities. Blunt craniocerebral trauma was the predominant cause of death identified in this study. This study also revealed pneumonia as the commonest cause of death contributing to head injury, which has not been reported in any of the previous studies. The possible explanation for the high occurrence of this complication may be the continuous recumbent posture in these (unconscious, comatose & bedridden) victims, which helps in the development of this hypostatic condition. Another, but less likely, explanation of this condition might be the use of ventilators as supportive respiratory measures. From the present study we feel that a separate study should be conducted in near future in order to identify the cause and relationship ( if any)

between head injury and the development of pneumonia.

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**Table 1**  
**Age and sex distribution**

Sex	Age (years)								Total
	0+ - 10	10+ - 20	20+ -30	30+ - 40	40+ - 50	50+ - 60	60+ - 70	> 70	
Male	6	16	42	40	29	20	10	4	167
Female	6	4	3	2	2	3	1	1	22
Total	12	20	45	42	31	23	11	5	189
Percentage	6.30	10.6	23.80	22.30	16.40	12.20	5.80	2.60	100.00

**Table 2**  
**Age distribution of victims of road traffic and vehicular accidents**

Age group in years	0+ - 10	10+ - 20	20+ - 30	30+ - 40	40+ - 50	50+ - 60	60+ - 70	> 70	Total (% age)
Pedestrians	3	2	4	9	4	3	5	0	30 (57.70)
Motor cyclist/ scooterist	--	2	3	4	4	--	1	--	14 (26.90)
Passenger	1	1	--	1	--	1	--	--	04 (7.70)
Driver of car/bus	--	--	--	--	1	--	--	--	01 (1.90)
Fall from running bus	--	--	3	--	--	--	--	--	03 (5.80)
Total	4	5	10	14	9	4	6	0	52 (100.00)

**Table 3**  
**Age distribution of victims in railway accidents**

Age groups in years	0-10	10+- 20	20+ -30	30+ -40	40+ -50	50+ -60	60+ -70	> 70	Total (%age)
Knocked down by train	1	4	20	8	9	7	1	1	51 (67.10)
Fall from running train	--	6	13	1	2	--	2	--	24 (31.6)
Hit by pole	--	--	--	1	--	--	--	--	01 (1.3)
Total	1	10	33	10	11	7	3	1	76 (100.00)

**Table 4**  
**Age distribution of victims in falls**

Age groups in years	0-10	10+- 20	20+ -30	30+ -40	40+ -50	50+ -60	60+ -70	> 70	Total (age)
Fall from height	2	2	4	8	4	3	0	--	23 (48.90)
Fall in bathroom	1	--	1	--	4	5	1	3	15 (31.90)
Fall from staircase/ ladder	1	--	1	2	2	1	1	1	9 (19.20)
Total	4	2	6	10	10	9	2	4	47 (100.00)



**Table 5**  
**Circumstance under which head injury was sustained**

Circumstances	Male	Female	Total (%age)
	No (%)	No (%)	
Accidental	151 (90.4)	22 (1.1)	173 (91.5)
Homicidal	04 (2.4)	0 (0)	04 (2.1)
Suicidal	02 (1.2)	0 (0)	02 (1.1)
Others*	10 (6)	0 (0)	10 (5.3)
Total	167 (100)	22 (0)	189 (100.00)

**\*Others – Fall of object on head/no definitive history available**

**Table 6**  
**Cause of death**

Cause of death	No of cases (%age)
1. Head injury alone	97 (51.3)
2. Head injury with pneumonia	73 (38.7)
3. Pyogenic meningitis as a complication of head injury	7 (3.7)
4. Head injury + Shock and Haemorrhage	8 (4.2)
5. Sepsis following head injury	4 (2.10)
Total	189 (100)

## Original research paper

# Profile of Medicolegal Cases at Adesh Institute of Medical Sciences and Research, Bathinda, Punjab

\*Vishal Garg, \*\*Dr S.K. Verma

### Abstract:

Drawing public attention and awareness towards traumatic casualties is important to prevent unnatural deaths, this possibly could reduce incidence of such cases. A two years retrospective study from April 1, 2007 to March 31, 2009, to analyze causative agents, manner of cases and their outcome was carried out in the Department of Forensic Medicine, Adesh Institute of Medical Sciences and Research, Bathinda, a rural area of Punjab. This study was conducted to understand the magnitude and pattern of medico-legal cases in this region.

The study revealed that road traffic accidents (59.4%) constituted the majority of the medico-legal cases out of total 784, followed by poisoning and fall from height (12.1% and 9.4% respectively). Male preponderance was quite evident (5:1). People between the age group of 21 – 30 years (33.8%) were most prone to such casualties. The peak time of the incidences was during 1601 to 2000 hours (33.5%) and the maximum cases admitted in the month of September (11.7%).

**Key words:** Medico-Legal Case, Injury, Road Traffic Accidents, Fall from Height, Poisoning

### Introduction:

A medico-legal case is a case of injury or illness where the attending doctor, after eliciting history and examining the patient, thinks that some investigation by law enforcement agencies is essential to establish and fix responsibility for the case in accordance with the law of the land [1]. Injury is defined under section 44 IPC as “any harm whatever illegally caused to any person, in body, mind, reputation or property” [2].

In spite of recent advancement of technology in the field of medical sciences, death and deformities due to all causes, are yet to be controlled successfully; rather incidences of road traffic accidents has been increasing at an alarming rate throughout the world [3]. By the year 2020 it is estimated that in countries like India, mortality from injury will be more than those from communicable diseases. Despite this documentation, injuries are still not well recognized as major public health problem in this country [4].

The present study is an attempt to address this deficit in this zone by providing epidemiological profile of medico-legal cases.

Since accidental causes form major part of this study, more attention has been given to their evaluation and prevention.

### Method:

The study was retrospective analysis from Apr 1<sup>st</sup>, 2007 to Mar 31<sup>st</sup>, 2009 of all medico-legal cases admitted in the emergency department of AIMSRS, Bathinda. The institute is situated in the rural area of Punjab along the side of national highway (NH-64). Information regarding gender, age, demography, mode, time of occurrence, stay in hospital and patient outcome was confirmed from the hospital records, victim’s attendants and police. The collected data were analyzed, observations discussed and compared with other studies.

### Objectives:

1. To analyze causative agents, manner of cases and their outcome.
2. To draw public attention and awareness towards traumatic casualties.
3. To suggest preventive measures, this possibly could reduce incidence of these cases.

### Observations and Results:

**Table 1 – Gender Wise Distribution**

	2007-08	2008-09	Total	%age
Male	349	303	652	83.2
Female	80	52	132	16.8

**Total 429 355 784 100**

Table-1 shows percentage of male victims (83.2%) was more than the females (16.8%), in the ratio of 5:1

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**Table 2 – Age Wise Distribution**

Age (Years)	2007-08	2008-09	Total	%age
0-10	26	19	45	05.7
11-20	68	63	131	16.7
<b>21-30</b>	<b>154</b>	<b>111</b>	<b>265</b>	<b>33.8</b>
31-40	61	67	128	16.3
41-50	58	51	109	13.9
51-60	28	24	52	06.6
>60	34	20	54	06.9
<b>Total</b>	<b>429</b>	<b>355</b>	<b>784</b>	<b>100.0</b>

Table-2 shows that victims of age group 21-30 years form the majority of cases (33.8%) followed by 11-20 years and 31-40 years 16.7% and 16.3% respectively.

**Table 3 – Rural/Urban Wise Distribution**

	2007 - 08	2008-09	Total	%age
Rural	271	216	487	62.1
Urban	158	139	297	37.9
<b>Total</b>	<b>429</b>	<b>355</b>	<b>784</b>	<b>100.0</b>

Table-3 shows that rural victims (62.1%) are more than the urban which comprised 37.9% of the total cases.

**Fig 1 – Mode of Injury (%Age)**

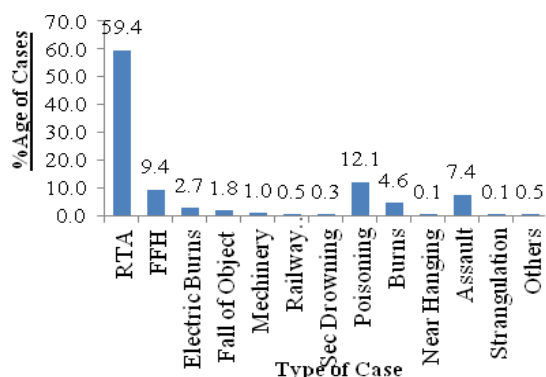


Fig-1 shows the distribution of cases according to their mode of injuries. Road traffic accidents form the major part of the study (59.4%) followed by poisoning (12.1%) and fall from height (9.4%).

Others (0.5%) include one case of accidental firearm injury and three cases of pedestrians hit by animals.

**Fig 2 – Manner of Cases**

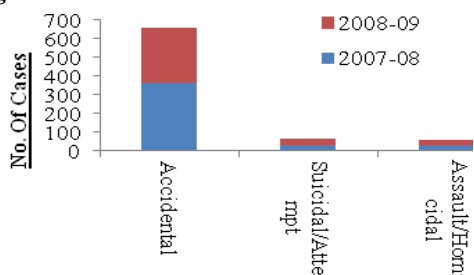


Fig 2 shows the maximum incidence of accidental injuries (84.3%).

**Fig 3 – Month Wise Distribution**

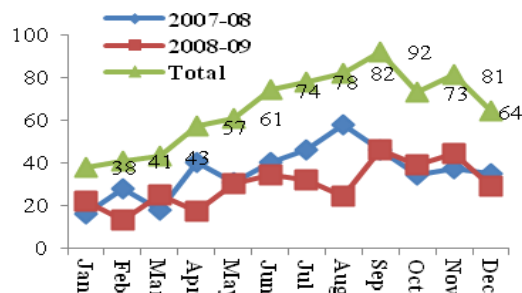


Fig-3 shows that maximum cases admitted were in the month of September (11.7%) followed by months of August (10.5%) and November (10.3%).

**Fig 4 – Time of Injury Sustained**

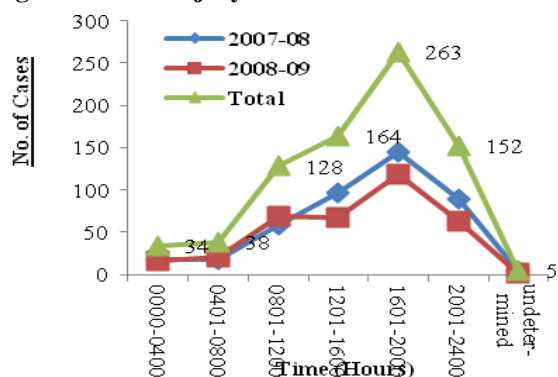


Fig-4 shows that majority of the injuries occur between 1601 to 2000 hours (33.5%) followed by 1201 to 1600 hours (20.9%) and 2001 to 2400 hours (19.4%) and in 0.6% cases the time of incidence could not be determined.

**Fig 5 – Stay in Hospital**

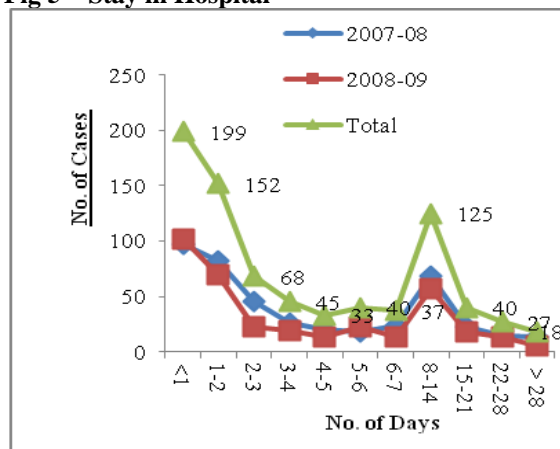


Fig-5 shows that maximum cases were discharged/referred/LAMA/died within 24 hours (25.4%) followed by 2<sup>nd</sup> day (19.4%) and during 2<sup>nd</sup> week.(15.9%).

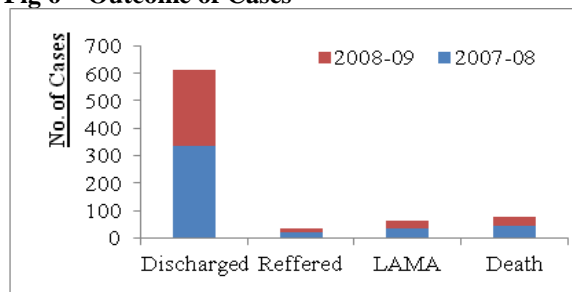
**Fig 6 – Outcome of Cases**

Fig-6 shows the distribution of cases according to their outcome. Majority of the cases 614 (78.3%) were discharged, 33 (4.2%) cases referred to higher center, 61 (7.8%) were LAMA and 76 (9.7%) died.

### Discussion:

In the present study 784 medico-legal cases were admitted in emergency department during the period of two years (Apr 1<sup>st</sup>, 2007 to Mar 31<sup>st</sup>, 2009). Road traffic accidents comprised of maximum number 466 (59.4%) followed by poisoning 95 (12.1%) and fall from height 74 (9.4%).

All accidental causes contributed maximum cases 661 (84.3%) in the study, suicidal/attempts and assaults/homicidal cases remained 65 (8.3%) and 58 (7.4%) respectively. There is overwhelming majority of the male victim 652(83.2%), consistent with other studies [5-10]. It is due to greater male exposure on roads, construction area and farms.

The most common age group affected was 21-30 years, included 265 (33.8%) cases and almost half of the victims were between 11-30 years, 396 (50.5%)cases. This is consistent with the studies available from India and other countries [5-7, 9-11]. This age group is the most active phase of life, physically and socially and hence outnumbers the other age groups. The majority of cases comprised of rural population 487 (62.1%) as compared to the urban 297 (37.9%).

Maximum cases 92 (11.7%) were admitted in the month of Sep and 252 (32.1%) cases during Jul to Sep (monsoons). The unusual high number of cases 81 (10.3%) in the month of Nov could be due to regional socio-economic factors. The majority of the incidences occur between 1601 to 2000 hours (33.5%) followed by 1201 to 1600 hours (20.9%) and 2001 to 2400 hours (19.4%).

Almost 1/4<sup>th</sup> cases 199(25.4%) were discharged/referred/LAMA/died within 24 hours, followed by 152(19.4%) cases on 2<sup>nd</sup> day and 126 (16%) cases during second week.

Majority of the cases 614 (78.3%) were discharged in a clinically satisfactory condition, 33 (4.2%) cases were referred to higher center, 61 (7.8%) left against medical advice and 76 (9.7%) died out of the injuries sustained and their complications.

### Conclusion:

The present study shows that causes of maximum injury cases are accidental in nature (84.3%). Road traffic accidents and poisoning cases continue to be a growing menace, incurring heavy loss of valuable man-power and human resources in the form of death and disability along with a corresponding drain of potential economic growth.

The basic principles of injury prevention are **education, engineering, uniform enforcement of law & order, pre-hospital care and the evaluation.** Proper education, training for safety standards and behavior modification are interlinked; and are required to be implemented in the community to prevent all kind of injuries including domestic violence. Further large number of prospective studies should be carried out that would assist various organizations to set various causative risk factors, circumstances, chain of events; and the preventive measures accordingly. In our opinion, the above considerations certainly are result oriented and will be extremely helpful to manage the health of all communities.

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## Original research paper

# Medical Ethics, Duties & Medical Negligence Awareness among the Practitioners in a Teaching Medical College, Hospital-A Survey

\*Dr. Shreemanta Kumar Dash

### Abstract

There is Growing public awareness regarding the ethical conduct of medical practitioners, and complaints against physicians appear to be escalating. The changing doctor-patient relationship and commercialization of modern medical practice has affected the practice of medicine.

This study aimed to assess the knowledge of, and attitudes to, medical ethics among doctors in the Kalinga Institute of Medical Sciences (KIMS), Bhubaneswar, Orissa. A self-administered structured questionnaire was distributed to all doctors; a total 120 numbers of practitioners of various clinical departments participated. 90% of the total participants were well aware about medico legal cases. All the participants advocated for an ethical practice but 12% of them practice as per the demand of the situation. 68% of the participants expressed that dichotomy should not be a part of medical practice. Only 52% of the respondents are aware of the MCI code of medical ethics 2002 and 57% knows the role of ethical committee in their institute. Majority, 88% of them expressed that 15 days duty in the department of Forensic Medicine should be mandatory during internship to handle the medico legal cases properly.

**Key Words:** Medical Ethics, Negligence, Medico Legal Cases

### Introduction:

Multiple factors - the increasing use of technology, paradigm shifts in patients' attitudes to doctors (and vice versa!), consumerism, litigation, and so on - have resulted in making the law an integral aspect of healthcare today. [1] Legal and ethical aspects of healthcare address some of these new issues. In medicine, professionalism connotes not only knowledge and skills, but also character, especially compassion and ethics. [2]

There is Growing public awareness regarding the ethical conduct of medical practitioners, and complaints against physicians appear to be escalating. The changing doctor-patient relationship and commercialization of modern medical practice has affected the practice of medicine. Patient suspects negligence as a cause of their suffering. There is an increasing trend of medical litigation by unsatisfied patients.

The recent increase in litigation against doctors is an issue of immediate concern. [3] The reasons for these are social, economic, professional and judicial. Social factors include increasing media awareness about medical facts and fallacies, professional accountability, and rights of patients in terms of information, decision-making and assessing outcomes. Negative publicity in the media about the profession has done further damage. Moreover, doctor-patient confrontations have been increasing in the recent past.

Doctors should familiarize themselves with the regulations and laws that concern their practice. Doctors have several ethical, moral and legal obligations in their duties. It is therefore very important that every doctor understands the nature of these obligations and then fulfills these obligations to the best of their ability. [4]

### Why this study?

Ignorance of law is no excuse for violating it. It is duty of everyone to know the law which concerns him or her. Nowadays practicing medicine is hazardous & risky. Mutual faith replaced with mutual suspicion. This study was taken up to assess the knowledge and practice of medical ethics and professionalism among doctors working in Kalinga Institute of Medical Sciences (KIMS), Bhubaneswar, Orissa.

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**Materials and Methods:**

A study was conducted at the Kalinga Institute of Medical Sciences Bhubaneswar in the month of January & February 2010. All the doctors of the clinical departments were approached and total 120 are included in the study. Those who were on leave, refused to participate and those who were not available on the third visit were excluded from the study. A structured, self administered questionnaire containing 19 items relating to awareness and attitudes to medical ethics was devised and pre-tested. An analysis was carried out for the questions by categorizing them into either the "yes" or the "no" and "can't say /don't know" answers. Permission to conduct the study was obtained from the institute authority. Oral informed consent was taken from each respondent. Confidentiality was maintained.

**Observation:**

In this survey total 120 numbers of practicing clinical faculties of various clinical departments of Kalinga Institute of Medical Sciences hospital are included. Answering the questions about the awareness regarding the medico legal cases 90% of the participants said that they are well aware about the medico legal cases and 82% of the total study group said that they are taking precautions while handling medico legal cases (Table No.-1). Responding to the questions about the medical ethics (Table No.-2) 100% of the participants favored an ethical practice but 12% of them are practicing as per the demand of the situation. 68% of the respondents strongly disagree with the dichotomy in medical practice, 52% of the participants have knowledge about the MCI's code of ethics 2002 and little more than that i.e. 57% are aware of the role of ethical committee in their institute, 54% of the participants have suggested that the code of medical ethics should be modified with the changing scenario of law in relation to medical practice.

When answering the questions relating to medical negligence and related affairs (Table No.-3) 82% of the participants are well aware to the facts that what makes a practitioner negligent in the view of the patients and 85% of them are taking proper precautions to prevent the litigations. Though 84% of the participants believe that proper consent and documentation can prevent a charge of negligence still 20% of them are either not taking or reluctant to take proper consent before any examination or procedure. About the rights of being a registered medical practitioner (Table No.-4) 43% of the total study group expressed their view that using "RED CROSS" emblem is the right of a doctor and 69% of them strongly agree that inclusion of medical practice under the purview of CPA has made it defensive medicine.

In spite of an increasing trend of litigations and compensation suites against the practitioners, only 35% of the total participants have insured themselves and 16% of them are ignorant about the self insurance in practice. Responding to other various aspects of medical practice (Table No.-5) 68% of the participants stated that they are not aware about the international format of Death Certification, 85% of them strongly opposed euthanasia in medical practice. 88% of the respondents expressed their positive desire that 15 days duty in the Department of Forensic Medicine should be made mandatory during internship to handle the medico legal cases properly in future professional life and all of them (100%) have shown their eagerness to attend the CME in relation to medico legal cases and medical ethics if conducted in regular intervals.

**Discussion:**

During the survey of 120 faculty members from clinical departments of KIMS it was observed that 10% of them are not sure of identifying the medico legal cases they come across and 18% don't care to take any precaution while dealing with MLC. Although every one in the survey are in favor of doing ethical practice 12% deviates at times. Taking commission although became a regular phenomenon in all other professions still it is considered as unethical on the part of a RMP as per the MCI guide lines. About half of the respondent doctors had "heard" and even "read" the Code of Ethics. This could be because the respondents consulted their colleagues or read the code between the time they received the questionnaire and the time that they returned the completed questionnaire. However, questions on specific sections of the Code of Ethics received fewer correct responses, indicating lack of in-depth knowledge about medical ethics. Though nearly 57% knew about an ethics committee in KIMS, very few knew about the role played by the committee. This could be because of the very limited role played by the ethics committee in the institute.

The committee looks after ethical issues of research only. As it is highlighted 18% are not aware of their activities which can prevent them from negligence and 7% knows very little. As such 15% are not able to take any precaution in preventing charge of negligence. 20% of them don't know that just taking a consent and proper documentation will be much more beneficial in preventing litigations. Even when more than half the respondents are unaware about questions on self insurance and whether doctors were covered under the Consumer Protection Act, their responses could not be considered satisfactory as such things should be known by all doctors.

**Conclusion:**

There was lack of proper and detailed knowledge on the MCI's Code of Ethics among doctors in KIMS, though a little more than half of them had read it once or partially. There is a need to sensitize them to the Code of Ethics and to medical ethics in general. A test on the code at the time of registration could be considered. [5] The medical ethics, acts related to medical practice should be emphasized in the MBBS under graduate so also in post graduate syllabus and examinations. There is always a continuum between practice and education because a medical career is one of life-long learning. Medical ethics teaching and training should help the doctors at any level whatever may be the discipline to assimilate and conceptualize the basic principles of ethical reasoning. [6] The application of ethics to medical practice dates back to ancient civilization as even today, all medical graduates must swear symbolic adherence to the Hippocratic Oath. Codes

of conduct and laws regulating the profession are laid down from time to time. [7] The periodical CME programme in medical ethics should be mandatory for all practitioners.

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**Table No.1**  
(N = 120)

Question	Yes	No	To some extent
Awareness about medico legal cases	108(90%)		12(10%)
Taking precautions during handling medico legal cases	98(82%)	22(18%)	

**Table No.2**

Question	Yes	No	As the situation demands/ Can't say
Are you in favor of an ethical practice	120 (100%)		
Are you practicing as per the ethics	105 (88%)		15 (12%)
Usefulness of dichotomy in medical practice	20 (16%)	80 (68%)	20 (16%)
Are you aware of MCI's Code of Ethics,2002	62 (52%)	38 (32%)	20 (16%)
Do you know the role of ethical committee in your institution	68 (57%)	32 (27%)	20 (16%)
Are you in favor of a modification in medical ethics	64 (54%)	36 (30%)	20 (16%)

**Table No.3**

Question	Yes	No	Sometimes / Don't know / Depending on the circumstance
Do you know what makes a practitioner negligent	98 (82%)	22 (18%)	
Are you taking precautions to prevent charge of negligence	102 (85%)	08 (07%)	10 (08%)
Are you taking proper consent before any examination or procedure	96 (80%)	10 (08%)	14 (12%)
Do you think consent and documentation can prevent a charge of negligence	100 (84%)	10 (08%)	10 (08%)

**Table No.4**

<b>Question</b>	<b>Yes</b>	<b>No</b>	<b>Don't Know</b>
Have you insured yourself	42 (35%)	58 (49%)	20 (16%)
"RED CROSS" emblem is the right of the doctors	52 (43%)	56 (47%)	12 (10%)
Inclusion of medical practice in CPA made the practice defensive	82 (69%)	20 (16%)	18 (15%)

**Table No.5**

<b>Question</b>	<b>Yes</b>	<b>No</b>	<b>Don't Know</b>
Are you aware of International format of Death Certificate	38 (32%)	82 (68%)	
Do you favor EUTHANASIA	12 (10%)	102 (85%)	06 (05%)
Do you feel 15 days forensic medicine duty during internship to be made mandatory to handle the MLC properly	105 (88%)	15 (12%)	
CME in relation to MLC and medical ethics in regular interval	120 (100%)		



## Original research paper

# A comparative study of clinical and autopsy findings (Clinical audit) in 100 cases died of trauma

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### Abstract

Clinical audit is the systematic analysis of quality of any aspect of patient care with the aim of identifying possible improvements. In the present study one aspect of clinical audit - a comparison of clinical findings and autopsy findings was done in 100 cases died of trauma and brought for autopsy to Medical College, Trivandrum. This Study was conducted to find out the frequency of discrepancy and the type of co-existing injuries along with the missed injury.

The discrepancies were classified according to the classification by Battle et al and Andersen et al. No discrepancy was observed in 62%, class I discrepancy (Major) in 25%, class II (Major) in 3%, and class III & IV (Minor) in 5% each. The injuries very rarely over looked were head injuries (11.4%) and spinal injuries (16.7%). The most frequent missed ones were abdominal injuries (64.3%) and chest injuries (63.9%). In majority of missed injuries head injury was a common occurrence i.e. 88.8% of missed abdominal injury, 78.1% of missed chest injuries, and all cases of missed spinal injuries.

**Key Words:** Clinical Audit, Clinical, Autopsy Findings, Discrepancy

### Introduction:

Clinical audit is the systemic analysis of quality of patient care [1] and involves systematically looking at the procedures used for diagnosis, care and treatment, examining how associated resources are used and investigating the effect of care on the outcome and quality of life of the patient. [2]

It identifies and promotes good practice and can lead to improvements in service delivery and outcome. It provides opportunities for training and education. Two phases of clinical audit are:

1. Medical accounting i.e. providing of adequate medical records as a basis for analysis
2. Actual analysis of the recorded data in the clinical records [3]

Autopsy findings can be compared with the clinical diagnoses and the certified cause of death. [1] Scheme for classification discrepancies between antemortem and postmortem diagnosis have been adapted by Battle et al (1987) and Andersen et al (1990) [1] and another one by Goldman [4]

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### Classification of Battle et al and Anderson et al

#### Category Discrepancy:

##### A. Major:

- **Class I:** Principal diagnoses definitely affecting clinical outcome
- **Class II:** Principal diagnoses possibly affecting clinical outcome

##### B. Minor:

- **Class III:** Secondary diagnosis either symptomatic but not treated or likely to have affected prognosis
- **Class IV:** Secondary diagnosis that could not have been made clinically
- **Class V:** No discrepancy

### Materials and Methods:

In the present study 100 cases died of trauma and brought to Medical College, Trivandrum for autopsy were selected by convenient sampling method during 2002-2005. The respective clinical case records from the concerned hospitals were perused and the discrepancies were noted down according to Battle et al and Andersen et al classification.

### Results and Discussion:

Of the 100 cases studied, 83% were males and 17% were females. Most common mode of trauma was found to be road traffic accident (65%), followed by fall from height (17%), fall of objects on the body (4%), assaults (8%) and others(6%).

No discrepancy (Class V) was noticed between clinical findings and autopsy findings in 62% of cases. Class I discrepancy in 25%, Class II in 3% Class III in 5% and class IV in 5% (Table I).

In a study conducted in Helsinki University Central hospital (1996-2000), class I discrepancy was found in 2.3% of cases and class II in 3.2%. [5] In another retrospective study conducted by Nadrous HF, Afessa B, Pfeifer EA and Peters SG in Mayo clinic, it was observed that 4% of cases showed Type I errors and 17% had type II errors. [6] A retrospective chart review in an Academic Emergency Department, conducted by Vanbrabant P, Dhondt E and Sabbe M in, no type I errors were found and 14 out of 29 cases showed type II errors. [7] The higher occurrence of discrepancies in the present study, compared to the three previous studies could be attributed to the differences in the hospital setup in western countries where the facilities and functioning are of higher quality.

Head injuries and spinal injuries were correctly diagnosed in 88.6% and 88.3% of cases respectively. This high frequency of correct diagnosis may be due to the characteristic symptoms produced by these injuries like unconsciousness, paralysis etc, which are very glaring and unlikely to be omitted. Abdominal and chest injuries were the ones most frequently missed ie.64.3% and 63.9% of cases respectively. (Table II)

Head injury was missed during primary diagnosis in 8 cases. In all these cases, either one or more, regional injury co existed. Distributions of these cases are shown in Table III.

Among the cases in which chest injury was missed, 47.8% cases were seen in combination with head injury. In another 30.3% head injury and other regional injuries co-existed with chest injury. Altogether in 78.1% of cases head injury was found in combination with missed chest injury. The neurological symptoms like varying degrees of consciousness and irregular respiratory rhythm might have masked the symptoms of chest injuries (Table IV).

Out of the 9 cases in which abdominal injury was missed, 88.8% were found in combination with head injury. (Table: V)

In all the three cases where spinal injuries were missed, head injury was a common occurrence. The similarity in clinical manifestations of head injury and spinal injury may be the reason for the omission in diagnosis.

**Conclusions:**

1. No discrepancy between clinical findings and autopsy findings was seen in 62%.
2. Class I discrepancy was seen in 25 %, Class II in 3% and Class III & IV in 5% each.

3. Least commonly missed injuries were (11.4%) and spinal injury (16.7%).
4. Most frequently overlooked injuries were abdominal injuries and chest injuries (64.3% and 63.9% respectively).
5. Head injury was seen in combination with 78.1% cases of missed chest injuries, 88.8% cases of missed abdominal injuries and all cases of missed spinal injuries.

Audit may be considered as a cycle, the first component being observation of existing practice. Comparisons are made and then necessary changes are implemented. Clinical practice is observed again. A decision is to be made later as to whether practice needs change further. These processes are called ‘**cycle of audit**’ and the consequent achievement of change has been termed “**Closing the audit loop**”. [8]

The audit loop feeds information from autopsies back into clinical practice. Regular mortality meetings may result in changes in clinical policy as a result of auditing fatalities. The success of these meeting relies on spirit of genuine partnership between pathologists and clinicians, to achieve improvements in patient care.

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**Table I**

**Distribution of grades of discrepancies in diagnosis**

No. of Cases		*Grade	No. (%)
with discrepancy	Major	Class I	25 (25)
		Class II	3 (3)
	Minor	Class III	5 (5)
		Class IV	5(5)
No discrepancy		Class V	62(62)
<b>Total</b>			<b>100(100)</b>

\*According to Battle et al and Andersen et al

**Table II**  
**Distribution of injuries according to the frequency of missed diagnosis**

Injury	Total Number (N)	Number not diagnosed	Correctly diagnosis
Head	70	8 (11.4%)	62 (88.6%)
Chest	36	23 (63.9%)	13(36.1%)
Abdomen	14	9 (64.3%)	5 (35.7%)
Spine	18	3 (16.7%)	15 (83.3%)
Fractures	24	9 (37.5%)	15 (62.5%)

**Table III**  
**Distribution of injuries where head injury was missed**

Injury	No.	%
Head + Chest	3	37.5
Head + Chest + Abdomen	1	12.5
Head + Abdomen + Spine	1	12.5
Head + Abdomen + Spine	1	12.5
Head + Abdomen + Chest + Spine + Fractures	2	25.00
<b>Total</b>	<b>8</b>	<b>100.00</b>

**Table IV**  
**Distribution of injuries where chest injury was missed**

Injury	Number	Percentage
Chest +Head	11	47.8
Chest +Head + Fractures	3	13.0
Chest +Head + Abdomen	1	4.31
Chest +Head + Abdomen + Fractures	2	8.7
Chest +Head + Spine	1	4.3
Chest + Fractures	2	8.7
Chest + Spine	1	4.3
Chest + Abdomen	1	4.3
Chest alone	1	4.3
<b>Total</b>	<b>23</b>	<b>100</b>

**Table V**  
**Distribution of injuries where abdominal injury was missed**

Injuries	No.	%
Abdomen + Head	1	11.1
Abdomen + Head + Chest	5	55.5
Abdomen + Head +Others	2	22.2
Abdomen + Chest	1	11.1
<b>Total</b>	<b>9</b>	<b>100</b>

} 88.8%

## Case Report

### Adult Choroid Plexus Papilloma: Cause of Sudden Death

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#### Abstract:

Choroid plexus papilloma (CPP) is a rare, benign neoplasm, relatively more common in childhood. It is associated with signs and symptoms of increased intracranial pressure, frequently in association with obstructive hydrocephalus. CT and MRI are the investigations of choice and are diagnostic. Sudden deaths have been reported, but are very unusual. A 41 year old male was brought for medico-legal autopsy examination on ground of sudden death. He was reported to have headaches over a long period of time. On autopsy examination, massive sub-arachnoid hemorrhage was seen on both the cerebral hemispheres and cerebellum. A cyst measuring about 1cm diameter was found in choroid plexus of right lateral ventricle.

On histopathological examination, it was found to be a choroid plexus papilloma. Calcification was also evident in the papilloma. From medico-legal aspect, the present case reveals an unusual cause for sudden death in an adult male. The pathology could have been diagnosed easily by CT scan or MRI. When diagnosed, it has good survival rate, the morbidity depending on the extent of pathological effects. The present case was likely to have survived having minimal effects with appropriate treatment had he been diagnosed. The pathology is rare and a suspicion for this pathology in the adult male was not expected, but a CT scan to investigate chronic headache was warranted. Absence of such a suggestion leading to death, which could have been preventable, is sufficient ground for charge of professional negligence.

**Key Words:** Sub-Arachnoid Haemorrhage, Intracranial Tumours, Choroid Plexus Papilloma

#### Introduction:

Choroid plexus papillomas are rare, accounting for less than 1% of all intracranial tumors in adults. They are relatively more common in childhood and constitute 1.5 to 4% of intracranial tumors. [1] They are neuroectodermal in origin and similar in structure to a normal choroid plexus in the form of multiple papillary fronds mounted on a well vascularized connective tissue stroma.

CPPs are often associated with a vascular stalk connected to the choroids plexus, allowing mobility within the ventricular system.

Grossly, they may appear as reddish cauliflower like growths, which often become heavily calcified. [2] CPPs are not malignant; however, malignant evolution may occur, with an incidence of 10-30%. In a recent series by McEvoy et al, the five-year survival rate was 100%. [3]

The tumor's presence is often heralded by non-specific signs and symptoms of increased intracranial pressure. In adults, headache is the most common presenting symptom, which may be related to an alteration in head position. CPPs are amenable to complete surgical excision and surgery should be performed before complications set in. The tumor is liable to spontaneous hemorrhage, resulting in blood-stained or xanthochromic CSF. Hydrocephalus is a common complication which may result from direct tumor obstruction of the outlet of CSF or due to excessive production of CSF. [2] CT and MRI are the investigative procedures of choice in the evaluation of CPPs. Because of the relatively non-invasive nature, high reproducibility and great contrast resolution of CT and MRI, they have supplanted all other methods of neuroimaging.

#### Clinical summary:

A 41 years old average built male was brought for medico-legal autopsy examination on ground of sudden death. He was reported to have come back from work the previous evening at about 8

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pm, a little later than usual and complained of headache. He was known to complain of headache quite often. A couple of hours later, he took some medication for his headache and then slept in the sitting posture in a chair. He was found dead the next morning in the chair itself and nothing suspicious was found around him. The police indicated their suspicion of cardiac arrest in the post-mortem requisition. On examination, no injuries were seen on the body. Heart was 350gms in weight with left ventricular wall being 2.5 cms thick and right ventricular wall about 4mm thick. Coronaries were normal except for left main coronary artery which showed 10 – 20% stenosis. Other abdominal and thoracic organs were normal and healthy. On opening the cranial cavity, duramater was markedly tense and congested. Massive subarachnoid hemorrhage was present all over on both cerebral hemispheres and cerebellum. A cystic structure 1 cm in diameter was seen in the right lateral ventricle attached to tela choroidea. Brain was congested and edematous. The cyst like growth was then examined.

### Pathological findings:

Gross findings: A bluish cystic mass, about 1 cm in diameter in right lateral ventricle, was attached to the choroid plexus with a short stalk. The outer wall appeared to be smooth. On cut section, the inner wall was granular and contained clear fluid.

Massive sub-arachnoid hemorrhage was present on both the cerebral hemispheres.

Microscopic findings: Histologically, the tumor simulates the normal architecture of the choroids plexus. The papillary fronds showed a fibrovascular core. The epithelial cells lining the fronds were crowded and mildly pleomorphic. Occasionally, calcified psammoma bodies were also seen. The histological diagnosis was choroid plexus papilloma.

### Discussion:

There is a regional difference between adult and childhood tumors with most choroid plexus tumors in children arising in the lateral ventricles and those in the adult more common in the fourth ventricle with a tendency to grow through the foramen of Luschka into the cerebello-pontine angle. [4] In the present case, CPP was seen in an adult male in the lateral ventricle.

The median duration of symptoms is reported to be about one month with approximately one-third of patients presenting within two weeks. [3] In the present case, the history as obtained from friends and neighbors, extended over a period of months. The tumor is reported to be associated with non-specific signs of increased intracranial pressure. In adults, headache is the most common presenting symptom. In the present case headache was the only symptom reported for months. The primarily intra-ventricular growth is responsible for the paucity of

symptoms in the early stages of the disease. [5] Grossly, choroid plexus tumors are generally described as a well-circumscribed, brownish-red, cauliflower-like mass, the carcinoma being invasive, appearing hemorrhagic or necrotic. Histologically, there is delicate connective tissue fronds covered by a single layer of cuboidal epithelium. The papilloma resembles normal choroid plexus but the cells are more crowded and elongated. The carcinoma is far more cellular and displays signs of anaplasia.

Rarely, these tumors can exhibit mucinous degeneration, melanization, tubular glandular architecture or osseous and cartilage metaplasia. [6] In adults, most CPP are heterogeneous secondary to cystic and /or calcific degenerations. The present case also showed calcification on microscopic examination.

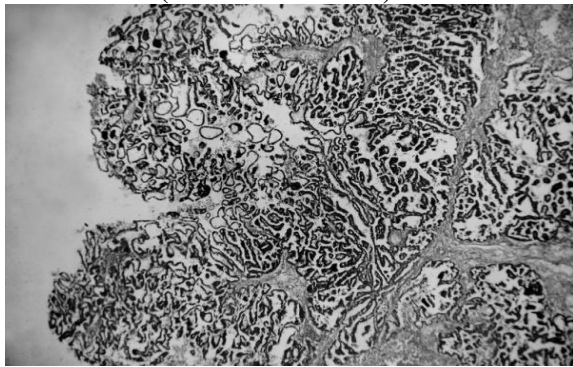
There has been a case report of sudden death in which the tumor involved the third ventricle and caused acute ventricular obstruction. [7] In the present case, there was massive sub-arachnoid hemorrhage leading to sudden death. WHO classifies choroid plexus tumors into either papillomas (Grade I) or carcinomas (Grade III). [8] In the present case, the tumor was designated as Grade I and was a papilloma. The case is being presented for its rarity and some features being distinct from expected findings in such a case.

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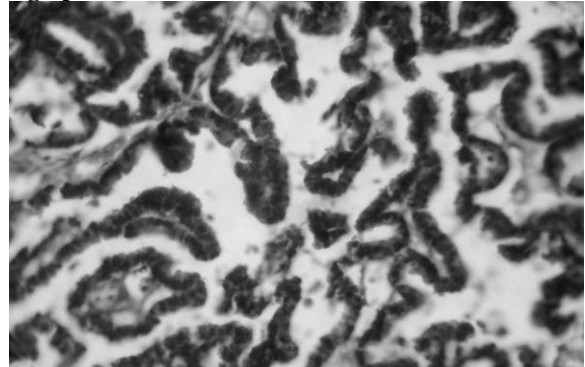
**Figure No. 1**

**Microscopic picture of CPP showing complex branching papillary fronds with central fibro-vascular core (H&E scanner view)**



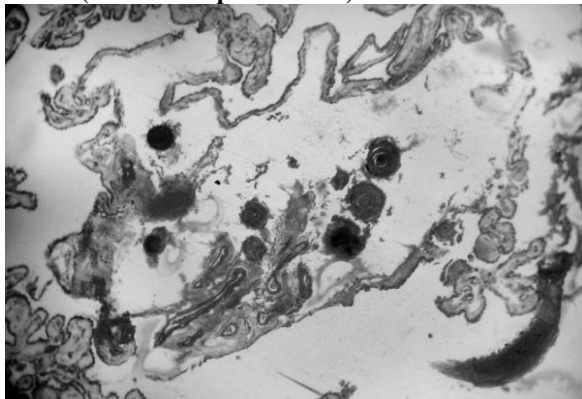
**Figure No.3**

**Photomicrograph of choroid plexus papilloma in high power showing epithelial cells with mild nuclear atypia lining the papillary fronds (H & E high power view)**



**Figure No.2**

**Photomicrograph of choroid plexus papilloma showing concentrically laminated psammoma bodies (H & E low power view)**



## Case report

### Suicide by para-phenylenediamine Poisoning

\* Dr.Sushil Kumar

#### Abstract

Twenty three cases of acute para-phenylenediamine poisoning were examined clinically at emergency ward of Rama Medical College Hospital, Kanpur (Uttar Pradesh) irrespective of age, sex and socio-economic strata along with route and manner of administration of the poison.

Albuminuria, anaemia, hypocalcemia, leucocytosis, thrombocytopenia, increased serum bilirubin, prolonged bleeding and clotting time alongwith increased levels of liver enzymes and serum creatinine were observed as significant bio-chemical parameters; on investigation in respect to complete haemogram, liver function test, renal function test, serum electrolytes, serum CPK levels and arterial blood gas analysis.

The para-phenylenediamine is the ingredient of a traditional cosmetic hair dye available with the trade name Godrej expert powder hair dye, which is orally administered mainly with an intention to commit suicide, sometimes accidentally and very rarely as homicidal poison by hair dye users. The suicidal poisoning is more common in females as compared to males. The systemic toxicity of PPD has serious consequences which may eventually lead to death.

The cases are reported with the advice "public education and strict control over the sale and distribution of para-phenylenediamine should be done to reduce poisoning by this agent".

**Key Words:** Para-Phenylenediamine, Suicidal Poisoning, Traditional Cosmetic, Hair Dye

#### Introduction:

Para- phenylenediamine is a poison, semi-permanent dye has smaller molecule and is therefore able to penetrate the hair shaft. This Colour will survive repeated washings.

Godrej hair dye, supervasmol 33, Para-phenylenediamine, are used for colouring of hair, P-phenylenediamine (PPD) is an organic compound. This derivative of aniline aromatic amine, is a colourless solid when pure. This compound is used in almost every hair dye marketed regardless of brands. The darker the colour, usually, the higher the concentration, some of the so-called 'Natural' and 'herbal' hair colours, while ammonia free contains PPD. Some product sold as henna also contains PPD Particularly black henna.

Short exposure to high level of PPD may cause severe dermatitis, eye irritation and tearing, Asthma, renal failure, vertigo tremors, convulsions and coma.

Ingestion of PPD produces rapid developments of edema of face, neck, pharynx tongue and larynx with respiratory distress which often needs tracheostomy.

In the later stages Rhabdomyolysis and acute tubular necrosis with acute renal failure and hepatic failure develops. Bleeding tendency (bleeding from gums), sub-conjunctival hemorrhage and bleeding from mucus membrane also occur.

#### Material and Method:

Twenty three cases of acute Para-phenylenediamine poisoning admitted to Rama Medical College & Hospital Mandhana Kanpur U.P. were examined irrespective of age, sex, socioeconomic strata Profession along with manner of administration of the poison.

Following investigations were done:

1. CBC, BT, CT
2. Renal function tests:
  - a. S. creatinine
  - b. Blood urea
  - c. Urine: Routine and Microscopic
3. Liver function test
  - i. S. Bilirubin
  - ii. SGPT, SGOT
4. Serum electrolytes:
  - a. Serum Sodium
  - b. Serum Potassium
  - c. Serum Calcium
5. CPK
6. Arterial blood gas analysis

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**Results:**

Sr. No.	Biochemical Parameter	Percentage of cases shown derangement
1	Raised total Leucocyte counts	78.125
2	Raised Liver enzymes: SGPT, SGOT	62.5
3	Raised serum creatinine	46.88
4	Hypocalcemia	37.5
5	Raised Bilirubin	68.75
6	Reduced Hemoglobin	31.25
7	Prolonged BT and CT	18.75
8	Thrombocytopenia	31.25
9	Blood urea	46.8
10	ABG Derangement	46.8
11	Albuminuria	50

**Discussion:**

Hair dye containing PPD is used for hair colouration and is added to Henna to accentuate the colour when used on the skin. Over-doses with this chemical is common, and can be fatal if taken in large quantities.

Death is usually caused by angioneurotic edema or arrhythmias due to direct cardiotoxicity of PPD cases of poisoning of PPD which develops renal failure require dialysis. The cause of renal injury is probably direct nephrotoxicity of compound. Rhabdomyolysis caused by PPD is also a cause of ARF in these patients.

The lethal dose of PPD is not known; estimates vary from 7-10 grams. The characteristic chocolate brown colour of the urine could be confirmative evidence of hair dye poisoning in individual with the poisoning of PPD (Presence of hair dye in urine can be confirmed by this layer chromatography in the lab). First case of systemic toxicity with PPD was described by the Nott in 1924 in the owner of a hair saloon. [7] A report from Sudan described a series of 18 cases of acute hair dye poisoning. Sood et al and Chug et al have reported hair dye poisoning from India. [8, 9]

Clinical studies were also done by Ansory et al 1983, [1] Fathi et al 1995, [2] Kamil and Davidson 1996, [3] Yagi et al 1996, [5] Ababou et al 1995, Ayuoub Filali, Lham Semlali 2006. [4] All our patient took poison intentionally with a suicidal intent. In the study of Ayoub et al & Yagi et al few cases were accidental but most of the cases were seen with suicidal intent. [4, 6]

In our study entire poisoning was by Ingestion. The toxic effects of PPD are many. The most explainable in the combined effect to kidney resulting from hypoxia, dehydration, intravascular hemolysis, methemoglobinaemia and a direct toxic effect of the chemical or its by products on the renal tubules. Rhabdomyolysis may also contribute to renal failure. [10, 11] In our study total leucocytes count was raised in 78.125 percent cases 62.5 cases were raised liver enzymes, S. creatinine and blood urea

was raised in 46.88 percent cases, these patients also have deranged ABG. Albuminuria seen in 50 percent case prolonged BT, CT in 18.75 percent cases, thrombocytopenia in 31.25 percent cases. 6 cases were Referred for dialysis were expired, mortality was 18.75%. mortality was 21.1% is study by Ayoub et al [4, 6] and 41.9 in study by M, Sir Hasim et al and 22% in study by Yagi et al. [6] The mortality was less in our study probably because of ingestion of low amount of dye, and early treatment of patient.

**Conclusion:**

The systemic effects of PPD poisoning have serious consequences which may eventually lead to death. The Lethal dose of PPD is not known; estimates from 7-10 grams. The mechanisms of acute tubular necrosis are many. The most of the injuries resulting from hypoxia dehydration, intravascular haemolysis, Methaemoglobinaemia and direct toxic actions of chemical or its by products on the renal tubules. This study showed that PPD poisoning was fatal in about 18.75 percent cases. The poisoning of PPD was not more common in this region previously.

Previously cases of Celphos poisoning were more but due to the strict control of sale of Celphos, poisoning of hair dye (PPD) is more common these days. The controlled supervision over selling of hair dye is necessary to stop PPD poisoning. We recommend that the selling of hair dye containing PPD should be banned and public education programme should be initiated in this regard so that mortality from PPD may be prevented, because availability of PPD in home causes easy accessibility of this poison.

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## Case report

# Acute Myocardial Infarction related to blunt Thoracic Trauma: Review of literature with two case reports

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### Abstract

Cardiac injury occasionally occurs as a result of blunt chest trauma. Most cardiac complications in chest trauma are due to myocardial contusion rather than direct damage to the coronary arteries. Coronary artery injury rarely occurs after blunt chest trauma, but it can lead to extensive myocardial infarction and be frequently overlooked. However, traumatic coronary injury has been reported, and a variety of underlying pathophysiological mechanisms have been proposed. For young adults, blunt chest trauma is one of the non-atherosclerotic mechanisms leading to acute myocardial infarction. Not only a severe trauma, but also a mild trauma such as sports trauma can cause acute myocardial infarction. Myocardial infarction after blunt chest trauma, however, is an extremely rare entity with most cases received conservative therapy. Here two cases of acute myocardial infarction due to blunt thoracic trauma are described in patients who were previously healthy and had no symptoms suggestive of coronary artery disease.

**Key Words:** Blunt Thoracic Trauma; Traumatic Coronary Injury; Acute Myocardial Infarction

### Introduction:

In blunt chest trauma patients, it is important to consider myocardial injury, which is mostly the result of myocardial contusion. The consequences of contusion include ECG-changes, arrhythmia and necrotic damage of the heart muscle. Direct damage to the coronary arteries however is a rare finding. Acute myocardial infarction (AMI) is described as a rare complication of blunt thoracic trauma (BTT), although there is no accurate data available regarding the true incidence of this condition.

Early diagnosis is difficult due to the nonspecific post-trauma clinical picture presented by patients. BTT may cause damage to the myocardium, cardiac valves, coronary arteries and pericardium, leading to serious complications such as arrhythmias and sudden death. [1, 2, 3] In promoting acceleration, deceleration or direct compression of the chest, the trauma can cause acute myocardial infarction through the following proposed mechanisms: dissection of coronary arteries, coronary thrombosis, vasospasm and rupture of atherosclerotic plaque. [4]

This paper deals with two case reports of patients who evolved with AMI after a BTT, as well as a review of literature.

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### Case Reports:

#### Case 1:

A 25 yrs old auto rickshaw (private three wheeler taxi) driver was rushed to the emergency block in unconscious state with history that his vehicle overturned while negotiating a sharp turn. He was declared dead on arrival. During autopsy examination it was noted that the deceased was of average built and multiple contused grazed abrasions were present over front of chest and abdominal region, the largest being of size 5cmX4cm. On internal examination, effusion of blood present over the thoracic and intercostal muscles. The thoracic cage was intact. Heart weighs 284gm. On examination of coronaries, the left anterior descending artery lumen shows 85% block. All other findings were insignificant.

#### Case 2:

A 55 yrs old male was assaulted by his neighbors over an issue of parking the car. He allegedly received blows over his chest as stated by eyewitnesses. The person becomes unconscious after suffering the assault and was taken to the nearby hospital where he was declared dead on arrival. On Postmortem examination, he was of average built and was wearing four layers of clothing's over his upper part of the body, out of which one was a thick woolen sweater and other is a leather jacket. On external examination minor abrasions were noted to be present over both elbow and knee regions. No other injuries present. During internal examination, the thoracic cage was intact and no internal contusions

were noted in that region. Heart weighs 258 gms and the LAD coronary lumen shows about 95% block. The reason for not finding any injuries over thorax, external or internal, was attributed to the fact that this region was covered with thick layering of clothes.

There was no significant past or family medical history in these two cases. The cause of death in both cases was acute myocardial infarction as a result of coronary artery disease consequent to blunt trauma thorax.

### **Discussion:**

Acute myocardial infarction secondary to a blunt thoracic trauma is rarely described as a complication in cardiac injuries related to trauma. [5] This issue is rarely approached in systematic studies and it is more frequently found as case reports in literature revised; therefore, its prevalence and the incidence of associated abnormalities in ancillary examinations may be underestimated. Maenza and colleagues performed a meta-analysis on cardiac complications in blunt cardiac trauma including more than 4600 patients. The prevalence of cardiac complications varied between 2.6% and 4.5%. Myocardial infarction or complications assuming infarction occurred only in a minority of the patients (between 5 and 7%). [6] Christensen et al. identified 77 published cases of acute myocardial infarction in blunt chest trauma. [7]

Although coronary artery atherosclerosis is the most common cause of AMI, 20% of acute myocardial infarctions in young adults have a non-atherosclerotic etiology such as coronary artery embolism, hypercoagulation status, congenital coronary abnormalities, dissection of coronary arteries, coronary artery spasms (including the use of cocaine), vasculitis and mediastinal irradiation. [8, 9] BTT is another possible underlying mechanism of acute myocardial infarction in young patients. Clinically significant cardiac injury occurs in approximately 5 to 20% of patients with non-penetrating thoracic trauma, and up to 76% in severe cases of BTT. [10] The time interval from injury to coronary vessel occlusion showed a highly variable course reaching from immediate onset to a delay of several weeks. [11]

Potential mechanisms of non-penetrating cardiac injury include fast acceleration or deceleration, direct chest trauma, heart compression between the sternum and thoracic segment of the spine, and fast increase of intra-aortic pressure due to abdominal or lower limb compression. The mechanisms that contribute to myocardial infarction may include intimal injury, subintima hemorrhage, intraluminal thrombosis and spasm.

Any coronary artery may become involved, although the anterior descending artery is the most commonly cited artery in case reports followed by

the right coronary and circumflex arteries. [12, 13] Coronary artery injury is more frequently diagnosed in patients less than 45 years of age victims of road accidents. [14] Minor traumas have rarely been reported as the cause of coronary artery injury. [15]

Early diagnosis is usually difficult because of low frequency, non-specific clinical picture and the level of suspicion by the assistant physician. Chest or abdominal pain following the trauma can be in most instances attributed to a contusion of bones and soft tissues, which can mask the pain of cardiac origin.

Appropriate diagnostic tests must be considered in patients who suffer a BTT. Electrocardiogram must be performed in all suspected cases. Measurement of cardiac enzymes, chest X-ray and echocardiogram can help in the diagnosis of cardiac trauma.

The treatment of acute myocardial infarction caused by blunt chest trauma may be complicated by the severity of accompanying injuries, and most of the cases have been managed conservatively. [16, 17] Successful thrombolytic treatments of coronary occlusions in patients with blunt chest trauma have been reported. [18, 19] However, many trauma patients will not be candidates for thrombolytic therapy because of the risk of hemorrhage from coexisting injuries. [20]

The conclusion drawn from these two case reports is that the clinical examination with high level of suspicion and an electrocardiogram in all cases of possible cardiac trauma must be part of the initial medical care of patients who have suffered a BTT. Acute myocardial infarction must early be considered in the differential diagnosis of patients who are victims of BTT, regardless of the intensity of trauma.

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## Case report

# Importance of Scene of Crime Visit, It May Be Late, but It Is Never Too Late

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### Abstract

A male aged about 75 years was found dead in his residence. When police arrived to the scene of incidence by information of relatives, he founds body was lying down in supine position on the floor with ligature mark around the neck and deeply congested protruded tongue from the mouth, eyes widely open, left hand lying on abdomen and right resting on the floor. During initial investigation Police relying on the history given by the servant and relatives presumed that it to be case of suicide. But he did not find any reason for suicide. Under dubious nature of case police become bound to take the forensic expert opinion after 6 days of intensive investigation.

A team of forensic experts (authors of this paper) visited and scientifically examined the scene of incidence and gave their expert opinion to solve the case.

**Key Words:** Suicide, Homicide, Hanging, Strangulation, Scene of Crime

### Introduction:

In any crime situation, whether simple or mysterious ones, scientific crime scene examination play a very vital role in providing clues and helps in drawing up accurate and logical conclusions.

There may be situations where the police reports are incomplete as sources of information. This is because the police are primarily interested in determining whether a homicide was committed, and they usually are not trained to collect extensive data on other aspect of case. Nevertheless, in evaluating a possible suicide, it is highly desirable to have a description of the scene of death, including position of body, and to have evidence gathered at the scene, such as weapons, pills, poisons, and notes, etc. In addition, it is important to reconstruct the habits of the victims both in connection with the method of death, and regards to the person's general lifestyle.

This will help to evaluate whether the person was at the high risk for death by suicide or for death with accident or homicide.

Interviewing the person who knew the deceased fairly well such friends and family members, as well as professional persons such as teachers, doctors, and clergymen who had dealt with the deceased may go long way in reconstructing the events. The process may be termed as "psychological autopsy". The objective of the psychological autopsy is to reconstruct the background, habits, personality traits, character and life style of the deceased.

[In addition, it is our personal opinion that in any suspicious death, the conclusion arrived at should be to the satisfaction of aggrieved party; apart from the ultimate satisfaction of the investigation officer and the team of autopsy surgeon and forensic scientist.

In this particular case, the relatives of the diseased were present during the time of the scene investigation and were eventually convinced by our results and appreciated the efforts in conducting the crime scene examination.]

### Case report

Incidence took place on Thursday morning 4:00 am, 8<sup>th</sup> October 2009 an unnatural death of an unmarried, well reputed millionaire old man of 75 years age (height 5feet 6 inches and weight 100kg approx) in his residence. When police arrived after information at 9:10am he founds body was lying down in supine position on the floor with ligature mark around the neck and deeply congested protruded tongue from the mouth, eyes widely open, left hand lying on abdomen and right resting on the floor, left leg was straight and right bend inside from knee. Both the hands were open, eyes were partly open and seminal stain on the undergarments. It was the big house surrounded nearby two lodges which

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was owned by the deceased, where approximately 200 students were residing for their study.

Deceased was last seen alive by his servant; who gone for sleep in the same room with the deceased, according to him he was perfectly well and nothing abnormal noted by him before going to bed at about 10.30 pm. According to servant at 4:00 am on 8<sup>th</sup> October 2009, when he wake up and came out of the room he saw that Victim was hanging with a double ligature of nylon rope in a loop fashion and feet was resting on floor with bend knee at the door between adjacent room and courtyard with half opened sliding iron gate. He freed the victim from loop for the scope of survival and he made him in lying position with difficulty due to heavy weight of the victim. He ran towards kitchen which is in the courtyard he started shouting from the kitchen window for help then he opened the second back door so that he may avail early help. Peoples residing in nearby lodge then comes and saw the victim was lying dead on the floor. Then he informs deceased relatives and police was informed subsequently 9:10 am. Then after preliminary investigation and formalities body was send to the postmortem examination.

During initial investigation Police relying on the history given by the servant and relatives presumed that it to be case of suicide. But he did not find any reason for suicide. The forensic technical team requested by investigating authorities 6 days after the incidence, reached the scene of incidence and noted the details from the concerned persons about the personal and public behavior of the deceased at the residence during the last moments when he was seen alive on the fateful day. It was tentatively concluded that everything was going well and there was suspicion that even some deal was finalized, he might have some huge cash at his residence. Team also scientifically observed the whole scene of incidence and noted every minute detail.

### Observation and Discussion

The scientific investigation team approached to the scene of incidence on 14 October 2009, at 6pm along with the investigating authorities. The scene of incidence was not well preserved. The relatives were already there. Forensic team meticulously inspected the entire house including living room, dining room, courtyard, backyard and all the possible assessable entry and exit. As per alleged history narrated by servant we made him to create similar situation as he seen the condition of scene of incidence, like direction exact state of deceased while suspending with the loop ligature, position of chairs, knife etc. and we few Important facts about the scene of incidence as point of suspension is around 9 feet, no friction mark was present at point of suspension, adjacent wall, old nylon rope which was used as a ligature material taken from nylon string tied for

drying of cloths in the court yard after cutting from both ends by sharp ordinary kitchen knife which was taken from the kitchen and kept on the nearby table.

There was history of cleaning his living area 2 or 3times after the incidence. There were no signs of breaking of door locks etc. Front door was not locked with supportive locks from inside, even at last wooden door of courtyard. But solid iron sliding gate at backyard and two solid iron gates in front side of his living room give impression about victim's sincerity regarding security. Sliding gate was found during visit that it can be opened from courtyard side with efforts. Courtyard having upstairs this can be assessable from inside and outside.

Taking consideration of heavy built and older age, it was found very difficult for the deceased to climb on old plastic chairs, which were kept above one another and to reach the point of suspension, especially in the background of climbing the stairs and bathing was a difficult task for him. Same is true for thin built of servant of 45 years age, and heavy built of deceased it is very unlikely that he can be made free the deceased body from the ligature and managed to the lying down position without inflicting any injuries.

Photographs have been taken by the police photographer, inquest report/ panchnama and postmortem report asked by the investigation authorities for correlation of the facts. PM report has been estimated time since death around ½ day, when PM conducted at 4.05 pm. There were very peculiar ante mortem injuries which were as followings:

- Single encircling ligature mark was there of more than  $\frac{3}{4}$  of circumference of the neck, (30cm × 2cm with 12cm gape at the nape of the neck)
- Abrasion on back of left shoulder (4cm × 2cm), medial of right knee joint (2cm×1cm), lateral part of left thigh (5cm×4cm), outer part of left lower leg (2cm×2cm) and lateral part of right side of chest (10cm×6cm).
- Contusion with abrasion (3cm×2cm) on outer part of left lower leg 7cm below the knee joint which was confirmed with slitting of contused area.
- Contusion (1cm×1/2 cm) on the right side of inner part of lower lip which was also confirmed by slitting.
- There was cut on the tip of the protruded tongue.

Last two findings were very important which goes in the favor of attempt of smothering for preventing the deceased to not made cry for help rest goes for sign of struggle.

There was absence of any stain of dribbling of saliva, with this we can conclude only two possibility

one is either constriction is postmortem in nature or it may be wiped off.

The larynx and trachea and respiratory passages were deeply congested and hyoid bone was fractured, signify that violent asphyxia death due constriction around neck. The hyoid bone was fractured. The stomach was half filled with food and gases and bladder was empty signify death must have occur nearly 2 hours after the consumption of dinner and after the emptying the bladder. All the viscera were congested.

Cause of death was clearly given in the PM report that '*death is due to asphyxia as a result of strangulation*'.

A thorough search was made on spot finally going through each every aspect of provided document and photograph the sequence of events were reconstructed.

### Reconstruction of the incident:

1. Taking consideration of all the relevant facts it was seems impossible that the deceased suicide to hang himself, and his attitude and personality as stated by near and dear one goes against the favor of suicide, his huge property and disputes regarding his heir of his property makes him very prone for homicide.
2. It is concluded that he may go for bed after dinner at 10:30 pm, and peaceful evening somewhere between 00:30am to 1:30 am. Some may have the entered in the house passage in the backyard where they would have cut the nylon rope of the backyard with ordinary knife obtained from kitchen. These all thing either make him awaken the deceased or intruder take advantage of deceased night awakening habits for micturation. Opening of backyard sliding iron gate may have some suspicion to the deceased, and as the deceased returning from urinal then the attack from behind with ligature around the neck and they tried to strangulate him and drag him on the floor at the same time some another person was there to stop him from crying by closing his mouth and nostrils. The deceased body was too heavy to hang so they kept as such.
3. Servant was either prior information and gave peaceful passages to the offenders or he was witness of the incident. He has no other choice than the helps the accused because of his has huge financial dependency for education of his children's, who are studying in professional colleges on a handsome fees. And every time his statement backing by and as per feeding of some intelligent person, and seems to be

poorly cooperating. Authorities were also very cautious in this high profile case.

### Conclusion:

After the meticulous reconstruction of event, with carefully gathered evidences it was concluded that it was a case of either planed/unplanned strangulation by means of ligature, and there was signs of smothering also which clearly reflecting its homicidal nature.

All the aforementioned activities, of evidence collected and examined were carried out in the presence of relatives of the deceased and authorities. Had the efforts not been made to conduct a proper scientific examination with the help of forensic experts, this case would have been deemed to be a case of suicide, and hardly anything would have been done for the justice for poor victim. It is also important to state that in such sensational and doubtful cases, the spot examination should be conducted immediately with the help of a complete investigation team i.e. police authorities, forensic experts and autopsy surgeon, so the all the findings can be examined by the experts and cautiously all evidence may collected. Which latter on strengthen the prosecution and justice can delivered poor victims. Spot examination should be held without delay, but even delayed spot examination will enormously help in reconstructing the incident. So scene investigation may be late but it's never too late, we still can find something.

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**Photograph No.1**  
**Position of dead body at scene of crime**



**Photograph No.2**  
**Ligature mark around the neck**



**Photograph No.5**  
**Point of suspension which has no friction marks and evidence of any exchange material**



**Photograph No.3**  
**Ligature material in situ with cut end**



**Photograph No.6**  
**Manner of suspension as alleged by witness in "O" loop fashion**



**Photograph No.4**  
**Ligature material in situ with cut end**



## Case Report

### Fatal Multiple Painless Intussusceptions: A Case Report

\*Nilesh Keshav Tumram, MD, \*\*Rajesh Vaijnathrao Bardale, MD, \*\*\*Manish B Shrigiriwar, MD

#### Abstract

Intussusception is an invagination of the intestine into another in the direction of peristalsis. Because of varied presentations and relative rarity, intussusception remains a difficult condition to diagnose and at times it may be missed altogether. It is a commonest cause of intestinal obstruction in infancy and childhood though morbidity and mortality rates from the condition have progressively declined in recent times, still avoidable deaths continues. Here we present a case of female child of 3 months brought for forensic autopsy after her death with history of fever and cough since 2 days and breathlessness since 1 day. Autopsy revealed three intussusceptions. Painless intussusceptions are deceitful in their presentations. The forensic pathologist should be aware of such condition. The current case report exhibits such diagnostic pitfall and highlights the importance of forensic autopsy in revealing the cause of death.

**Key Words:** Intussusception, Death, Infant, Cause of Death, Autopsy, Forensic Pathologist

#### Introduction:

Intussusception is an invagination of the intestine into another in the direction of peristalsis. [1] It is the commonest cause of intestinal obstruction in young children, two thirds of cases occurring in infancy. [2] Although morbidity and mortality rates from the condition have progressively declined in recent decades but avoidable deaths still occurs. [3, 4]

Because of varied presentations and relative rarity, intussusception remains a difficult condition to diagnose. Moreover, in case of “painless intussusception”, diagnosis not only becomes difficult but there is very chance that the condition may be missed altogether. Such case may be referred to forensic pathologist as a case of sudden death. The current case report exhibits such diagnostic pitfall and highlights the importance of forensic autopsy in revealing the cause of death.

#### Case report:

A 3-month-old female infant was referred to Forensic Autopsy at Indira Gandhi Govt. Medical College, Nagpur.

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Patient was admitted for 12 hours at Govt. Medical College, Nagpur with history of fever and cough from past two days and breathlessness from one day. Her birth history was uneventful. No significant past and family history. On physical examination, the general condition was not satisfactory. She was hypothermic with toxic look. Her pulse rate was 100/minute and respiratory rate 30/minute. Her abdomen was noted to be soft. Peripheral blood smear revealed microcytic plus macrocytic cells. Total leucocytic count was 11000/cu mm, differential count revealed – polymorphs 70%, lymphocytes 28%, monocytes and eosinophils 1% respectively.

At autopsy, her weight was 3.75 Kg, length 52 cm, head circumference 37 cm and chest circumference 34 cm. External examination revealed no injuries except for those from clinical procedures and resuscitative measures. Internal examination showed edematous brain with white matter studded with petechial hemorrhages. Lungs showed evidence of patchy consolidation. Heart was unremarkable. The peritoneal cavity contains 500 ml reddish colour fluid. Three intussusceptions were noted; first and second were ileo-ileal Fig No.1 and third one was ileo-cecal. Other abdominal organs were congested. Toxicological screening was negative for poison.

#### Discussion:

Intussusception may occur spontaneously or may be associated with an anatomic lesion such as – enlarged mesenteric nodes, hypertrophied peyer patches, Meckel diverticulum, polyp, enteric cyst, intramural hematoma, ileal duplication, lymphosarcoma, inspissated meconium associated with cystic fibrosis and Henoch-Schonlein purpura.



The classical clinical manifestations of intussusception are colicky abdominal pain, reflex vomiting, currant-jelly stool and palpable abdominal mass. But it is not always true that all patients may present with classical manifestations. In study conducted by Stringer et al, between 13 to 20% of children with intussusception have no signs of abdominal colic or discomfort and such presenting intussusception is called as "painless intussusception". Moreover, small bowel intussusception does not tend to produce the classic symptoms and signs. Similarly, only half of the children with ileocolic intussusception had a history of abdominal colic and in only one fifth was there a palpable abdominal mass. [2] Therefore such cases pose difficulty for doctor to diagnose the condition and treat accordingly.

It has been shown that unexpected death is more likely to occur in older children with purely small intestinal intussusception. [5] However, the foregoing case exhibits mortal potential and unexpected death can occur at any age with intussusception at any level. Moreover, if intussusception is painless one and that too occurring at multiple sites then risk increases manifold.

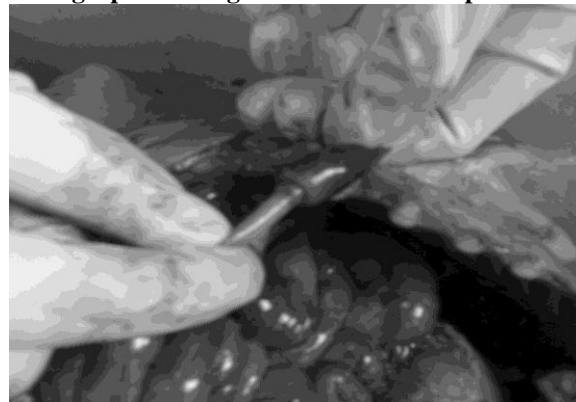
Considering the autopsy practice, it is to be emphasized that autopsy of infant need special attention especially when history is lacking or inappropriate. Painless intussusceptions are deceitful in their presentations. [3]

The Forensic Pathologist should be aware of such condition. The autopsy assessment of death due to intussusception requires careful systemic or local evaluation for presence of any lesion that had caused the intussusception. [5]

In conclusion it can be added that improvements in the management of childhood intussusceptions are likely to be grow from a wider appreciation and understanding of diverse possible presentations of the condition and helps to reduce morbidity and mortality.

#### Figure No. 1

#### Photograph showing ileo-ileal intussusception



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## Case report

# Fatal Unintentional Carbon Monoxide Poisoning Inside a Garage A Case Report

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### Abstract

A young female aged 18 years was found unresponsive in the car by her boyfriend. Both were inside the car, which was parked inside a closed garage. The engine and air conditioner of the car was switched on. The girl had complained of giddiness earlier and the boyfriend too was feeling drowsy.

The boy had been going out of the car to attend to phone calls and upon returning after one such call, found that his friend was not responding. She was immediately brought to the casualty dept of a tertiary care hospital by him where she was declared dead on arrival. A police complaint was lodged by the relatives of the girl, accusing the boy of homicide due to the presence of some minor injuries on the body of girl. Medico Legal autopsy on the girl revealed, death due to carbon monoxide poisoning.

**Key Words:** Carbon Monoxide, Garage, Vehicle, Ventilation, Haemoglobin

### Introduction:

Carbon monoxide is a ubiquitous product of incomplete combustion of materials containing carbon. Faulty domestic heating appliances have resulted in many accidental poisoning. [1] Deliberate self exposure to car exhaust fumes in enclosed space, which can contain up to 10% of carbon monoxide is a very effective form of suicide. [2] Use of catalytic converters in vehicles has reduced carbon monoxide emission considerably. However prolonged exposure can lead to death due to hypoxia. A common non fire CO death scene involves an automobile in a garage, workshop or similar enclosed space. Deceased succumb to carbon monoxide poisoning due to running of engines and accumulation of carbon monoxide inside a closed space.

### Case Report:

A young female of 18 yrs age along with her boyfriend were sitting inside a car parked in the garage of the boy. As it was warm inside the garage, the engine and AC of the car was kept on and all the windows of the car were closed.

The family members of the boy did not approve of the relationship between the two and in order to convince them, boy along with his girlfriend had come to his house. Both had stayed in the car inside the garage to plan a strategy. The boy kept going out of the garage frequently to attend calls on his cell phone. Meanwhile, the girl complained of giddiness to him. After attending to one such call, when the boy went back inside the garage, he saw his friend lying unconscious inside the car. She was immediately brought to the casualty of a tertiary care hospital where she was declared dead on arrival. A complaint was made by the relatives of the girl accusing the boy of foul play.

### Autopsy Findings:

The body was that of an 18-year-old young female, with fair complexion. Rigor mortis was present all over the body. Cherry red postmortem lividity was present on the back and dependent parts of the body in supine position. (Fig.1) Face was congested and pupils were dilated. Finger nail beds were cyanosed. (Fig. 2) Two small abrasions were present over the left side of forehead and an abrasion was present over the tragus of left ear. No other injuries were noticed on the body. All the internal organs were congested. Surface of brain and lungs showed petechial haemorrhage. Blood was cherry red in colour. Spot test in the mortuary showed presence of carbon monoxide in blood. Chemical analysis report on blood and viscera, received subsequently from forensic science lab confirmed presence of Carbon Monoxide.

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## Discussion:

Carbon monoxide is a colourless, tasteless, non-irritative gas, which is produced by incomplete combustion of materials containing carbon. It is a potent cellular toxin and acts as a chemical asphyxiant. Carbon monoxide has very high affinity for haemoglobin, which is about 220 times that of oxygen. There is also evidence of a synergistic effect of alcohol and carbon monoxide leading to death at lower COHb saturation levels when the blood alcohol concentration is high. [3]

Unintentional carbon monoxide poisoning in vehicles can occur due to leaking exhausts and inadequate ventilation. [4] In a study by Susan P et al. in 1972 [5] fatal concentration of CO was found even with garage door open and also in the absence of defective exhaust systems. Possible entry of fumes can be through holes in the floor of the passenger compartment, fender panels, holes in the spare tire well that were originally plugged with rubber at the time of manufacture. Since the affinity of hemoglobin for CO is approximately 220 times greater than that for oxygen, even low concentration of CO can be hazardous during prolonged exposure. In some case the measured carbon monoxide hemoglobin saturation level (COHB) was considerably below the lethal value. Death in such cases has been attributed to a combination of a high CO<sub>2</sub> and a low O<sub>2</sub> tension. [6] Griffin SM et.al [7] had reported a case of CO poisoning which was initially thought to be a case of IHD, but later toxicological analysis revealed a lethal blood COHbg, due to inhalation of vehicular exhaust fumes.

In the case presented here inadequate ventilation inside the garage along with continuous running of AC of the vehicle must have led to the accumulation of CO inside the garage, which has entrance into the car affecting the deceased sitting inside. The boy, who was with her girlfriend in the garage, escaped due to inadequate exposure to CO, as he was frequently going out of the garage to attend calls on his cell phone.

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**Fig. 1**  
**Cherry Red PM Staining**



**Fig. 2**  
**Cyanosed Finger Nails**

## Case Report

# A Rare Case Report: Poland's Syndrome with Unilateral Amastia in an alleged victim of Rape

\*\*Dr. Kalpasree Bhowmik, \*\*Dr. Nibedita Shyam, \*Dr. K.C. Das (MD)

### Abstract:

We report a rare case on Poland's syndrome with unilateral Amastia in an alleged victim of rape who was brought to our department escorted by the police for Medical examination. Congenital absence of breast is an unusual anomaly of the breast. As such, anomalies of breast are rare. Amastia is the total absence of breast tissue. Poland's syndrome is one such rare syndrome associated with Amastia. Poland's syndrome is not a single entity but is a constellation of anomalies.

In this syndrome, the predominant defect varies depending upon the extent of involvement of different parts. All children with Poland's syndrome have apalsia or hypoplasia of the sternocostal portion of the pectoralis major muscle and at least one other associated lesion. Other than Amastia, abnormalities of hand, nipples and other muscles may be associated with Poland's syndrome. Such congenital anomalies may be associated with depression and this in turn may lead to these patients falling easy prey of criminal minds.

**Key Words:** Poland's syndrome, Amastia, Anomaly, Breast

### Introduction:

Amastia is a rare congenital developmental anomaly of the breast. In Amastia, there is absence of breast tissue, areola and nipple.[1] Amastia is described in The Holy Bible as:

*"We have a little sister and she hath no breast."* (Song of Solomon VIII: 8). Amastia is frequently not the only problem but it is associated with other anomalies. Poland's Syndrome is one such rare condition associated with Amastia.

**Brief case history:** (This case was registered under section 376/493 IPC in one of the Police Station of the Kamrup district of Assam)

- An alleged victim of Rape of age about thirteen years, escorted by police, hailing from Kamrup District of Assam, presented to the Dept. of Forensic Medicine, Gauhati Medical College, Assam, for medical examination on 29th October, 2009.
- As per the victim girl, she was in love with a boy who forced her to have sex with him in lieu of false assurance of lawful marriage and then consequently she became pregnant.

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No family history of absence of breast was found.

- Birth history: She was born by normal vaginal delivery at home.
- Menstrual history: She has attained menarche at the age of about twelve years.
- No significant history of medical or surgical treatment.
- Socio-economic status-poor

### On examination:

- Thin built
- Height-155cm, weight-39kg
- Chest girth-79cm
- Abdomen- Girth-77cm. Fundal height at 32 weeks. Fetal parts felt.
- Teeth: Total number-twenty six. Twenty four permanent; two temporary molars (second temporary molar in both lower quadrants). Space for third molar not developed.
- Genitalia- healthy and well developed
- Pubic and axillary hair- present and scanty in distribution.
- Systemic examination: no other abnormality detected clinically

### On local examination of the chest wall on inspection:

- Absence of breast with absence of nipple and areola found on the left side of the chest wall
- The sternocostal part of the Pectoralis major muscle on the left side was also found to be deficit and deformity seen on the part of the chest wall.
- A furuncle present on the mid-sternum area

- The other breast on the right side was present and borne features of changes during pregnancy.
- Both the upper limbs and lower limbs are normal

**Discussion:****Amastia:****Definition:** [1]

Amastia is the total absence of breast tissue. Athelia is the absence of nipple. In Hypomastia there is underdevelopment of breast tissue and the nipple is usually present.

**Developmental cause of Amastia:**

- Lack of formation or obliteration of milk line.

**Amastia can also be due to:** [1] [2]

- ✓ Teratogen exposure [1] [2]
- ✓ Injuries sustained during – [1]
  - Thoracotomy
  - Chest tube placement
  - Inappropriate biopsy of the breast bud
  - Radiotherapy
  - Severe burns

Amastia may be associated with Congenital Ectodermal Dysplasia and Poland's Syndrome. [1] [2]

**Poland's Syndrome:** [1] [3]

The initial description of Poland's Syndrome first appeared in the English literature in 1841 written by Alfred Poland (1822-1872), who was a medical student at the Guy's Hospital, London, although German and French cases had been described earlier.

**Definition:** By definition, all children with Poland's Syndrome have aplasia or hypoplasia of the sternocostal portion of the Pectoralis major muscle and at least one other associated lesion. [1]

**Incidence:** [1] [3]

- It has a sporadic occurrence estimated at 1:30,000 to 32,000 live births. [1] [3]
- It is rarely familial [1] [3]
- More commonly involves right side. [3]
- One out of six patients with Amastia or Hypomastia have Poland's syndrome [3]

**Developmental causes of Poland's syndrome suggested are:** [1] [3]

- Abnormal migration of the embryonic tissues forming the pectoral muscles
  - Hypoplasia of the subclavian artery
  - In utero injuries from attempted abortion
- None of these theories have been uniformly accepted.

**Clinical features:** [1] [3]

- ❖ Poland's syndrome is a constellation of anomalies. [3]
- ❖ Children demonstrate remarkable diversity. [1]

- ❖ The predominant defect varies, depending on the extent of involvement of different parts. [1]
- ❖ The degree of abnormality of the hand, breast or chest wall varies. [3]
- ❖ Pectoralis major may be partially absent or totally missing. Generally, the sternocostal component of the Pectoralis major is the missing portion. [1] [3] [4]
- ❖ Pectoralis minor, Serratus anterior, Lattisimus Dorsi, Rectus Abdominis may be deficit or absent. [3]
- ❖ Abnormalities of breast may include Amastia, Hypomastia or Athelia. [3]
- ❖ Nipple, if present, may be lightly pigmented and higher on the chest than the normal contralateral nipple. [1]
- ❖ Syndactyly and brachydactyly may be seen in the hands. [1] [3]
- ❖ Aplasia of two to three ribs (second to fifth ribs mostly) may be present. [1]
- ❖ Chest wall deformity so severe that it may require surgery. [1]
- ❖ Scanty subcutaneous fat. [1] [3]
- ❖ Absent axillary hair. [1] [3]

**Investigations:** [1]

CT scan has been helpful in assessing:

- a) The chest wall configuration
- b) Extent of involvement

**Treatment:** [2] [3]

Surgical repair is rarely required except in certain cases. [2]

Because of rarity of this condition, optimal treatment has not been adequately investigated. Some of the reasonable options are:

- a) Use of Transversus- Rectus Abdominis Muscle (TRAM) flap for reconstruction of breasts. [2]
- b) Tissue expansion and implant placement. [2]
- c) Reconstruction of aplastic ribs with autologous rib grafts. [3]

**Conclusion:**

Congenital anomalies are important data in Identification but these have got other dimensions too. In a country like India, birth of a female child is highly unwelcome amongst many communities. In a girl child with anomaly (especially of the breast), underlying depression resulting from social stigma due to such deformity and the grim prospect of marriage, may be the cause behind such victims becoming easy prey of criminals who take advantage of their vulnerable minds by giving them false assurance of marriage.

**PHOTOGRAPH 1:** Picture of the chest wall of the victim. Please note the absence of breast tissue, areola and nipple and deformity seen in the central part of the chest wall. The right breast bears the changes during pregnancy.



**PHOTOGRAPH 2:** Full length (anterior view) of the victim. Hand and other structures of the body appear normal. Thin built is noted.



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## Research paper

# Operational Difficulties in M.B.B.S. 2<sup>nd</sup> Professional Course Due to MCI Regulations: Is MCI Listening?

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### Abstract:

Students of 1<sup>st</sup> professional if failed during final exams are not allowed to attend classes of 2<sup>nd</sup> professional according to MCI rules. These students appear in supplementary exams of 1<sup>st</sup> professional and after clearing them, join 2<sup>nd</sup> professional late by 4-6 months. Here lies the operational difficulty: conducting separate supplementary batch for them in 2<sup>nd</sup> professional is not feasible; and asking them to attend classes with regular batch is a cruelty to them as they will not gain anything when one-third syllabus and basic concepts in 2<sup>nd</sup> professional subjects have already been covered. Moreover, these supplementary students often rush to courts to have remedial measures-to allow them to appear with regular batch in 2<sup>nd</sup> professional exams. Sometimes their plea is allowed, sometimes it is dismissed. This paper discusses all these difficulties faced both by faculty and students and also suggest some remedial measures for kind consideration by MCI.

**Key Words:** MCI, Rules, Supplementary, Professional, University

### Introduction:

This paper is to discuss the operational difficulties that arise in conducting M.B.B.S. 2<sup>nd</sup> professional course due to a clause of MCI regulations for undergraduate teaching, which states that "No student shall be permitted to join the Phase II (Para-clinical/clinical) group of subjects until he has passed in all the Phase I (Pre-clinical) subjects for which he will be permitted not more than four chances (actual examination), provided four chances are completed in three years from the date of enrollment". [1]

This clause of MCI regulations has been questioned many a times; is a subject of constant litigations, and had been scrutinized many a times, by court of law. [2, 3]

Moreover, it poses operational difficulties; both for the students as well as for the concerned departments.

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Forensic Medicine being part of 2<sup>nd</sup> professional M.B.B.S. course, Indian Academy of Forensic Medicine is the right forum to raise such an important issue, so that experts in this field can discuss it further.

Those students who are unable to pass 1<sup>st</sup> professional examination in first attempt (re-appear students/ supplementary batch), are not allowed to attend 2<sup>nd</sup> professional classes due to this clause of MCI regulations. Their supplementary examinations are to be held within six months of the main examination. [1]

Usually, this period ranges from 4-6 months. Now, MCI regulations also state that "Supplementary examination may be conducted within six months so that the students who pass can join the main batch and the failed students will have to appear in the subsequent year." [1] This means that after passing their 1<sup>st</sup> professional in supplementary examination, the re-appear students have to join their main batch.

### Discussion:

M.B.B.S. 2<sup>nd</sup> professional course has been divided into three semesters of six months each (having 120 teaching days in each semester) starting from 3<sup>rd</sup> semester i.e. semester 3<sup>rd</sup> to 5<sup>th</sup> are to be completed in 2<sup>nd</sup> professional. Regular students will join 2<sup>nd</sup> professional course in 3<sup>rd</sup> semester, but re-appear students, who join course six months later, will join which semester? 3<sup>rd</sup> or 4<sup>th</sup>, because they are supposed to join main batch after passing supplementary examinations, as stated by MCI rules, [1] and by that time main batch is already in 4<sup>th</sup>

semester. Now question is, when those re-appear students will complete their 3<sup>rd</sup> semester? And, what will they gain in 2<sup>nd</sup> professional, when almost 1/3<sup>rd</sup> of syllabus has already been covered, that's too the basic concepts. Moreover, this problem will be there throughout their remaining career, as they will join every professional late by six months.

Now if we say that reappear students will join 3<sup>rd</sup> semester, it will virtually mean that there will be a separate batch, say "re-appear batch". Then what will happen, when next regular batch will come? That means, for six months a year, all 2<sup>nd</sup> professional departments will have three batches at their disposal from July to December of every year i.e. one batch in 5<sup>th</sup> semester, another in 3<sup>rd</sup> semester and one supplementary batch and two batches for other six months (from January to June of every year), and to run so many batches simultaneously is impossible for all the departments, given the prevailing situation.

Another point of concern is regarding the unutilized six months. Reappear students are not allowed to attend classes of 2<sup>nd</sup> professional; and they are not supposed to attend classes of 1<sup>st</sup> professional because they had already covered syllabus and requisite attendance of 1<sup>st</sup> professional M.B.B.S. Then, what will they do for those six months? Moreover, the re-appear students will lose six precious months of their career, as they join main batch after passing supplementary examination, as stated by MCI regulations, but are examined in 2<sup>nd</sup> professional six month later than main batch, as they have to complete one and half year course of 2<sup>nd</sup> professional M.B.B.S., before they can appear for 2<sup>nd</sup> professional examination, according to MCI regulations which states, "after passing pre-clinical subjects, 1 ½ year (3 semesters) shall be devoted to para-clinical subjects".

Due to this clause of MCI, universities have to follow-in the footsteps and frame rules accordingly. Ordinance 7 of Baba Farid University of Health Sciences, Faridkot (Punjab) [BFUHS, Faridkot] says, "the 2<sup>nd</sup> Professional examination shall be held during the fifth semester in the month of November/December or on such other dates as may be fixed by the Vice Chancellor, and shall be open to a person who after having passed the 1<sup>st</sup> Professional examination, remained on the rolls of an affiliated college for one and a half academic year preceding examination, and has his name submitted to the Registrar through the head of the College/Institute along with the certificates as required by Clause (2) of Ord.6 Supra". [4]

### Research of Court Cases:

These clauses has been constantly challenged in the courts, and many a times courts have allowed re-appear students to attend classes with regular batch and even allowed these re-appear

students to appear in 2<sup>nd</sup> professional exams along with regular batch. Recently, Hon'ble Punjab & Haryana High Court gave verdict in favor of students in five identical cases, which were disposed off collectively. Students were first allowed to attend classes with main batch and subsequently they were allowed to appear with regular batch in 2<sup>nd</sup> professional examination. [2, 3, 5, 6, 7] The learned judges of High Court observed that,

..... "In the present case, notice of motion was issued by a Coordinate Bench on 25.1.2008 and an interim order was passed in favor of the petitioners whereby they were permitted to attend classes of Phase II of MBBS course subject to passing of their re-appear papers. It has been stated that except for Omrao Singh Bawa petitioner No.1 in Civil Writ Petition No.1368 of 2008, all other petitioners in the five writ petitions before us have passed their re-appear examination and have also attended classes of 2<sup>nd</sup> professional examination. We are of the view that the petitioners because of the interim orders have proceeded ahead in their studies, in case we put the clock back, it would cause extreme hardship to the students. During the pendency of the writ petitions, much water has flown. Petitioners except Omrao Singh Bawa petitioner in Civil Writ Petition No.1368 of 2008 have not only passed the re-appear examination but have attended the classes and have been imparted education. Therefore, it will not be just to take away the benefit which has flown to them due to grant of interim orders in their favor. Therefore, without taking the present cases to be precedent binding, we permit the petitioners except Omrao Singh Bawa, to proceed ahead in their studies and undertake final examination of the 2<sup>nd</sup> professional examination." [2]

In an earlier order, same views were expressed by the learned judges of the Punjab and Haryana High Court and the petition of the students to allow them to appear in 2<sup>nd</sup> professional M.B.B.S. exam with the main batch was allowed. Hon'ble High court ruled that,

..... "We are of the view that once the students passing supplementary examination are allowed to join the main batch and complete requisite period of study, they could not be debarred from appearing in the main examination for second professional along with the main batch. Even the University is not taking the period of 18 months as rigid, as the examinations for the main batch are being held before 18 months of commencement of study. From, August 2006 to November 2007, period is 15months. Only difference in the students who join the main batch after supplementary examination and the students who join the main batch from the beginning is a period of 2-3 months and if the students joining the main batch later have been



allowed to complete the said studies, as per the certificate, issued by the college, they should not be debarred from appearing in the main examination of the 2<sup>nd</sup> Professional with the main batch itself. In the present case; as per certificate, Annexure P.3, all the petitioners have completed their attendance and the requisite period of study. Accordingly, we allow this petition and direct that the petitioners be allowed to appear in examination of the second Professional along with the main batch". [8, 9]

But, many a times courts have also dismissed the petitions of the students to give them a chance to appear with the main 2<sup>nd</sup> professional batch, when they were admitted to 2<sup>nd</sup> professional after clearing 1<sup>st</sup> professional supplementary examination. In another recent judgment, while disposing off five writ petitions collectively; [10, 11, 12, 13, 14] a full bench of the Hon'ble P & H High Court dismissed the petition of the re-appear students of Baba Farid University of Health Sciences, Faridkot and denied to grant them the permission to appear in 2<sup>nd</sup> professional examination with the main batch. Observations made by the court were,

.....A plain reading of the above shows that the 2<sup>nd</sup> professional examination held during fifth semester in the month of November/December or on such other dates as may be fixed by the University is open to a person who has remained on the rolls of the affiliated college for 1½ academic year preceding the 2<sup>nd</sup> professional examination and has his name submitted to the Registrar through the Head of the College/institute along with certificates as required under Clause 2 of Ordinance 6. The petitioners do not satisfy the said requirement. They have not been on the rolls of an affiliated college for 1½ academic year preceding examination. That is so because they could not be admitted to Phase-II of the training programme commencing with the third semester anytime before 20th December, 2007 when the result of 1st Professional Supplementary Examination was announced declaring the petitioners successful. The statutory requirement of 1½ year academic study is a condition of eligibility for appearing in the second professional examination, which the petitioners in Civil Writ Petitions No.18206, 18846 and 19120 of 2008 do not satisfy. In the result, these writ petitions fail and are hereby dismissed. [10]

It is pertinent to mention that the two cases mentioned here i.e. CWP no 1192 of 2008 and 17820 of 2008 were filed by the students of the same batch i.e. 2006 of BFUHS, Faridkot. The students who were allowed to appear in 2<sup>nd</sup> professional examination with the main batch by the Division bench of the Court (CWP 1192) had cleared their 1<sup>st</sup> professional in 3<sup>rd</sup> attempt i.e. in May/June 2008, while the students who were denied such chance by the full bench of the same Court (CWP 17820) had

cleared their 1<sup>st</sup> professional in 2<sup>nd</sup> attempt i.e. Nov/Dec 2007. As is clear, students who passed their 1<sup>st</sup> professional earlier were denied to appear in 2<sup>nd</sup> professional with main batch, while those students, who passed their 1<sup>st</sup> professional six months later, were allowed to appear in 2<sup>nd</sup> professional examination with the main batch.

In a case of same gravity, Uttar Pradesh High Court (Allahabad bench) refused to grant any relief to supplementary students who have filed a writ petition to allow them to appear in 1<sup>st</sup> internal examination of 2<sup>nd</sup> professional along with main batch; after passing their 1<sup>st</sup> professional examination in supplementary examinations. [15] The Hon'ble court observed that "*the petitioners have themselves to blame (for their misery) as they did not pass in the 1<sup>st</sup> Professional Main Examination.*"

Without passing any comments on the judgments, the point we are trying to raise is that either granting permission or denying it to appear with main batch by the courts will depend upon the different interpretation of the rules by different Judges; so, why we are leaving our own students at the mercy of the Courts? Why can't we implement the appropriate remedies ?

Height of suffering is that those students, who fail in the 2<sup>nd</sup> professional or 3<sup>rd</sup> professional (Part I) examination, are allowed to join next professional courses. Only rider is that they are not allowed to appear in next professional examination, without passing the previous professional. MCI rules says, "a students who fails in the 2<sup>nd</sup> professional examination, shall not be allowed to appear in 3<sup>rd</sup> Professional (Part I) examination unless he passes all subjects of 2<sup>nd</sup> Professional examination; also passing in 3<sup>rd</sup> Professional (Part I) examination is not compulsory before entering for 8<sup>th</sup> and 9<sup>th</sup> semester training, however passing of 3<sup>rd</sup> Professional (Part I) is compulsory for being eligible for 3<sup>rd</sup> Professional (Part II) examination". [1] If we consider a hypothetical situation; one student who got one failure in 1<sup>st</sup> professional will loose six months but another student who got two failures in 2<sup>nd</sup> professional and two failures in 3<sup>rd</sup> professional (Part I) examination, will still be able to complete his degree in time. Why there is this discrepancy?

### Summary and Conclusions:

Due to this single clause of MCI regulations, students who got even one failure in 1<sup>st</sup> professional examination are:

- bound to loose six precious months
- at the disposal of courts for seeking justice
- at disadvantage throughout their remaining M.B.B.S. course, as they will join every professional late by six months and will miss the very basic concepts of each subject (even Court

orders can't make up for the loss of studies for six months)

- at disadvantage compared to those students who got failure in 2<sup>nd</sup> professional or 3<sup>rd</sup> professional (Part I)
- arranging a separate batch is not feasible for the concerned departments; and moreover MCI rules don't permit it (Re-appear students have to join main batch)

Where lays the remedy? In our opinion, those students who are not able to pass their 1<sup>st</sup> professional examination should also be allowed to join 2<sup>nd</sup> professional. Only rider should be that they should be examined in 2<sup>nd</sup> professional, only after passing all the subjects of 1<sup>st</sup> professional, as is allowed in 2<sup>nd</sup> professional and 3<sup>rd</sup> professional (Part I) examination. A uniform yardstick should apply throughout the M.B.B.S. course. Another solution is that supplementary examination of 1<sup>st</sup> professional may be conducted within 45 days of the main examination, and subsequently the students should be allowed to attend classes and appear in 2<sup>nd</sup> professional with the main batch; subject to their passing in the supplementary examination of 1<sup>st</sup> professional.

This way, re-appear students will not lose their precious six months and also they will not face much difficulty in understanding the subjects of 2<sup>nd</sup> professional. MCI rules also says, "Supplementary examination may be conducted within 6 months so that the students who pass can join the main batch and the failed students will have to appear in the subsequent year." [1] So, there is no bar on the Universities to conduct the supplementary examination within 45 days.

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## Review Article

### The Medico-Legal Autopsy -It's Religious and Social Attitudes

\*Dr. Putul Mahanta

#### Abstract

An autopsy is a post-mortem assessment or examination of a body. It is performed by a physician trained in the specialty and authorized by law. The approach of the **forensic pathologist** to the investigation of a death is different from that of the **hospital pathologist**. Several health care areas are dependent on people's willingness to dispose of their body or parts thereof after death, and the issue of procedures involving corpse's entails important and, to some extent, growing problems. At this time there were still strong religious and social objections to the autopsy.

There are also difficulties in providing corpses for anatomy education. The reasons behind these problems are probably manifold; some would be connected with the attitudes of people in general. This short review paper describe briefly only of its practical aspect of medicolegal autopsy with a brief historical review on its "**Religious and Social Attitudes**".

**Key Words:** Medicolegal Autopsy, Hospital Autopsy, Social Attitudes

#### Introduction:

An autopsy can be described as the examination of a deceased human body with a detailed exam of the person's remains. This procedure dates back to the Roman era when few human dissections were performed; autopsies were utilized, however, to determine the cause of death in criminal cases.

Though *necropsy* is the most accurate term for the investigative dissection of a dead body, the term *autopsy* is used more commonly. Post mortem examination is an alternative expression, but it unfortunately suffers from a lack of precision about the extent of examination, for in some countries many bodies are disposed of after external examination without dissection [1].

Every case the autopsy must be complete, all the body cavities should be opened, and every organ must be examined, because evidence contributory to the cause of death may be found in more than one organ.

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In Partial autopsies have no place in forensic pathologic practice. A complete autopsy is necessary to substantiate the truth of the evidence of eyewitnesses. A poor autopsy is worse than no autopsy at all, as it is more likely to lead to a miscarriage of justice [2].

#### Medico-legal Autopsy:

Autopsy is only one part of death investigation. Body, History and Scene are equally important (**diagnostic triangle**). Each of the three aspects of the death investigation process is equally important (like a three legged tool, which will fall over if one leg is removed or even shortened!).

##### 1. Scene

- Attendance by police officers, police surgeon, forensic pathologist etc.
- The aim is to collect the maximum information with the minimum disturbance.
- Potential for professional conflicts.
- Photography, videos, collection of trace evidences is to done when necessary.

##### 2. History:

- Social - from relatives, friends, police.
- Medical - from GP, hospital notes. Often indicates the likely cause of death.
- Psychiatric - from GP, hospital notes which may help in ascertaining the possibility of suicide.

**3. The medico-legal autopsy:** It is differs from the hospital autopsy in two major respects:

- Purpose: - What happened? To Who, When, Where, Why, and How.
- Technique: - The external examination assumes much greater importance, special dissection techniques and examinations, evidential materials, report formulation or commentary.

**Autopsy authority:**

Instruction for autopsy is derived from a law officer having jurisdiction, i.e. the Coroner, magistrate etc. Authority for autopsy is permanently recorded: how received, from whom, and when.

**Identification of decedent:**

The body must be identified to the Forensic Pathologist as the decedent for whom autopsy authority has been given.

Initial (provisional) identification may be: Visual (relatives), Circumstantial (address, car, papers, cards, keys, and clothes), Medical (scars, teeth, x-rays, DNA).

Permanent record is made of the method of formal identification: Personal (name, title, address), Body tag (record all details), Accompanying documentation. Abdullah Fatteh [3] has stated that the personal effects such as keys, watchband, belt buckle, buttons, cuff links and pieces of unburned clothing can be helpful in establishing the identity of the decedent.

By contrast with the hospital autopsy, the examination of personal effects and clothing is an integral part of the medico-legal autopsy providing information on life style, events leading to death, and often the actual cause of death. List of **jewellery, valuables, and personal effects** should be recorded. Listed description of the **clothing**: - type of garment, colour, fabric type, location, if disarranged, wet/moist/dry, stains (blood, vomit, faeces, urine, semen, dirt, oil, soot, etc.), damage (holes, cuts, tears). Clothing findings are correlated with historical and scene information, e.g. appropriateness of clothing, source of stains, trace materials. Clothing findings must also be correlated with other autopsy data, e.g. injuries, source of blood stains.

A comprehensive autopsy is the solution of difficult cases. Martin-de-Ias-Heras et al [4] has identified charred bodies in a vehicular crush. Their post mortem procedures included a general external examination, routine photographs, dental examinations, dental and general radiographs, and tissues for DNA analysis. They also stated that odontological examination and complementary radiographic procedures to be accurate, economic and rapid methods of identifying this type of victims.

**External Examination:**

This is a detailed head to toe examination of the naked body, documenting stains and soiling, general and specific individualizing characteristics, post-mortem changes (temperature, lividity, rigor mortis and putrefaction). The location, extent and type of **staining or soiling** of the body are described e.g. dual flow pattern of blood from a wound, high velocity impact blood spatter from gunshot wound, coffee grounds vomitus and melaena (upper

gastrointestinal haemorrhage), antiseptic from medical intervention.

**General body characteristics** are recorded, namely: racial group, height, weight, head hair, eyes, nose and ear canals, earlobes, face, mouth, breasts, genitalia, feet.

More **specific identifying characteristics** are described fully: tattoos (location, design, colour, and names), scars (surgical and non-surgical, needle tracks, striae), skin lesions (naevi, senile keratoses and other skin diseases), prosthesis and pacemaker.

Post-mortem changes are to be documented, namely: body temperature to touch (alternatively state if the body has been refrigerated), rigor mortis (extent and degree), hypostatic lividity (distribution, dual pattern, colour, and contact pallor) and putrefactive changes.

The state of natural orifices is to be carefully observed, and any abnormality or discharge if present, must be recorded. The mouth in particular must be examined closely for evidence of salivary dribble, discolouration due to poisoning, peculiar odour, foreign bodies etc. In a suspected drug related death, the nasal orifices must be examined for evidence of 'snorting', i.e. intake of drug by insufflations. [5]

**Evidence of Injury:**

All injuries are described systematically either by grouping them according to anatomical location, or in numerical order. If numbered, it is stated that the order of numbering does not imply sequence of infliction or degree of severity. Injuries are to be described as to their type, location, size, shape and colour.

Internal injuries are described in continuity with the related externally apparent injuries, e.g. the bruising and abrasion to the chest, then the fractured ribs, then the lacerated lung and haemothorax. This organization of the final report frequently does not correspond with the order of dissection and dictation of findings. In the final report remote injuries are segregated from recent injuries under separate subheadings.

Signs of **medical intervention** should be described under a separate heading. This includes all medical equipment attached to, or accompanying, the body, e.g. urinary catheter, endotracheal tube, oral airway, rods for external fixation of fractures, arterial and intravenous lines, intravenous solutions or blood (with details of contents). External surgical incisions are described in continuity with the internal evidence of surgery.

**Internal Examination:**

It is a systematic description of natural disease and does not include recent injuries. Negative observations are included. It has been suggested that if a conventional autopsy is difficult or impossible to

undertake for any reason, a post-mortem endoscopic examination can be performed with the help of a trocar and telescopic device coupled to a video camera [6]. This is called endoscopic autopsy.

### Other Examinations:

Other Examinations like special dissections, e.g. neck dissection, or further examination of organs e.g. brain after formalin fixation, together with microscopic, biochemical, and toxicological studies should be described at this point.

Collection of specimens should be done carefully if reliable analytical results are expected. Blood, urine, stomach contents, intestinal contents, or gans [liver], CSF, bile, and ocular fluid may be required [7]. Histological examination of tissue, even if only to exclude some natural diseases is also needed sometimes. The required tissue is placed in sufficient quantity of formalin, and allowed to fix for several days before processing. The volume of fixative should be six times the total volume of tissue. There are several specialized procedures in use at present, such as histochemistry, fluorescent microscopy, and immune-histochemical examination, if evidence of early myocardial infarction is being sought. However, even light microscopy can be helpful in many cases. [8]

**Cause of Death:** It is the disease process or injury responsible for initiating the train of events, brief or prolonged, which produces the fatal end result, should be mentioned. It should always include:

- a) **Mechanism of Death:** The physiological or biochemical derangement produced by the above cause, which is incompatible with life; i.e. how the disease or injury leads to death and
- b) **Manner of Death:** The fashion in which the cause of death came into being; i.e. whether natural, accident, suicide, homicide, unclassified (alcohol/drug deaths) or undetermined.

### Opinion of an Autopsy Report:

Forensic Medicine is best learned by a judicious combination of theoretical and practical knowledge. A good forensic expert is one who has not merely a vast experience in conducting autopsies, but one who has trained himself to make precise and correct interpretation of findings. One must not allow dogmatism or inflexibility to cloud one's judgment. [9] This section is interpretative and subjective, representing the opinion of the author. It includes the cause of death as appearing on the death certificate. The commentary is in simple English and brings together all the relevant information obtained from examination of the body, the scene of death and the history of the decedent. Information obtained second-hand (hearsay) may be included e.g. from police reports, medical records, fire investigation reports. The relevant issues are addresses i.e. what happened,

to who, when, where, why and how. It may be as brief or as detailed as the need dictates. It is directed to the law officer investigating the death and any other legally interested parties who may obtain access to the report subsequently. The commentary is analogous summary of a hospital autopsy which brings together the pathological autopsy findings with the clinical findings and subsequent progress.

All medico-legal reports require the original **signature and seal** of the author. Relevant degrees and other qualifications are to be given with the occupational titles.

### Religious and Social Attitudes:

At this time there were still strong religious and social objections to the autopsy. Although in the early years of Christianity there was no formal church prohibition, certainly the general attitude of church leaders was unfavorable. Both Tertullian (160-230) and Augustine (354-430) wrote strongly against dissection, apparently more on humanitarian and aesthetic grounds than on any theological basis. Vindician, a physician and friend of Augustine, is quoted in a tenth century manuscript from Monte Cassino as saying, "It pleased the ancient anatomist to examine the viscera of the dead to learn in what way they died, but for us humanities prohibits this"[10].

There were no official church decrees on the subject but at the Council of Tours in 1163 it was affirmed that "the church abhors blood." This was interpreted to mean that the clergy could not perform surgery on the living or the dead. Since most physicians did belong to the clergy this fairly effectively prevented autopsies, but did not absolutely forbid them. In 1299 Boniface VIII forbade the cooking of bodies to separate the flesh from the bones. This had been done to bring home the bones of people who died on crusades. Although the ruling specifically referred to cooking the body, many people interpreted it to forbid any dissection' [11].

Nevertheless, it was about this time that a few physicians began to dissect and eventually the church attitude was modified. In 1410, Pope Alexander died suddenly and was autopsied by Pietro D'Argelata. Pope Sixtus IV (1471-1484) issued a bill permitting studies on human bodies by students at Bologna and Padua, and Clement VII (1523-1534) confirmed this. In 1556 Ignatius Loyola was autopsied. Stones were found in the kidneys, bladder, and gall bladder. [12]

It therefore appears that by this time autopsy was fully accepted by the Catholic Church. In fact, one autopsy had been performed in 1533 specifically for a religious reason. According to the New World History, compiled by Oviedo y Valdes, in the sixteenth century, there was born in 1533 in Espafiola

(now the Dominican Republic) a double monster, female twins, joined from the region of the umbilicus to a point in the thorax just below the breast. Of course, the infants were to be baptized, but the priest was uncertain as to whether one soul or two souls required baptism. The father reported that one would cry while the other was quiet, one might sleep while the other was awake. Two baptisms were performed, but the priest was still uneasy. When the infants died at the age of 8 days an autopsy was done in the hope of settling the question. Since two complete sets of internal organs were found, it was decided that there probably were two souls. Chavarria and Shipley, who located and translated this fascinating story, commented that this was perhaps the only post-mortem examination ever conducted to study the soul of the deceased [13].

Respect for the body was an important part of the Jewish tradition, since the Bible taught that God created man in his image. Handling a dead body made a man unclean for several days, but there were rules for his purification. Nevertheless, it was emphasized that the body must be treated respectfully and buried promptly. Even for a criminal put to death, hanged on a tree, "his body shall not remain all night upon the tree, but thou shalt in any wise bury him that day." These laws were interpreted by the rabbis to forbid post-mortem dissection which would be a disgrace to the body. However, it is recorded that about 100 AD the students of the Rabbi Ismael obtained the body of a young harlot who had been executed and boiled it in order to count the number of bones. They found 252 [14].

There is one passage in the Talmud stating that if an autopsy would save the life of an accused murderer, it would be permitted. Autopsies were otherwise not approved by Jewish authority until the eighteenth century when Rabbi Landau was asked if it were permissible to make an incision in the body of a patient who died of cancer, in order to learn the proper therapy in future cases. Rabbi Landau replied that autopsy is a desecration of the dead and is only permissible to save the life of another patient immediately at hand, not some problematic future patient [15]. This ruling was apparently maintained by orthodox Jews until the twentieth century when the Knesset, the Israeli parliament, passed a law permitting autopsies under strictly limited conditions. [16]

Some indications of the popular objections to autopsies may be noted. In 1538, Guillaume Rondelet (1507-1566), a scientist in Montpellier, autopsied his own infant son and later requested that autopsies be performed on his sister-in-law and his first wife. This is told in a biography dated 1578, by his pupil Joubert, who comments, "a cette époque le public avait l'anatomie en horreur". [17]

Vesalius, the noted anatomist, who practiced medicine and performed many autopsies, died in 1564 during the return from a pilgrimage to Jerusalem. Many years later a biographer, Melchior Adam, published a letter allegedly written by Hubert Languet in 1565, stating that Vesalius had been forced to make this pilgrimage as expiation for the sins of murder and impiety. O'Malley is convinced that there is no foundation of fact for this story, [18] but points out that it may be based on the same rumor referred to by Ambroise Pare, who, writing in 1573, warned against opening a body too soon and noted that "in this century it happened that a great anatomist . . . I say great and famous . . . then a resident in Spain was ordered to open the body of a woman believed to be dead of suffocation of the womb. At the second cut of the razor the woman began to move and show other signs that she still lived . . . the good master had to leave the country and being exiled, soon after died of grief which was certainly a great loss for the Republic" [19].

Jarcho has called attention to the problems of performing autopsies in Germany in 1670. In a medical periodical of that year, there is an autopsy report with a comment, "the other structures could not be examined because a female relative changed her mind. Our people have a great horror of autopsies and very rarely allow them unless special persuasion has been used." The editor of the journal added a discussion of the difficulties of obtaining permission and some possible answers to the objections of relatives [20].

Popular reluctance for autopsies at a slightly later period is also evident by the fact that, when in 1699 the Republic of Lucca established rules designed to limit the spread of consumption which included the recommendation of autopsies; the ruling had to be revoked because of the citizens' objections [21]. Even today these attitudes are still encountered, and further consideration would carry us too far afield.

### **Conclusion:**

Some Forensic Pathologists argue that more autopsies are performed than necessary. However, recent studies show that autopsies can detect major findings about a person's condition that were not suspected when the person was alive. And the growing awareness of the influence of genetic factors in disease has also emphasized the importance of autopsies. It is important to note that autopsies can also provide peace of mind for the bereaved family in certain situations. Therefore autopsy should be encouraged in all communities regardless of religion upon all unnatural death for the check of justice. The key is the renewed understanding by pathologists and clinicians and hospital administrators about the role of an autopsy in health care. The autopsy room

should not be seen as the place where sorrow and the spectre of death come alive, but rather it should be where death rejoices to aid the living.

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### **Join Quality of Medical Education Group and serve the Humanity**

**Quality of Medical Education** is directly related to **Quality of Health Care Services** in any Country, which in fact directly related to **Quality of Health/Life** of its **Citizen**. Healthy mind can only reside in healthy body. By improving the **Quality of Medical Education** one can thus, serve **humanity**.

This is a group of like minded persons who wishes to participate in improving quality of medical education in India in democratic manner. Mainly **Medical Doctors, Medical Teachers, Lawyers, Social Activists, Journalists, etc.** can become member of this group. Information pertaining to improving the quality of medical education may be shared on this platform.

#### **FAQs**

#### **Q. Who can become member?**

Anybody whether doctor or not can become member of this group:

- If you are ready to serve the nation
- If you can spare at least two hours a week
- Basic knowledge of computer and use of internet
- If you can donate some money whenever needed to protect the interests of group (voluntary)
- Send your suggestions, publicize the group among your colleague
- Group can offer free legal advise on any issue to improve the quality of medical education in India

#### **Q. How I can become member of this group?**

Follow these steps:

- Copy and paste / type following web address in your browse:
- Web Address: [http://groups.yahoo.com/group/Quality\\_of\\_Medical\\_Education/](http://groups.yahoo.com/group/Quality_of_Medical_Education/)
- Click Button “Join Group”
- **Enter your Yahoo email ID**
- **Submit request**

#### **Q. Is there any fee for becoming member of this group?**

- No, you need not to pay any fees to become member of this group

#### **Q. Can a non-medical person become member of this group?**

- Yes, a non-medical person can also become its member. In a democratic setup opinion of even a single person kept meaning, particularly when it is related to one of the most important **Fundamental Human Right** i.e. **Right to Quality of Health Care** part of **Right to Life** protected by the **Indian Constitution** under **Article 21**.

#### **Q. To whom I can contact in case of any difficulty?**

- You can contact on following address:
  - Prof (Dr.)Muksh Yadav
  - Email: [drmukesh65@yahoo.co.in](mailto:drmukesh65@yahoo.co.in)
  - Group email address: [Quality\\_of\\_Medical\\_Education@yahoogroups.com](mailto:Quality_of_Medical_Education@yahoogroups.com)
- Group home page location: [http://groups.yahoo.com/group/Quality\\_of\\_Medical\\_Education](http://groups.yahoo.com/group/Quality_of_Medical_Education)
- Play your much awaited role in improving the **Quality of Life** of your fellow colleague and future generation and serve the humanity. Help in Improving the Indicators of **Human Development Index of India** (Life Expectancy, Maternal Mortality, Infant Mortality, etc.) and help **Mother Land India**, to become a **Developed Nation** and **Global Leader** in **Health and Medical Education Industry**.

*Mukesh Yadav*