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From Editor's Desk

JIAFM

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I feel immense pleasure to present before you the First issue of 2013. I would like to inform all of you that our esteemed Journal of Indian Academy of Forensic Medicine which is published quarterly since 1991 has been started gaining wide recognition not only in India but globally among the scientific community. I am trying to maintain your faith and trust in me to bring this journal to highest level of its achievements.

I have received many requests from other countries about inclusion of many papers in their indexing data base, including USA Government agencies. JIAFM is indexed not only in **IndMed** and **MedInd Indian indexing** agencies but also in the **SCOPUS**, **IMSEAR** informed by the **Information Management and Dissemination (IMD)**, **World Health Organization, Regional Office for South-East Asia, Indraprastha Estate, New Delhi, India**. It is hoped that once this journal indexed in IMSEAR it would be automatically indexed in the **Global Index Medicus managed by WHO Headquarters in Geneva as informed**.

The title mentioned above has been evaluated for inclusion in **SCOPUS by the Content Selection & Advisory Board (CSAB)**. The review of this title is now complete and the CSAB has advised that the title will be **accepted** for inclusion in Scopus. For your information, the reviewer comments are copied below:

This is a well produced journal in an important subject field with interesting content, which deserves a wide readership. The editors are to be commended on their efforts.

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.

Professor [Dr.] Mukesh Yadav
Editor, JIAFM

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Editorial

RTI and Medicolegal Cases

Right to Information Act, 2005 has inherent tension between conflicting rights i.e. right to privacy, right to autonomy, public interest etc. especially pertaining to medical profession. Many situations do come in direct confrontation with RTI as in case of Medicolegal Reports, Post-mortem Reports, medical records etc. many such issues come for appeal before appellate authorities i.e. Central Appellate Authority appointed under Central Information and various courts including High Courts and Supreme Court of India.

Many conflicting judgments of CIC, and courts in these matters further confused the issue of RTI and medical profession.

The subject matter of Right to Information, privileges and exceptions came before Hon'ble Supreme Court and Delhi High Court which involved questions of great importance concerning balance of rights of individuals and equities against the backdrop of paradigm changes brought about by the legislature through the Right to Information Act, 2005 ushering in an era of transparency, probity and accountability as also the increasing expectation of the civil society that the judicial organ, like all other public institutions, will also offer itself for public scrutiny.

SC Views on need for RTI:

It is pertinent to cite a judgment of the Honourable Apex Court in *The State of U.P. vs. Raj Narain and Others* wherein it has been held:

"In a government of responsibility like ours, where all the agents of the public must be responsible for their conduct, there can be but few secrets. The people of this country have a right to know every public act, everything that is done in a public way, by their public functionaries. They are entitled to know the particulars of every public transaction in all its bearing. The right to know, which is derived from the concept of freedom of speech, though not absolute, is a factor which should make one wary, when secrecy is claimed for transactions which can, at any rate, have no repercussion on public security. To cover with veil of secrecy, the common routine business is not in the interest of the public. Such secrecy can seldom be legitimately desired. It is generally desired for the purpose of parties and politics or personal self-interest or bureaucratic routine. The responsibility of officials to explain and to justify their acts is the chief safeguard against oppression and corruption. To justify a privilege, secrecy must be indispensable to induce freedom of official communication or efficiency in the transaction of official business and it must be further a secrecy which has remained or would have remained inviolable but for the compulsory disclosure. In how many transactions of official business is there ordinarily such as secrecy? If there arises at any time a genuine instance of such otherwise inviolate secrecy, let the necessity of maintaining it be determined on its merits."

Another pertinent judgment of the Honourable Apex Court in *Union of India vs. Association for Democratic Reforms and Another* wherein the Honourable Apex Court referring to its earlier judgment delivered in *Dinesh Trivedi M.P. and Others vs. Union of India and Others*, would held:

"The right to get information in democracy is recognised all throughout and it is natural right flowing from the concept of democracy. At this stage, we would refer to Article 19(1) and (2) of the International Covenant on Civil and Political Rights which is as under:

(1) Everyone shall have the right to hold opinions without interference. (2) Everyone shall have the right to freedom of expression; this right shall include freedom to seek, receive and impart information and ideas of all kinds, regardless of frontiers, either orally, in writing or in print, in the form of art, or through any other media of his choice."

In a case it was observed that "One basic fact regarding the ownership of medicolegal records, is that the medicolegal documents, especially the post-mortem report belongs to the requestor i.e. the police and the same is held by the doctor in fiduciary relationship". It was decided in *Baba Gurcharan's* case in eighties, a MLC becomes a public document only when it is filed in the court.

In a 12 Jan 2010 judgment by Delhi High Court, a three judge bench decided that medical details of an individual cannot be made public and cannot be given under RTI.

Copy of Post-mortem Report (PMR) cannot be given to the claimant wife of deceased held in another landmark case. Copy of Medical Record (MR) cannot be given held by Delhi High Court in January 2010.

If any request is made for medical records either by the patients/authorized attendant or legal authorities involved, the same may be duly acknowledged and documents shall be issued within the

period of 72 hours. (Chapter I, Point 1.3.2) Medical records cannot be given to another person until unless authorized by patient, as doctor is duty bound to maintain confidentiality of patient as per the MCI Regulations 2002.

Regulations reads as "Confidences concerning individual or domestic life entrusted by patients to a physician and defects in the disposition or character of patients observed during medical attendance should never be revealed unless their revelation is required by the laws of the State. Sometimes, however, a physician must determine whether his duty to society requires him to employ knowledge, obtained through confidence as a physician, to protect a healthy person against a communicable disease to which he is about to be exposed. In such instance, the physician should act as he would wish another to act toward one of his known family in like circumstances". (Chapter II, Point 2.2)

It may amount to professional misconduct on the part of physician, Regulations read as "If he/she does not maintain the medical records of his/her indoor patients for a period of three years as per regulation 1.3 and refuses to provide the same within 72 hours when the patient or his/her authorized representative makes a request for it as per the regulation 1.4.2." Chapter II, Point 7.2)

Doctor-Patient relationship:

Doctor-patient relationship falls under the category of "fiduciary" i.e. doctors are also bound by ethical regulations and keep information gained from patient confidential and can only be disclosed when situations of 'privileged communications' demands in larger public interest.

Delhi High Court observed that "Section 8(1)(f) affords protection to one such class, i.e. fiduciaries. The content of such provision may include certain kinds of relationships of public officials, such as doctor-patient relations; teacher-pupil relationships, in government schools and colleges; agents of governments; even attorneys and lawyers who appear and advise public authorities covered by the Act".

Scenario in Tamil Nadu:

In a case Selvanathan @ Raghavan and 9 Others vs. State by Inspector of Police, Madras and Others wherein the Full Bench of Madras High Court has held:

"... At any rate, R.339 (of the Criminal Rules of Practice) does not postulate that the accused is entitled to copies at any stage. Held that accused are not entitled to certified copies of the Post-mortem certificate, requisition given by the police officers to the Medical Officer for conducting post-mortem and medically treating the injured, before the final report is forwarded to the Magistrate, as contemplated under S.173(2) of the Code".

Only person affected in natural and accidental way can request for it; Court, police, and public authorities can ask as per the law of land.

Medico-legal cases also include cases referred by Courts of law, and other prosecuting agencies to the hospital, wherein disclosure of information/supply of records to the parties involved in the medicolegal cases, can very well be withheld by the hospital, as this would be obligatory on the part of the hospital, matter being sub-judice. Such information is also exempt under RTI Act, and has been upheld by CIC.

Certified copy of PMR/MLR cannot be issued under RTI and is covered under the Exemption of Section 8(1) (j) of RTI Act as per various decisions of Central Information Commission.

In another landmark case of Veerapan encounter, Madras High court while dismissing the petition filed by the wife of deceased for asking post-mortem report of his husband under RTI held that "In consideration of the facts pleaded, having regard to the materials placed on record and upon hearing the learned counsel for the petitioner and the learned Public Prosecutor, High Court, Madras and senior counsel, what this Court could assess is that the petitioner is the wife of Veerappan who was killed along with three others by the Tamil Nadu Special Task Force, no mention need be made that he was wanted in many number of cases ranging from murder to forest offences".

Court further observed that "The petitioner stating that there are considerable doubts in the manner in which the Task Force claimed that her husband was done to death along with three others in an encounter, but he was secured along with others and keeping under the custody of the police for two or three days illegally, tortured and ultimately killed, as it comes to be argued on the part of her counsel and therefore in order to project the proper case before the Human Rights Commission against the concerned authorities as against the fake encounter, she has sought for the copy of the Post Mortem Certificate which would tell tales of the fake encounter perpetrated against her husband".

Reasonable Restrictions for procedure for issuance of PM Report:

Court further clarified by observing that "The learned counsel would cite from various Sections of law and even from Article 19(1) (a) of the Constitution of India which generally pronounce the right to

information by citizen; that it is a public document that parties are entitled to normally get the copies of the documents and that freedom every citizen of this country is enshrined with".

Court further added that "But, all these rights generally declared either in favour of citizens of this country or parties to the prosecution or litigation are only subject to certain reasonable restrictions either imposed by law or even by Rules, conventions, precedents etc. and one such restriction that is imposed regarding the issuance of a copy of the Post Mortem Certificate, which is the subject matter of the above petition, is Rule 591 of the Madras Police Standing Orders which is positive to the effect that 'originally the Post Mortem Certificate has to be sent by the Medical Officer direct to the Magistrate concerned in a sealed cover, the police being given a copy of it immediately after the examination is over' thus setting the procedure as to the issuance of the Post Mortem Certificate and therefore revoking such procedures established by law, this Court or any other court for the matter is not entitled to order to issue the copy of the Post Mortem Certificate particularly when the investigation into the case registered regarding the death in encounter by the respondent Police is still pending finality of decision by the police themselves and since the field is occupied entirely by the respondent, as it is held on the part of the Honourable Apex Court in general regarding any criminal case registered which is under investigation that the Courts are little or no chance to order such applications, citing the general provisions of law or even the Constitutional provision which would set the outer line without specifying anything which has to be decided in the manner provided under the law on the specific subject and the propositions held by the upper forums of law do not help the case of the petitioner".

Scenario in MP:

According to MP Police Regulations, No document or record belonging to, or in the custody of the police, and no copy of or extract from any such document or record will be furnished to any private individual unless a percept of competent court is received by the Police. However, copy of or extract from a post-mortem report may be supplied free of cost by the Police to any department of the Central or State Government and autonomous or corporate body, if the supply of the same, in the opinion of the Superintendent of Police, is not likely to affect adversely public interest.

Scenario in UT Chandigarh:

As per Chandigarh Administration (Union Territory) orders dated 29.1.2009 require firstly a notarized affidavit in the name of the applicant stating his relationship with the deceased/injured and the particular purpose for which copy of PMR/MLR is needed and the number of copies needed; and secondly an NOC from the concerned police station (investigating the case) clearly stating that the issue of copies will not hinder the investigation.

Scenario in Mizoram:

Further RTI Act 2005 Manual of Health & Family Welfare Department, Government of Mizoram [29 states that Post mortem report is considered to be classified item as such, the report cannot be disclosed to the public without the authority of Ist Class Magistrate.

If affected party is asking for a record in road traffic accidents or where some issues of compensation or some relief is there, then attested photocopy of the record can be given to the victim or next of kin on written request. A production fee can be officially decided by the hospital as a part of its declared policy.

In cases, where injuries are produced as part of criminal offence then leakage of information before Police file a challan in the court of law, unauthorized leakage or communication is not permitted.

RTI and Medical Education:

Right to Information can be used to improve the quality of medical education by asking information from Medical Council of India or Ministry of Health & Family Welfare, Government of India, University Grant Commission and other concerned health and medical education authorities.

Dr.Mukesh Yadav
Editor, JIAFM

Original Research Paper

Significance of Gastric Lavage in Viscera of Death Due to Poisoning

*Akhilesh K. Pathak, **Bijaysing Rathod, **Ashok Mahajan

Abstract

Failure to find any poison in viscera of the individual whose death was allegedly due to poisoning is a routine problem in India and the reasons of it are explained by various authors. In practice of Forensic Medicine, it is commonly observed in hospitalized patients who are treated for few days before death. The present autopsy based retrospective study was carried out on 289 corpses, which were brought to us for autopsy examination in year of 2008. The aim was to increase the results of positive FSL report to confirm and assure the exact nature and type of poisoning on the basis of chemical analysis and hence to achieve this particular aim we at our center also send additional sample of gastric lavage other than routine viscera of autopsy. After our this process of investigation, we found that the positive results of chemical analysis which were 53.36% without the samples of gastric lavage improved significantly to 83.33% after sending the lavage sample with routine viscera of autopsy, which suggest that the investigation and correlation of ante-mortem samples with viscera reports are of great significance and cannot be ignored, so as to reach a confirmatory conclusion.

Key Words: Poisoning, Viscera, Lavage, Autopsy, Sample, Corpse

Introduction:

Poisoning is a significant contributor to mortality and morbidity throughout the world. [1] According to WHO (1999) more than three million poisoning cases has been reported out of which 2,51,881 deaths occur worldwide annually, Out of which, 99% of fatal poisoning occur in developing countries, predominantly among farmers due to various kinds of poisoning, including poisonous toxins from natural products are handled. [2, 3] Deliberate self poisoning is the commonest form of poisoning in adults and accounts for at least 95% of all poisoning admission to hospital.

In India majority of death due to fatal poisoning are of married males of 10-30 years of age belong to low socioeconomic status from a rural area, which had been observed by others authors. [4-8] the recognition of poisoning during autopsy and after that is important; for autopsy surgeon in order to identify the exact nature as well as to unmask the manner of poisoning.

Incidences are common where no trace of poison was detected on chemical analysis of viscera, while from history and other circumstantial evidences it is almost certain or quite certain that poison was the cause of death. [1] It may be due to many reasons, but commonly observed in hospitalized patients in whom either the poison has been removed from the stomach and intestines, or detoxified, conjugated and eliminated by the kidneys and other channels or the quantity present is below the detection limits which makes its detection difficult or even impossible during the routine chemical analysis. [9] In present study we tried to find out that whether we can improve the results of chemical analysis by sending additional sample of lavage (which was the only ante-mortem sample collected during treatment) other than routine viscera of autopsy.

Material & Methods:

This autopsy based retrospective study was conducted in the Departments of Forensic Medicine Govt. Medical College, Vadodara (Gujarat, India). During the period of one year from January to December 2008 total 1712 medico-legal autopsies were conducted and out of them 289 (16.88%) cases of death due to poisoning were selected for the present study. In all cases, detailed and complete autopsy examination of the corpses was done and routine viscera of autopsy (stomach and loop of

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small intestine with their contents, pieces of liver, spleen and kidneys and sample of blood) were preserved in saturated solution of common salt for chemical analysis. To increase the specificity of results of chemical analysis, additional samples of gastric lavage were collected from the casualty and were also sent other than routine viscera of autopsy.

In present study gastric lavage was available for chemical analysis only in 186 cases (64.36%), while in rest 103 cases (35.64%) it was not available due to inclusion of received dead cases, cases of inhalational poisoning and corrosive poisoning and the cases which were brought to us from private hospitals from where lavage sample was not sent with dead body.

The results were analyzed after receiving the chemical analyzer reports and the details of the parameters used in the study were filled up in Performa and finally conclusions were drawn after comparing and discussing with similar type of the work carried out by the foreign and Indian authors.

Results:

During the period of present study total 1712 autopsies were conducted and out of them 289 cases (16.88%) of death due to poisoning were studied in detail. In all these cases routine viscera were preserved for chemical analysis, and the analysis was done at Forensic Science Laboratory Surat (Gujarat). In present study gastric lavage was available for chemical analysis only in 186 cases (64.36%), while in rest 103 cases (35.64%) it was not available to send with viscera. In 92.04% cases we received FSL reports while only in 7.96% cases FSL reports were not received till the date of this study. (Table 1)

The analysis of results of FSL reports shows that when additional sample of gastric lavage was also sent other than routine viscera of autopsy the poison was detected by FSL report in 83.33% cases while it was not detected only in 9.68% cases and in rest 6.99% cases FSL reports are not received till the date of this study. (Table 2) On the other hand when additional sample of gastric lavage was not sent with routine viscera, poisoning was confirmed only in 53.36% cases and not confirmed in 36.9% cases. Analysis of the cases according to duration of hospital stay shows that as the duration of hospital stay increases the positivity of FSL reports were also increasing in cases where we have sent the additional sample of gastric lavage with viscera as compared to other cases where we did not sent it. (Table 3) After adding lavage sample, the incidences of positive

FSL reports become almost double in cases where the hospital stay was about 4-7 days and increased up to almost six times in cases where the hospital stay was up to more than 7 days.

Discussion:

Diagnosis of death due to poisoning and detection of specific poison by chemical analysis of viscera is a routine procedure during the practice of Forensic Medicine. Vadodara is a city of mid Gujarat in India and as the chemical factories are more, it is also known as a 'chemical city'. Our institute is a tertiary health center of Gujarat and we are doing every year around 1800-1900 autopsies in Department of Forensic Medicine.

Failure to detect any poison in the viscera or other specimen of the individual whose death was allegedly due to poisoning is not expected here due to incorrect sampling of fluids and tissues or their improper preservation, but rather commonly observed in hospitalized cases where the patients were treated for few days before the death. In such cases of false negative viscera reports, analysis of gastric lavage, blood and urine samples collected during the treatment may help us to detect the exact nature of poison and cause of death.

But similar to other health centers in India here also the investigations done before death of the victims are not analyzed with post-mortem investigations, which unable to detect the exact nature of poison and to confirm the poisoning as a cause of death in such cases.

On the other hand it also creates an unwanted legal contradiction in the circumstances of death as the investigating agencies believe that results of FSL are reliable and accurate and performed by a competent scientific officer, which is an incorrect presumption, because chemical analysis of viscera of autopsy has a good specificity and poor sensitivity as the laboratories use several methods to screen for toxins and there is no single, accurate, inexpensive method that detects all toxins.

There can be other limitations also because each method differs in cost, accuracy, complexity, speed and specificity. Problems may also arise from the changes that occur in the storage of biological fluids, the transfer of drugs from tube to tube, and the standards used to test the particular drugs and poisons. [10] So it is not wise always to blame the autopsy surgeon for not able to confirm poisoning as a cause of death in cases of alleged poisoning.

In present study, to improve the results of chemical analysis in favor of circumstances of death we collected ante-mortem samples of

gastric lavage from the casualty department (which was the only sample preserved during treatment) and was sent for chemical analysis with viscera of autopsy. After receiving FSL reports, results were analyzed and we found that positive results (detection of poison) improved from 53.36% to 83.33% after sending additional sample of lavage other than viscera.

When the results were analyzed with hospital stay of the patients we found that the incidences of positive FSL reports increased to almost six times in cases where the stay was more than 7 days. It clearly showing that if we sent additional antemortem samples (lavage, blood and urine) of the victim other than viscera of autopsy, we can improve the positivity of FSL report to a good range which further increase the efficiency of autopsy surgeon to diagnose the poisoning especially in hospitalized patients where the exact nature of poison cannot be detected in viscera due to any reason.

Limitations of this study are that we could receive only lavage sample from casualty because it was the only sample preserved during treatment and secondly we have to also rely on its sampling and preservation done by others. The results of FSL reports were given in collective form by the chemical analyzers, which were also not informative regarding the individual specimens sent for analysis.

To improve the results in medico-legal field hospital administrators and the policy maker should take the help of Forensic Experts regarding the proper sampling, preservation and transportation of tissues and fluids for chemical analysis so the quick results can be achieved. A laboratory for easy, quick and confirmatory diagnostic tests for common poisons should be established in hospital setup, so that the specific life saving treatment can be given to the patients

in golden hours of emergency in cases of fatal poisoning.

Conclusion:

The present study was done to analyze the role of ante-mortem investigations in diagnosis of death due to poisoning and to find the possibilities by which we can improve the results of chemical analysis of viscera taken during autopsy. Finally more research at this centre as well as other centers also needed to provide a better understanding of the role of lavage sample in viscera of death due to poisoning and how we can further reduce the incidences of false negative reports of chemical analysis. The policy makers should take the help of Forensic Experts for better results and possible substitution of methods.

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Table 1: Distribution of Cases according to Gastric Lavage & FSL Report

Cases	Gastric Lavage		FSL Report	
	Sent with Viscera	Not Sent with Viscera	Received	Not Received
Number	186	103	266	23
Percent	64.36%	35.64%	92.04%	7.96%
Total	289 (100%)		289 (100%)	

Table 2: Analysis of FSL Reports when Gastric Lavage was sent/not sent

Gastric Lavage	Poison Detected	Poison Not Detected	Report Not Received	Total
Sent with Viscera	155 (83.33%)	18 (9.68%)	13 (6.99%)	186 (100%)
Not Sent with Viscera	55 (53.36%)	38 (36.90%)	10 (9.74%)	103 (100%)

Table 4: Analysis of Cases with Duration of Hospital Stay

Hospital Admission (In days)	Gastric Lavage Not Sent & Poison Detected	Gastric Lavage Sent & Poison Detected
	Number (%)	Number (%)
< 1 day	38 (69.09%)	66 (42.58%)
2-3 days	15 (27.27%)	72 (46.45%)
4-7 days	02 (3.64%)	08 (5.16%)
>7 days	00 (0%)	09 (5.81%)
Total	55 (100%)	155 (100%)

Original Research Paper

Perinatal Autopsy: A Study from India

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Abstract

The objective of present study are to describe and analyze data of all perinatal deaths and determine how often the perinatal autopsy identify the cause of death even though there is steady decline of perinatal autopsy rate worldwide and compare accuracy of ante mortem diagnosis(USG) with that of autopsy findings. It was a prospective study performed in India where 70 perinatal autopsies performed. Results show congenital malformation, 70%, is the major cause of death & neural tube defect, 92% is on the top. Autopsy and ultrasound findings were same in 63% cases, where as ultrasound diagnoses were found wrong in 11.43% cases. Autopsy successfully identified the cause of death in each and every case(100%). This study shows that perinatal autopsy is the gold standard to detect the cause of perinatal death. In a country like India where perinatal death rate is still high but perinatal autopsy rate should be improved as perinatal autopsy can reveal a specific disorder for which precise strategies for prevention can be formulated.

Key Words: Perinatal death, Perinatal autopsy, Congenital malformation

Introduction:

The term “**Autopsy**” derives from the ancient Greek word “autopsia” that means “to see for oneself” derived from (autos- “oneself”) and (Opsis-“eye”). [1] Perinatal death is unfortunate but common clinical problem and the family seeks and deserves answers regarding the cause of death. Perinatal autopsy information facilitates emotional and psychological recovery, exact diagnosis for accurate counseling and future pregnancy planning. Perinatal autopsy remains the gold standard in investigating the perinatal death. [2]

According to Saller D.N. study in 55.3% cases the pathologic diagnosis confirms the clinical diagnosis and in 44.7% cases it changed or significantly added to the clinical diagnosis. [3] Some of the physicians think that antenatal sonography is enough for diagnosing the cause of death. However as illustrated by the Routine Antenatal Diagnostic Imaging with Ultrasound (RADIWU) antenatal ultrasound examinations fail to serve the purpose.

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These techniques cannot identify a large proportion of major congenital anomalies for which autopsy are must. [4] The clinical and autopsy diagnosis were compared and categorized as follows, Confirm (clinical and autopsy diagnosis concordant), Change (clinical and autopsy diagnosis discordant), Add (significant unexpected findings noted on the autopsy although the clinical diagnosis was not altered), Autopsy inconclusive, (Autopsy not done or not available). [3]

Despite its importance perinatal autopsy rates have been declining due to, well publicized events ‘Organ retention scandal’ in UK notably in Alder Hey hospital [5] leading to adverse public perception to autopsy, Reluctance to request for autopsy by the clinicians, partly because of administrative constraints, difficulty in obtaining consent from parents / family member due to religious belief, [6] Potential of litigation if a clinically important misdiagnosis has been identified. In India perinatal death rate is high but perinatal autopsy is rarely performed.

The ignorance about the benefits and cost constraints, unfortunately lead to reluctance towards autopsy. Once a couple faces a fetal demise there are always concerns about the cause of death and its recurrence risks. Among all modalities perinatal autopsy is the best mode to answer these queries that is why perinatal autopsy is so important.

Objective:

- To describe and analyze data of all perinatal deaths and determine how often the

perinatal autopsy identify the cause of death and compare accuracy of antemortem diagnosis (USG) with that of autopsy findings.

Materials and Methods:

This study is a prospective, non interventional, conducted in a medical college in India, between January 2011 to Oct 2011. This study includes the perinatal death i.e. the death of a fetus weighing 500 gm or more at 22 or more weeks of gestation and the death of an infant between birth and at the end of the neonatal period. After the delivery, informed and written consent was taken from the parents or guardian, for a fetal autopsy procedure. They were told that such a procedure will help diagnose the cause of fetal death, and also will be useful in assessing the risk of recurrence.

Detailed maternal medical and obstetric history including the laboratory and ultrasonographic reports were reviewed. In each case the autopsy was done according to the Standard Protocol in the following order: Anthropometry, External examination, internal examination, Examination of the placenta and umbilical cord, Tissue taken for Histopathological study. In case of suspected skeletal dysplasia radiologic study was done. After autopsy completed all the organs were returned into the respective body cavities and the incision lines were sutured. The bodies were then properly disposed.

Results:

During the study 70 perinatal autopsies were performed and analyzed critically. Out of all (i.e.70) perinatal deaths, 66 cases (94.3%) were low birth weight babies & only 4(5.7%) were of normal birth weight. Gross & microscopic examination of placenta & umbilical cord shows that abnormality was detected in only 12 (17.14%) cases out of 70 cases. Most of the babies, (88.57%) were still born and only 8 (11.43%) died in Neonatal period.

Out of the 70 cases 56 cases (80%) were pre-term babies. (Table 1) Most important maternal risk factor was elderly Primi Gravida (40%) followed by close birth spacing (31.43%). (Table 2) Congenital malformation was the leading cause of the death (70%), followed by chronic utero placental insufficiency (17.14%). Among 49 cases of congenital malformations Neural Tube defect dominated the picture (45 cases, 91.84%). Few rare cases like Ellis van Creveld syndrome (1), Holoprosencephaly with synophthalmia (1), Patau syndrome (1), Congenital Diaphragmatic Hernia (1) were also found in autopsy series. (Table 3) In 8 cases

(11.43%) prenatal Ultrasonography proved to be wrong after perinatal autopsy and in 18 cases (25.71%) important additional information was obtained by perinatal autopsy. (Table 4)

Gross, Microscopic Features and Final Autopsy Diagnosis of All Cases:

- Serial no.1 (final autopsy diagnosis-Patau Syndrome) shows Cleft lip, Cleft palate, imperforate anus, ambiguous genitalia, collapsed lungs absence of intestine, asplenia on gross examination & shows no abnormality in HP study.
- Serial no.2 (final autopsy diagnosis-Holoprosencephaly with Synophthalmia) shows no structures of face developed except a midline aperture with single eyeball structure & there was failure of Forebrain to separate. HP study confirmed eye ball structure.
- Serial no. 3 was a case of Neural Tube Defect with Congenital Intracranial teratoma on gross examination which shows Anencephaly, Spina bifida, Intracranial mass (HP study confirmed mature teratoma).
- Serial no. 4 to 22 were case of Neural Tube Defect having both Anencephaly & Spina bifida where as serial no. 23 to 47 were Neural Tube Defect having only Spina bifida. CNS structures are confirmed by HP study in all cases of neural tube defect.
- Serial no. 48 was a case of Twin pregnancy, one term baby and the other was hydatidiform mole (partial mole confirmed on HP study).
- Serial no. 49 to 52 were complicated twin pregnancy (small for date baby) with no histopathological abnormality.
- Serial no. 53 was a case of congenital diaphragmatic hernia and dextrocardia with no histopathological abnormality.
- Serial no. 54 to 65 (Final autopsy diagnosis-Intra-uterine growth retardation) show on gross examination Placental infarction with adherent blood clot. Umbilical cord show more coiling. HP study shows villi atrophy, edema of Inter-villous space, and Cord fibrosis.
- Serial no. 66 was a Macerated baby with enlarged liver and spleen. HP study shows signs of degeneration of all organs. Final diagnosis was possibly congenital infection.
- Serial no. 67 shows no abnormality on gross examination with only degeneration of liver on HP study. Possibly it was a case of storage disease.
- Serial no. 68 (final diagnosis- Ellis Van Creveld Syndrome) had Syndactyly and

polydactyly, imperforate anus, absent kidney with no histopathological abnormality.

- Serial no. 69 & 70 were case of Hydrops Foetalis (all organs show edema). Cause of death was Rhesus isoimmunisation.

Discussion:

Determining the cause of death is an essential part of patient care for perinatal deaths. Although perinatal period occupies less than 0.5% of the average life span there are more deaths within this period than during the next 30-40 years of life in many developing countries. [7]

In our study out of the 70 cases, 56 cases (80%) were preterm by gestational age i.e. < 37 weeks of gestation which were the predominant category of babies and term babies' i.e. ≥ 37 weeks of gestational age were 14 cases. Similar findings have been observed by Grace Francis D' Costa et al [8]

Out of 70 babies 66 babies (94.29%) were low birth weight babies. Birth weight of an infant is the single most important determinant factor of its chance of survival. In Hammersmith hospital the total number of deaths in the low birth weight category was 86.5 %. [9] In our study the percentage of low birth weight babies were so high due to poor socio-economic status leading to maternal malnutrition.

In the present study out of the 70 cases placental abnormalities were detected only in 17.14%. In these cases both gross and microscopic abnormalities were detected. The gross abnormalities were placental infarction, with adherent blood clots. Infarction was associated with Intra Uterine Growth Retardation (IUGR) and cause of death was chronic utero placental insufficiency. According to Tingle and Wigglesworth [10] placental infarction and retro placental haematomas were the most frequent contributors to foetal deaths.

62 cases (88.57%) were still born babies. This is similar with the study of Naidu S et al, where among all perinatal deaths two thirds (66.66%) were still births. [11] Maternal risk factors were found in (91.43%) and in 8.57% no maternal risk factors were found. According to Aiken CG [12] general risk factors were found in 21.67% cases, which is much lower than the present study. Maternal risk factors were present in majority of our cases because of unregulated fertility which were often due to poor socio economic and environmental conditions. In the present study pregnancy related risk factors i.e. twins and Polyhydramnios were present in (10%) According to Singhal et al [13] pregnancy

related risk factors were present in 25.58% of cases of perinatal deaths.

Out of the 70 cases in 49 cases (70%) the major cause of perinatal death was congenital malformation. These findings were dissimilar to the Indian studies from P.G.I. Chandigarh [14] in which the major cause of perinatal death was perinatal hypoxia. The dissimilarity is due to the fact that in our study the parents were reluctant to give consent for the autopsy of their babies which do not have any obvious congenital malformations. They wanted to take these babies with them. That is why we mainly received the babies with congenital malformations for autopsy. In comparison our findings were similar to many western studies as Widdiaja et al and Kalter et al, [15, 16] in which major cause of perinatal death was congenital malformations.

In many western countries the major cause of death was congenital malformation because of improved socio-economic status and maternal nutrition they avoid delivery of low birth weight babies, high quality of antenatal, intranatal and neonatal care to avoid death due to causes like birth asphyxia. In all the cases of congenitally malformed babies karyotyping were not done because the time interval between the death of the baby and the autopsy done was not feasible to take sample for karyotyping study. In our hospital set up there is no facility of amniocentesis and chorionic villous biopsy.

Among 49 cases of congenital malformation studied, 45 cases (91.84%) were neural tube defects. Nearly similar findings were observed by Bozo Kruslin et al in whose study neural tube defects were the most common congenital anomaly (44.10%) and Agarwal et al [17, 18] Such a high percentage of neural tube defect in our study may be at least selectively explained by lack of folic acid supplementation in ante partum period. When post mortem examinations were compared with USG findings, in 8 cases (11.43%) the USG findings was wrong. As in autopsy serial No.53 the USG findings were tracheo-esophageal fistula and esophageal atresia. But on autopsy no such findings were found to be present. In autopsy serial No. 68 the USG finding was unilateral absent kidney. But on autopsy it was found that bilateral kidneys were absent and one side adrenal gland was enlarged simulating kidney on USG. In 18 cases (25.71%) additional information were obtained on autopsy.

In Autopsy serial No.2 the USG findings was baby with midline facial defect. On autopsy the additional information obtained was Holoprosencephaly. This is always associated

with the most severe form of developmental defect of facial structures. In autopsy serial No.3 the USG finding was neural tube defect. The additional finding obtained on autopsy was intracranial mature teratoma. In autopsy serial No.23 the USG finding was spina bifida only.

The additional finding obtained was hydrocephalous. This study is similar to the study of C. Rose et al [19] in which autopsy reveals new information in 25% cases. Similarly according to Johns N et al [20] post mortem examination provides significant additional information in 38% cases. In present study no additional information was obtained in 44 cases (62.86%), similar to Sushan Shen et al. [21]

Conclusion:

Perinatal autopsy is must after every perinatal death irrespective of prenatal sonographic diagnosis as in our study in 37.14% of cases autopsy either changed prenatal diagnosis or provided vital information. The high rate of mortality from perinatal conditions and congenital malformations both reflect the need for a better prenatal care programme in our country. For many clinicians interest in the autopsy as a mean of detecting clinically missed diagnosis is sometimes offset by concerns over litigation. These legal and ethical problems need to be sort out to increase perinatal autopsy rate.

All the autopsy information will be provided to the bereaved parents as it will facilitate acceptance of the loss and can be applied to reduce recurrence risks in future pregnancy. We make sure that future neonatologists and obstetricians obtain the skills to ask for consent in a sensitive way that informs the parents adequately about the vital role of this investigation.

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Table 2: Maternal Risk Factors Distribution

Maternal Risk factors	Cases	Percentage
Elderly Primi (30 years and over)	28	40%
Close birth spacing	22	31.43%
Bad obstetric history	7	10%
Maternal risk factors not present	6	8.57%
Twin	5	7.14%
Polyhydramnios	2	2.86%
Total	70	100%

Table 3: Cause of death distribution (N=70)

Causes	Cases	Percentage
1. Congenital Malformation	49	70%
2. Chronic utero placental insufficiency	12	17.14%
3. Complicated twin pregnancy	5	7.14%
4. Rhesus Isoimmunisation	2	2.86%
5 Maternal genital tract infection	1	1.43%
6. Storage Disorder	1	1.43%
7. Total	70	100%

Table 4: Co-relation between USG Finding and Autopsy Findings (N = 70)

Correlation	Cases	Percentage
USG findings were proved to be wrong	08	11.43%
Additional findings obtained on autopsy	18	25.71%
USG and autopsy findings were same	44	62.86%
Total	70	100%

Table 1: Age & Gender distribution (N=70)

Gestational Age	Male	Female	Ambiguous genitalia	Total
Preterm <37 weeks of age	26	28	2	56 (80%)
Term > 37 weeks and <42 weeks of age	8	6	0	14 (20%)
Total	34(48.57%)	34(48.57%)	2(2.86%)	70(100%)

Original Research Paper

Fusion of Hyoid Bone: A Preliminary Study in Indian Bengali

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Abstract

The greater cornua of the hyoid bone fuse with the body at a certain age. The fusion of hyoid bone can be helpful in estimating the age of unknown dead bodies. Several investigations have shown considerable variations in the age of fusion of hyoid bone. The present study was aimed at examining the age of fusion of hyoid bone in Indian Bengali sample. Also it was designed to assess whether fusion of hyoid is sex dependent. The sample comprised thirty (equal number of male and female) healthy hyoid bones. The hyoid bones obtained from adult subjects in consecutive autopsies. The X-ray films were examined for the presence of fusion between the greater cornua and body. The mean age of fusion in the pooled sample was 57.28 (11.40) years. Again the mean age of fusion in males was 59.00(9.45) years. It was seen from the present study that the mean age of fusion did not significantly differ in the two sexes. Fractures of hyoid when found in subjects below 45 years should be evaluated more carefully. Attempt to estimate age from hyoid fusion in Indians would be unreliable owing to the regional variations.

Key Words: Forensic anthropology, Hyoid, Fusion, Age, Indian Bengali

Introduction:

The greater cornua of the hyoid bone fuse with the body at a certain age. The fusion of hyoid bone can be of considerable help in estimating the age of unknown dead bodies. Also in mechanical asphyxia where there is compression of the neck, fracture of hyoid bone is more likely if it is fused. So time of fusion of hyoid along with its morphology and morphometry is of considerable interest for Forensic Pathologists. [1-3] Apart from this the hyoid fusion has been studied in relation to mastication and pathology of sleep apnea in susceptible individuals. [4]

Several investigations [5] have shown hyoid bone. The age at which the greater cornua fuses with the body are seen to be dependent on the population studied and the methods employed. Some authors have reported that the fusion of hyoid bone occurs only after 40 years of age while other observed that the bone fused at an earlier age. Earlier works was on 170 excised hyoid bones from dead bodies belonging to the age group of 20-65 years of Indian origin. [6]

It showed that fusion occurred earlier in females as compared to males by about 5 years. The mean age of unilateral and bilateral fusion in males was 38.25 and 53.16 years, respectively. The mean age of unilateral and bilateral fusion in females was 38 and 48.5 years, respectively. All the hyoid bones were fused after the age of 60 years. The researchers did not find significant differences between the fusion on right and left side. Another investigation to study the age of fusion in 200 hyoid bones (133 males and 67 females) varying in age from 18 to 85 years in North West Indians [7] concluded that estimation of age by using hyoid bone is not reliable as time of fusion of greater cornua with the body of hyoid is irregular. Subjects above the age of 60 years had either unilateral (13.2%) or bilateral (42.1%) non fusion or also fusion (21.1% bilateral, 13.2% unilateral).

The researchers suggested that method adopted can be a supplementary approach for estimating age when the other skeletal remains are not available. A recent study from India [8] has shown the mean age of unilateral and bilateral fusion in males as 39.39 and 41.77 years, respectively. The same research reported the mean age of unilateral and bilateral fusion in females as 37.5 and 45 years, respectively. Fusion was not seen in ages below 20 years while non fusion has been found even after the age of 60 years.

The present study was aimed at examining the age of fusion of hyoid bone and to

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assess whether fusion of hyoid is sex dependent in Indian Bengali sample.

Materials and Methods:

An investigation was conducted at the mortuary of the Department of Forensic Medicine, Burdwan Medical College, Burdwan, West Bengal, India. The sample comprised of thirty (equal numbers of male and female) healthy hyoids bones. The investigations were carried out in the month of January 2011. The hyoid bones were obtained from adult subjects in consecutive autopsies as part of routine medico-legal works. Cases with neck injury and asphyxial deaths were excluded. The age was recorded after verification from the police inquest report/supportive documents.

The hyoids were prepared by standard and proven method of dissection. [9] Initial examination was done to examine the status of fusion of the greater cornu. Then the hyoids were examined by gentle palpation to see the state of the junction between the body and greater cornu. This was followed by X-ray examination using digital system. The tube was placed 90 cm from the table top (using 10 mAs and 64 kVp specification for X-Ray). The films after development were examined for the presence of fusion between the greater cornu and body of hyoid. Hyoids were classified into four groups namely bilateral fusion, bilateral non fusion, unilateral fusion of left and unilateral fusion of right.

SPSS version 17 for windows was used for analysis of results. Descriptive statistics was used to examine the variables. Student's t-test for independent variables was applied to examine and compare the mean ages of fusion of the groups. P value of less than 0.05 was considered significant.

Results:

Thirty hyoid bones were studied in the present investigation on Indian Bengali adult sample. Table 1 shows the descriptive statistics of the studied variable. The mean age of fused and non fused hyoids in the pooled samples was 57.28 and 32.37 respectively. (Table 2) The mean age of unilateral [left] fusion in males and females was 59.0 and 55.57 years, respectively.

There was no significant difference in the age of fusion of hyoid in the two sexes (Fig. 1) as well as no significant differences in age were found between the fusion on right and left side. The results of independent t-test where grouping was done on the state of fusion of hyoid body with cornu on the left side showed that there was significant difference in the mean age of fused and non fused hyoids. This was

true for the male, female as well as the pooled sample. (p-value of .001, .004 and .000 respectively)

Discussion:

The present investigation was designed to examine the age at which the body of hyoid bone fuses (calcifies) with the greater cornu in Indian Bengali population. The body of the hyoid bone fuses with the greater cornu as a process of development. This fusion takes place at variable age and is depend on several factors including sex and population, as supported by previous researches. [1, 4, 6] Though exceptions have been reported, hyoid is generally fused above a particular age.

The fusion of hyoid has two important medico-legal implications. First, fracture of hyoid is more common in cases where the bone is fused. Secondly attempts have been made to estimate age from hyoid fusion as a supplementary approach when other skeletal remains are not found. [7] Results however, were not always consistent and satisfactory. [7, 8] The results of this series on Bengali hyoids show that there is significant difference in the mean age between the fused and non fused hyoids. This clearly indicated that age is one of the important determinants of hyoid fusion. This is in consonance with other published works from India and abroad. [2, 4, 6- 8]

The mean age of fusion in the pooled sample was 57.28 years. Again in males it was 59.00 years. These are comparable with the results of 53.16 years reported by earlier Indian researchers. [6] The results of our investigation however showed that age of fusion is more than those reported by workers from southern part of India. [8]

It was seen from the present study that the mean age of fusion did not significantly differ in the two sexes. This finding is similar to those of earlier works from North India where no significant sexual and side differences were found between the incidences of fusion of greater cornu with the body of hyoid in almost all the age groups except in those above 60 years of age. [7, 8] However some previous publications have asserted that fusion occurred earlier in females as compared to males by about 5 years. [6] Also there was no difference in the mean age of fusion of left and right side. This is similar to previous observations. [6, 8]

The present work is a preliminary study as the sample comprised only thirty human hyoid bones belonging to the Indian Bengali population. Given the diversity of the Bengali population, such a small sample size is not at all

effective in providing results that can be generalized. This approach needs to be further worked out with a larger sample preferably in a multicentric study. There is also ample scope to examine and investigate the regional variation in age of fusion of hyoid bones in Indian population. Thus it is concluded that age of fusion of hyoid in Indian Bengali males and females was 59.00(SD 9.45) and 55.57(SD13.62) respectively.

This should be duly considered while examining the neck structures (for hyoid fracture) at autopsy in cases of fatal compression of neck. In any case of mechanical asphyxia, fractures of hyoid when found in subjects below 45[mean57.28 minus 11.4 (one standard deviation)] years should be evaluated more carefully. Comparing with other studies the present investigation help to estimate age from hyoid fusion in Indians would be rather unreliable owing to the regional variations.

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Table 1: Descriptive Statistics

	Range [Max.-Min.]	Mean	S. D	Variance
Age [POOLED]	60[80-20]	44.0	16.0	256.2
Age Female	57[80-23]	44.33	15.55	241.81
Age Male	52[72-20]	43.66	16.99	288.66

Table 2: Group Statistics of Pooled Hyoid Bones [N=30]

	N	Mean	S.D.	Std. Error Mean
Age Left unfused	16	32.37	8.58	2.14
Left fused	14	57.28	11.40	3.04

Table 3: Statistics of Male Hyoid Bones

Left Cornu Male	N	Mean	Std. Deviation
Age Unfused	8	30.25	7.74
Fused	7	59.00	9.45

Table 4: Statistics of Female Hyoid Bones

Left Cornu Female	N	Mean	Std. Deviation
Age Fused	7	55.57	13.62
Unfused	8	34.50	9.36

Fig. 1: Age and Sex Wise Distribution of Fused and Unfused Hyoids [Left Side]

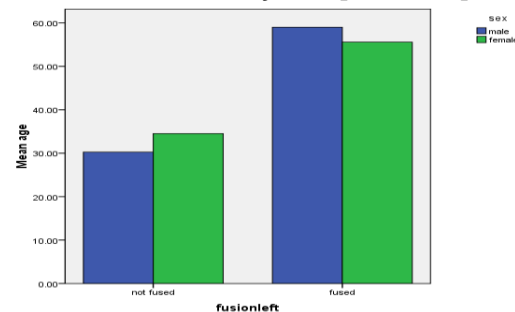


Photo 3.1: Digital X-Ray Showing Unilateral Fusion of Hyoid

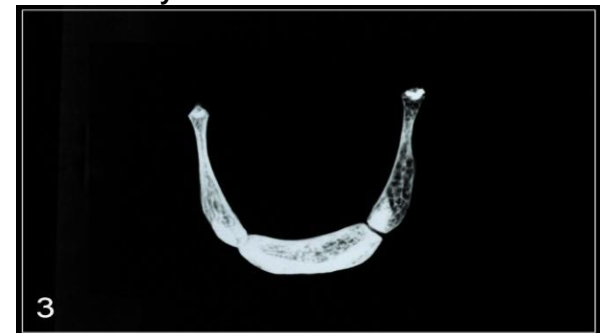


Photo 3.2: Digital X-Ray Showing Bilateral Fusion of Hyoid Bone



Photo3: 3: Digital X-Ray Showing Bilateral Non-Fusion of Hyoid Bone



Original Research Paper

Death due to Poisoning in District of Kamrup, Assam A Medico-legal Study

*Mrinal Haloi, *Mamata Devi Haloi, **Amarjyoti Patowary

Abstract

Rapid development in science and technology and rapid growth in agriculture and industrial sector has led to increase in the incidence of poisoning, taking away a lot of precious human life. The chemical substances developed to protect the agriculture products from rodents and pests, to save the human beings from starvation, are themselves becoming a threat for the human life. Trends of poisoning had been constantly changing throughout the world with advent of new agents. This study aims to evaluate Incidence and pattern of poisoning in the district of Kamrup, Assam.

The study included all the cases of suspected poisoning brought to Gauhati Medical College and Hospital for autopsy during the period of one year i.e. from 1st July 2010 to 30th June 2011. A total of 96 cases of suspected poisoning death were analyzed. Male victims (62.50%) outnumbered females (37.50%) and maximum numbers of cases (33.33%) were in the age group 20-29 years. Economic status was found to be lower in 66.66% cases and maximum cases (73.95%) are from rural habitat. Organophosphorus compounds were the most common agent responsible for poisoning with 22.91% cases followed by organochlorine compounds with 19.79% cases.

Key Words: Poisoning, Suicide, Insecticide, Death, Organophosphorus

Introduction:

Death is a harsh reality of life. With the society going through transition in quick succession, a host of problems have crept up causing serious concern amongst the conscious section. One such problem is the tendency towards suicide by consumption of poison. Every un-natural death, whether suicidal, accidental or homicidal, represents a tragic waste of precious human life and resources. Death due to poisoning is no exception. [6]

Poison is a substance (solid, liquid or gaseous), which if introduced to the living body or brought into contact with any part thereof, will produce ill health or death, by its constitutional or local effect or both. [11]

The people of advanced world use a lot of substance in every aspect of life including household, industry, agriculture, hospital, etc.[1] In modern world, chemical substances play a vital role in every aspect of life starting from as a preservative to treatment and prevention of many diseases. [3, 10]

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Off different mode of suicide, poisoning is common and it has been known since antiquity. [7] The choice of poisoning agents depends on availability, cost, harmful effects of poison and regional consideration. [2] Suicidal and accidental poisoning is a significant contributor to morbidity and mortality throughout the world. As per WHO, about 3 million cases of poisoning with 2,20,000 death occur annually worldwide, of which 90% of the cases occur in developing countries particularly among agricultural workers. [8] The mortality rate of poisoning in developed countries is very less but in developing country like India it is quite high (15-30%). [5, 9]

Aims and Objectives:

The study was conducted to find out:

1. Incidence and pattern of poisoning in the district of Kamrup, Assam.
2. The different aspect of poisoning along with the demographic pattern, diurnal variation, distribution of cases in different climatic conditions and other related parameters.
3. The risk factors and group for control of incidents of death due to poisoning.
4. Modality to prevent loss of precious human life due to poisoning.

Material and Methods:

The present study is a retrospective study. All the cases of suspected fatal poisoning

brought to Gauhati Medical College and Hospital for medico legal autopsy during the period of one year i.e. from 1st July 2010 to 30th June 2011. Details of suspected poisoning cases were collected from inquest reports, hospital records, autopsy reports and chemical examiner's analysis report of viscera and body fluids. The various epidemiological data i.e. age, sex, religion, habitat, marital status, education, occupation, economic status, mental status, date and circumstances of ingestion of poison, place of treatment and most common agent responsible for fatal poisoning are studied. During the period of study 96 cases of suspected poisoning death were analyzed.

These are the cases having specific history and autopsy findings suggestive of poisoning. The skeletal remains, decomposed bodies and cases where the signs of poisoning were not present were excluded from this study. The investigation of the scene of incident was excluded from the purview of this study.

Observation and Results:

A total 2598 autopsies were performed during the study period, of which 96 cases were death due to suspected poisoning. Male victim outnumbered the female victim, the number being 60 (62.50%) in male and 36 (37.50%) in female. The male-female ratio is 1.66:1 in our study. (Table 1)

The present study shows that most of the victims were in the age group 20-29 years, with 32 (33.33%) cases, the lowest number of cases is reported in the age group of 0-9 years (1.04%). Most of the victims were married, 64 (66.66%) cases, of which 32.29% cases are male and 34.37% are female. (Table 1)

In our study Hindus outnumbered the Muslim with 48(50%) male and 26(27.08%) female cases, the overall cases being 74(77.08%). Maximum numbers of cases are educated up to high school level. Total 27(28.12%) cases are reported from this group. The lowest cases are reported from illiterate group with 11(11.45%) cases, of which 5(5.20%) were male and 6(6.25%) were female. (Table 2)

Regarding the occupation, maximum number of victim were students with 27(28.12%) cases followed by domestic worker and house wife from female community with 21(21.87%) cases. (Table 2)

In present study Lower class tops the list with 64(66.66%) cases followed by middle class with 31(32.29%) cases and rest 1 (1.04) case belongs to upper class. Victims with no specific habit outnumber the other categories with 39(40.62%) cases. In males, 24(25%) are

smoker and in female 2(2.08%) cases had habit of tobacco. (Table 3)

Most of the victims mental statuses were normal numbering 88(91.66%). Depression was found in 8.33% cases in this study. Rural habitats were found in 71(73.95%) cases. (Table 4) Most ill-fated place was residence as it was recorded highest number of cases i.e. 78(81.25%) cases. 89(92.70%) cases of death due to poisoning were suicidal in nature and 7(7.29%) cases were accidental in nature. (Table 4)

Our study shows that most lethal hours in cases of poisoning was between 6 PM-12 Midnight, a total of 46(47.91%) cases died during this hour, of which 28(29.16%) were male and 18 females. Most of the patient 47(48.86%) were treated in Medical College Hospital while 41(42.70%) cases did not received any treatment. Majority of victims, 55(57.29%) died in the hospital. 22 (22.91%) cases died on the spot whereas 19(19.79%) cases died on the way to hospital. (Table 5) Maximum number of victims, 62(64.58%) died within 24 hours of ingestion of poison. Only 2(2.08%) cases survived beyond 7 days.

Most of the fatal poisoning cases occurred in the month of July, 16 (16.66%) cases whereas lowest number in the month of March, only 1 (1.04%) case. Incidence of poisoning were maximum during summer season 43(44.79%) cases. followed by winter with 28(29.16%), autumn with 13(13.54%) and spring with 12 (12.50%) cases. (Graph 1)

Maximum number of victims committed suicide due to family quarrel and unhappiness, 27 (30.33%). The lowest number reported to be due to illegitimate pregnancy, only 1(1.04%) case. (Graph 2)

External Autopsy Findings:

Out of 96 cases Cyanosis was present in 62(64.58%) cases, froth around mouth was found in 42(43.75%) cases. Petechial haemorrhage was detected in 26(27.08%) cases. 2 (2.08%) cases had injury over body.

Internal Autopsy Findings:

- **Specific smell of content of stomach and small intestine:** Kerosene like smell was most common in both stomach (49 i.e. 51.54%) and small intestine (23 i.e.23.95%)
- **Findings of visceral organs:** Highest number of cases showed congestion in kidney (87 i.e.90.62%) followed by liver (83 i.e.86.45%).

On toxicological analysis Organophosphorus compounds were the most common agents with 22(22.91%) cases,

followed by organochlorine 19(19.79%) cases, carbamate 11(11.45%) cases, alcohol 3(3.12%) cases and corrosive substance were detected only in 1(1.04%) case. (Graph 3)

Discussion:

In the present study, incidence of poisoning found to be 3.96%. Male victim (62.50%) outnumbered female (37.50%) as males lead a more stressful life than female due to family responsibilities. Maximum numbers of cases (33.33%) were in the age group 20-29 years due to the fact that at this period they are by nature more emotional, aggressive, intolerant and irrational. Married outnumbered single), because after marriage economic problem of family results in frequent quarrels and familial disharmony leading to increased stress. Most of the victims were Hindu (77.08%) because population of Hindu community is more in this study region. Majority of victims belong to the student community (28.12%), as this group is less exposed to life with worries of study, future unemployment and love affairs.

Maximum numbers (28.12%) of victims were educated up to high school level. Economic status was found to be lower in 66.66% cases, because poverty is a motive behind suicide and because of deficiency of funds they cannot afford the standard of treatment after exposure. Most of the victim (35.41%) had no specific personal habit, due to the fact that younger age group and females constitute significant number of cases and smoking, drinking alcohol are socially not accepted in this study population. 91.66% cases were mentally stable. Maximum cases (73.95%) are from rural habitat, due to bulk of present study population live in rural areas and agricultural activities are more prevalent.

Most of the incidents (81.25%) took place in the residence, because agricultural insecticides used for suicidal act were available at their residence. Most lethal period of poisoning found to be 6PM-12 Midnight (47.91%), due to emotional outburst resulting from tiredness, disappointments, and frustration reaching peak level at the end of days busy schedule. The place of treatment was Medical College Hospital in 48.95% cases, as most of the victims of poisoning referred and treated in medical college hospital for lack of facilities in the local hospitals. 57.29% cases died in hospital, 64.58% cases died within 24 hours.

Month of July accounted for maximum cases (16.66%), highest cases (44.79%) took place in summer, as this is the period of active agricultural activities when pesticide and

insecticide are extensively used. 92.70% cases were suicidal in nature, family quarrel and unhappiness were the most common (30.33%) motive for suicide, as in nuclear families in which husband and wife is dependent on each other to a greater extent in all family matters are more prone to commit suicide. Externally cyanosis, petechial haemorrhage and froth were found in 64.58%, 27.08%, 43.75% of the cases respectively, kidney (90.62%) was the most common organ showing congestion. Organophosphorous compounds were the most common agent responsible for poisoning with 22.91% cases followed by organochlorine compounds with 19.79% cases.

The present study findings are similar with most of the studies done in this field like study of Dr. Khairul Hussain, Assam in 2001, GMCH Chandigarh study, G.G. Hospital Jamnagar etc. [4, 6] The study is in difference with the PGIMS, Rohtak study where the most common poison found to be used is the organochlorine insecticides where as in the present study the organophosphates are the most common poison used. [1]

Conclusion:

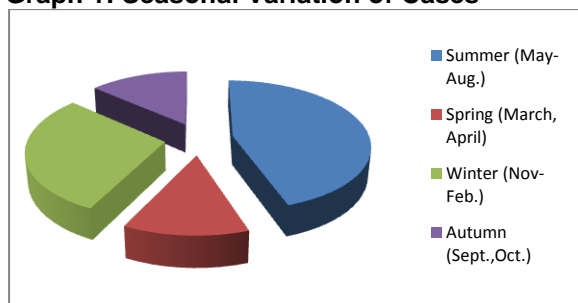
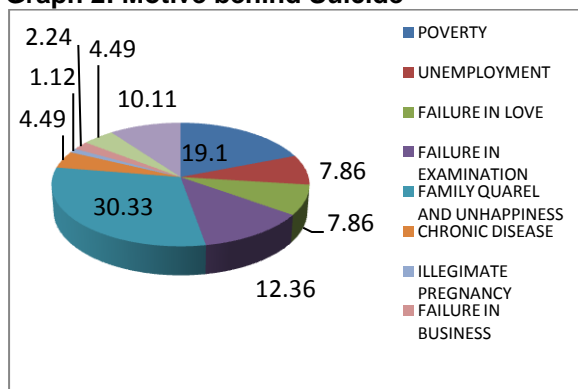
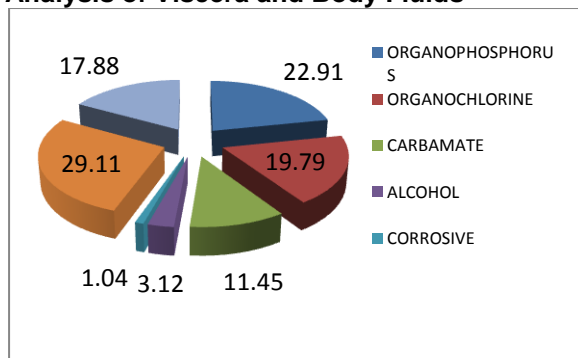
Measures to improve the socioeconomic conditions through reforms in the field of education, health, employment and more economic as well as scientific support to cultivators are expected to decrease the incidence of poisoning. Proper education of common people, cultivators about storage, handling, uses of pesticide and insecticide is expected to reduce incidence of poisoning. [3]

The existing laws in relation to toxic substances should be incorporated to erase the loopholes for their production, distribution, sale, storage and application. Public awareness about seriousness of poisoning is expected to reduce death due to poisoning. Government should provide toxicological diagnostic and therapeutic assistance to doctors. [2] Preventive measures for incidents of poisoning will be best. But once incidents occur, most modern treatment modality will reduce mortality. The problem of poisoning has been and is going to exist with human society. Hence further studies are necessary in the containment of this growing menace.

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Graph 1: Seasonal Variation of Cases**Graph 2: Motive behind Suicide****Graph 3: Agents detected by Chemical Analysis of Viscera and Body Fluids****Table 1: Sex and Marital Status of the Victims**

Parameters		Male		Female	
		No	%	No	%
Sex of the Victim		60	62.50	26	37.50
Marital status	Married	31	32.29	33	34.37
	Unmarried	29	30.20	3	3.12

Table 2: Educational and Occupational Status of the Victims

Parameters		Male		Female	
		No	%	No	%
Educational Status	Illiterate	5	5.2	6	6.25
	Primary	12	12.50	9	9.37
	High School	14	14.38	13	13.54
	Higher Secondary	17	17.70	6	6.25
	Graduate	12	12.50	2	2.08
Occupational Status	Student	16	16.66	11	11.45
	Business	9	9.37	0	0
	Service	7	7.29	2	2.08
	Cultivator	13	13.54	0	0
	Domestic worker	0	0	21	21.87
	Labor	7	7.29	2	2.08
	Unemployed	8	8.33	0	0

Table 3: Economical and Personal Habit of the Victims

Parameters		Male		Female	
		No	%	No	%
Economic Status	Lower	41	42.70	23	23.95
	Middle	18	18.75	13	13.54
	Upper	1	1.04	0	0
Personal Habit	Smoking	24	25	0	0
	Alcohol	13	13.50	0	0
	Tobacco	12	12.50	2	2.08
	Smoking, alcohol & tobacco	6	6.25	0	0
	Normal	5	5.20	35	35.40

Table 4: Habitat, Mental Status and Nature of Death of the Victims

Parameters		Male		Female	
		No	%	No	%
Habitat	Rural	43	44.79	28	29.16
	Urban	17	17.70	8	8.33
Mental Status	Normal	54	56.25	34	35.41
	Depressed	6	6.25	2	2.08
Nature of Death	Suicidal	56	58.33	33	34.37
	Accidental	4	4.16	3	3.12

Table 5: Time, Place of Poisoning and Death of the Cases

Parameters		Male		Female	
		No	%	No	%
Place of incident	Residence	47	48.95	31	32.29
	Working place	6	6.25	1	1.04
	Open field	4	4.16	3	3.12
	Not known	3	3.12	1	1.04
Time of poisoning	6 AM-12 Noon	9	9.37	6	6.25
	12 Noon-6 PM	11	11.45	4	4.16
	6PM-12AM	28	29.16	18	18.75
	12AM- 6 AM	3	3.12	3	3.12
	Unknown	9	9.37	5	5.20
Place of Death	Place of incident	16	16.66	6	6.25
	Way to Hospital	8	8.33	11	11.45
	Hospital	36	37.50	19	19.79

Original Research Paper

Age Determination by Gross and Radiological Aspect of Sternum

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Abstract

Now a day, determination of age and sex of skeleton remains or of advanced decomposed body is an important task for the Forensic Expert to help in the investigation of concern case. There are many criteria for determining age like secondary sexual characteristics, dental status, appearance and fusion of ossification centre of bones, various skull sutures. The relationship between age and degree of fusion between manubrium & mesosternum, sternal segments, Xiphoid process with mesosternum were studied in 116 cases at New Civil Hospital, Surat. Gross finding of fusion is compared with radiological findings. The study group comprised (65.5%) male & (34.5%) female. In majority of the cases, gross finding regarding fusion of sternum were observed and which were confirmed by radiological aspect. The gross finding shows early fusion as compared to radiological findings. Study also shows sternal segments fused in between ages of 21-30 yrs, Xiphoid process shows fusion at the age of 40 yrs and manubrium fused at late advanced ages.

Key Words: Age estimation, Sternum, Gross & Radiological Findings, Mesosternum

Introduction:

There are many criteria for determining age like secondary sexual characteristics, dental status, appearance and fusion of ossification centre of bones, various skull sutures. For medico-legal studies, examination of human skeleton has obviously an utmost importance for identification purpose. For estimation of age in late age group the forensic expert are facing lot of problem because there are few bones which ossify during this age group and the age calculated gives a bigger range & so this study is done to find out age estimation with in short range. Sternum as an individual parameter for the determination of age was first studied way one in 1788 by Wenzel. He described the difference in the Ratio between the length of the manubrium and that of the mesosternum in both the sexes.

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All these workers studied the old parameters of sternum and also tried some new optometric parameters, but could not establish any new commendable parameter.

The present study is an attempt to study the sternum in the purview of existing parameters of the determination of age. It includes a study of fusion of manubrium with mesosternum, sternal segments, fusion of Xiphoid process with mesosternum in relation to age. Gross finding of fusion is compared with radiological findings.

Material and Methods:

116 cases of age above 10 years including both sexes from rural and urban area of Surat city were brought for medico-legal post mortem examination in Department of Forensic Medicine and Toxicology at Government Medical College & New Civil Hospital, Surat. Information regarding the age of the deceased were obtained from nearest relatives and investigating officer of concern cases during January 2008 to December 2008.

From these cases sternums were removed from cadaver with consent of relatives. Recovered sternums were kept in water containing solution of Sodium- hypo chloride for few days for maceration and then cleaned. Dried and cleaned sternums were examined grossly for degree of fusion of segments of body of sternum, manubrium sterni and xiphisternum then all sternums were sent to the Radiological

department of New Civil Hospital, Surat for radiological examination. For determining the age, gross findings and radiological findings were compared and decided degree of fusion whether it was complete/ partial/ not fused.

All cases selected for the study were apparently healthy without any congenital or constitutional disease.

Results:

The study group comprised (65.5%) male & (34.5%) female. More than one third (34.2%) of male from the age group of 21 to 30 years, which was highest among the male group. In the same way, female group also highest among 21 to 30 years group (27.8%).

More than 95% study population belonged to Hindu religion for both sex and rest of belonged to Muslim. Majority of the cases belonged to urban area for both male (86.8%) and female (72.5%). Near about three fifth (58.6%) of the cases were non-vegetarian and rest of vegetarian. Near about half of the male (47.4%) had service at different places where as more than two third of the female (70%) were house wife. (Table 1) Most of the cases of both sex male (93.4%) and female (82.5%) had fused type of gross appearance of 1st sternal segment and it was quite high between the ages of 21 to 40 years in both sexes. Six female cases had Separate type of 1st sternal segment on radiological bases whereas in male half of them only three. Majority in both sex male (76.3%) and female (70%) had fused 1st sternal segment.

Highest in relation to age group for fused type was 21 to 30 year for male and 31 to 40 years for female (35.7%). The cases which show fused state in gross appearance; actually it was partially fused in radiological appearance. (Table 2) In our study most of the cases of both sex male (96.1%) and female (85%) had fused type of gross appearance of sternal segment two and it was quite high between the ages of 21 to 40 years in both sexes. One has Separate type in male whereas five female has Separate in nature. Three female cases had Separate type of sternal segment two whereas not for male on radiological bases. Majority fused type for both male (90.8%) and female (85%). (Table 3)

Present study showed that Most of the cases of both sex male (96.1%) and female (90%) had fused type of gross appearance of sternal segment three. Majority found between the age group from 21 to 50 year in case of male and 21 to 40 year in case of female. All male cases (100%) had fused type sternal segment three on radiological bases whereas in case of female it was 92.5%. (Table 4)

Gross appearance of xiphoid was observed and more than half (52.6%) in male and near about one third (62.5%) female had Separate type. Almost equal percent 35% were fused type in both sexes. Radiological appearance of Xiphoid was also studied.

It was found the Separate type in male (60.5%) and 57.5% in female cases. Whereas fused type xiphoid presented with 36.8% in male and 40% in female cases. Most of the cases i.e. 67% cases of male shows partially fused in age group of 31-40 yrs and about 100% in female.

Most of the cases show fusion of Xiphoid with body of sternum in 41-50 yrs of age group in both sexes grossly as well as radiologically. (Table 5) In this study near about three fourth (71.1%) of the male as well as three fourth (75%) of female cases had suppressed manubrium. Fused type observed from the age group of 41-50 years in male and 31-40 years in female. Four fifth of female (80%) and male (82.9%) had Separate type of radiological appearance of manubrium.

The study also shows that manubrium was in separate state grossly as well as radiologically in age group of 31-40 yrs in both sexes and it fused completely in age group of 51-60 yrs in both sexes. After the age of 50 years manubrium was fused in both sexes by gross examination which was confirmed by radiological examination. (Table 6)

Discussion:

Nandy A. has commented that fusion activities of bones depend upon race, geographic distribution, climate, sex, food habits and heredity etc. [1] Majority of both sex had fusion of their sternal segments in the age group of 21-40 years in this study by gross examination which confirmed by radiological examination. Nandy A. reported that all four segments of body of sternum fused between ages of 14-25 years from below upwards in both sexes. [1] Dwight T. in his study on the sternum as an index of sex and age found that union of the elements of body of sternum was completed by 20 years or so. [2]

Fusion of all pieces of body of sternum into one occurs at 21-25 years of age in north India as concluded from above three studies viz. Inderjeet [3], Inderjeet [4] and Singh D [5] Indian authors Mukherjee [6]; Reddy K. Krishna [7]; Reddy [8]; Nandy A [1] and Franklin CA [9] have also mentioned union of pieces of sternal body with one another from below upwards between 14-25 years of age. A similar study was done by Gautam RS by regarding sternum as index of age and sex by examining 100 sternums.

They were concluded that the fusion of third and fourth sternbrae is complete at puberty. The fusions of the first and second and second and third sternbrae occur by the age of 25 years. The fusion of Xiphoid process with body of sternum starts after 30 yrs. In most of the cases the fusion is complete after the age of 50. The fusion of the manubrium with the body of sternum begins after the age of 40. Complete fusion occurs after the age of 50. Similar findings were observed in this study. [10]

Majority of both sex found their fusion of xiphoid with sternum after the age of 40 years by gross examination which confirmed by radiological examination. According to M.K.R. Krishnan [11] and Nageshkumar G. Rao [12]; four pieces of sternal body unite with one another from below upwards between 14-25 years, xiphoid unite at 40 years of age and manubrium unite with the body at old age.

The fusion of xiphoid process with the body of sternum starts after 30 years. The fusions of manubrium with the body of sternum occur after 40 years. Also concluded that width index and sternal index has no relation with the sex, but length of manubrium and length of body has consistent relation with the sex. [10]

Similar study was carried out in living person by Garg A [13] by studying radiological age estimation from xiphisternal joint in 192 cases. They were concluded that the earliest age of fusion of Xiphoid process with body of the sternum or mesosternum was 36 & 35 yrs in males & females respectively. The latest age of fusion of Xiphoid process with body of the sternum was 59 & 56 yrs in males & females respectively. The present study shows that Xiphoid process was completely fused with body of sternum in age group of 41-50 yrs in both the sexes. The study shows that sternum which shows partially fused in gross examination; it was actually separate state in radiological examination. The Radiological examination confirms state of fusion of segments of sternum.

Conclusion:

1. All four pieces of the body of sternum in the present study showed complete fusion with each other in majority of age group of 21-30 years in both sexes.
2. The fusion of body segments of sternum in the present study was observed from below upwards i.e. starting from fourth segment to first segment.
3. The fusion of Xiphoid process with the body of sternum was seen mostly in age of 40 years in both the sexes.

4. The fusion of manubrium with the body of sternum was seen after 40 years and was complete by 60 years of age in both the sexes which suggests that manubrium fuses only in late advanced age.
5. The gross fusion of manubrium sterna and Xiphoid process was observed a bit earlier than radiological fusion, but the difference of period was 2-3 years.

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Table: 1 Socio-demographic Profile of Cases

Variable	Sex		Total (%) n=116
	Male (%) n=76	Female (%) n=40	
Age (Yrs)			
11-20	10 (13.2)	8 (20.0)	18 (15.5)
21-30	26 (34.2)	10 (27.8)	36 (31.0)
31-40	18 (23.7)	11 (27.5)	29 (25.0)
41-50	13 (17.1)	4 (10.0)	17 (14.7)
51-60	7 (9.2)	4 (10.0)	11 (9.5)
61-70	2 (2.6)	3 (7.5)	5 (4.3)
Religion			
Hindu	73 (96.1)	38 (95.0)	111 (95.7)
Muslim	3 (3.9)	2 (5.0)	5 (4.3)
Habitat			
Rural	4 (5.3)	5 (12.5)	9 (7.8)
Semi-urban	6 (7.9)	6 (15.0)	12 (10.3)
Urban	66 (86.8)	29 (72.5)	95 (81.9)
Diet Habit			
Veg	29 (38.2)	19 (47.5)	48 (41.4)
Non-veg	47 (61.8)	21 (52.5)	68 (58.6)
Occupation			
Business	4 (5.3)	Nil (0.0)	18 (15.5)
Housewife	Nil (0.0)	28 (70.0)	36 (31.0)
Labourer	19 (25.0)	Nil (0.0)	29 (25.0)
Service	36 (47.4)	3 (7.5)	17 (14.7)
Student	4 (5.3)	8 (20.0)	11 (9.5)
Worker	13 (17.1)	1 (2.5)	5 (4.3)

Table 2
Cases According to their Gross & Radiological Appearance of 1st Sternal Segment

Age(Years)	Sex wise Gross appearance of 1 st Sternal segment					
	Male			Female		
	Fused (%)	Partially Fused (%)	Separate (%)	Fused (%)	Partially Fused (%)	Separate (%)
11-20	5(7.0)	2(100.0)	3(100.0)	2(6.1)	1(50.0)	5(100.0)
21-30	26(36.6)	Nil	Nil	9(27.3)	1(50.0)	Nil
31-40	18(25.4)	Nil	Nil	11(33.3)	Nil	Nil
41-50	13(18.3)	Nil	Nil	4(12.1)	Nil	Nil
51-60	7(9.9)	Nil	Nil	4(12.1)	Nil	Nil
61-70	2(2.8)	Nil	Nil	3(9.1)	Nil	Nil
Total	71(93.4)	2(2.6)	3(3.9)	33(82.5)	2(5.0)	5(12.5)
Age(Years)	Sex wise radiological appearance of 1 st Sternal Segment					
	Male			Female		
	Fused (%)	Partially Fused (%)	Separate (%)	Fused (%)	Partially Fused (%)	Separate (%)
11-20	Nil	7(46.7)	3(100.0)	Nil	3(50.0)	5(83.3)
21-30	19(32.8)	7(46.7)	Nil	7(25.0)	2(33.3)	1(16.7)
31-40	17(29.3)	1(6.7)	Nil	10(35.7)	1(16.7)	Nil
41-50	13(22.4)	Nil	Nil	4(14.3)	Nil	Nil
51-60	7(12.1)	Nil	Nil	4(14.3)	Nil	Nil
61-70	2(3.4)	Nil	Nil	3(10.7)	Nil	Nil
Total	58(76.3)	15(19.7)	3(3.9)	28(70.0)	6(15.0)	6(15.0)

Table 3
Cases According to their Gross & Radiological Appearance of 2nd Sternal Segment

Age(Years)	Sex wise Gross Appearance of 2 nd Sternal segment					
	Male			Female		
	Fused (%)	Partially Fused (%)	Separate (%)	Fused (%)	Partially Fused (%)	Separate (%)
11-20	7(9.6)	2(100.0)	1(100.0)	3(8.8)	Nil	5(100.0)
21-30	26(35.6)	Nil	Nil	9(26.5)	1(100.0)	Nil
31-40	18(24.7)	Nil	Nil	11(32.4)	Nil	Nil
41-50	13(17.8)	Nil	Nil	4(11.8)	Nil	Nil
51-60	7(9.6)	Nil	Nil	4(11.8)	Nil	Nil
61-70	2(2.7)	Nil	Nil	3(8.8)	Nil	Nil
Total	73(96.1)	2(2.6)	1(1.3)	34(85.0)	1(2.5)	5(12.5)
Age(Years)	Sex wise Radiological Appearance of 2 nd Sternal Segment					
	Male			Female		
	Fused (%)	Partially Fused (%)	Separate (%)	Fused (%)	Partially Fused (%)	Separate (%)
11-20	3(4.3)	7(100.0)	Nil	2(5.9)	3(100.0)	3(100.0)
21-30	26(37.7)	Nil	Nil	10(29.4)	Nil	Nil
31-40	18(26.1)	Nil	Nil	11(32.4)	Nil	Nil
41-50	13(18.8)	Nil	Nil	4(11.8)	Nil	Nil
51-60	7(10.1)	Nil	Nil	4(11.8)	Nil	Nil
61-70	2(2.9)	Nil	Nil	3(8.8)	Nil	Nil
Total	69(90.8)	7(9.2)	Nil	34(85.0)	3(7.5)	3(7.5)

Table 4
Cases According to their Gross & Radiological Appearance of 3rd Sternal Segment

Age(Years)	Sex wise Gross Appearance of 3 rd Sternal segment					
	Male			Female		
	Fused (%)	Partially Fused (%)	Separate (%)	Fused (%)	Partially Fused (%)	Separate (%)
11-20	7(9.6)	2(100.0)	1(100.0)	4(11.1)	2(100.0)	2(100.0)
21-30	26(35.6)	Nil	Nil	10(27.8)	Nil	Nil
31-40	18(24.7)	Nil	Nil	11(30.6)	Nil	Nil
41-50	13(17.8)	Nil	Nil	4(11.1)	Nil	Nil
51-60	7(9.6)	Nil	Nil	4(11.1)	Nil	Nil
61-70	2(2.7)	Nil	Nil	3(8.3)	Nil	Nil
Total	73(96.1)	2(2.6)	1(1.3)	36(90.0)	2(5.0)	2(5.0)
Age(Years)	Sex wise Radiological Appearance of 3 rd Sternal Segment					
	Male			Female		
	Fused (%)	Partially Fused (%)	Separate (%)	Fused (%)	Partially Fused (%)	Separate (%)
11-20	10(13.2)	Nil	Nil	5(13.5)	1(100.0)	(100.0)
21-30	26(34.2)	Nil	Nil	10(27.0)	Nil	Nil
31-40	18(23.7)	Nil	Nil	11(29.7)	Nil	Nil
41-50	13(17.1)	Nil	Nil	4(10.8)	Nil	Nil
51-60	7(9.2)	Nil	Nil	4(10.8)	Nil	Nil
61-70	2(2.6)	Nil	Nil	3(8.1)	Nil	Nil
Total	76(100.0)	Nil	Nil	37(92.5)	1(2.5)	2(5.0)

Table 5
Cases According to their Gross & Radiological Appearance of Xiphoid

Age(Years)	Sex wise Gross Appearance of Xiphoid					
	Male			Female		
	Fused (%)	Partially Fused (%)	Separate (%)	Fused (%)	Partially Fused (%)	Separate (%)
11-20	Nil	Nil	10(25.0)	Nil	Nil	8(32.0)
21-30	1(3.7)	2(22.2)	23(57.5)	Nil	Nil	10(40.0)
31-40	7(25.9)	6(66.7)	5(12.5)	3(21.4)	1(100.0)	7(28.0)
41-50	10(37.0)	1(11.1)	2(5.0)	4(28.6)	Nil	Nil
51-60	7(25.9)	Nil	Nil	4(28.6)	Nil	Nil
61-70	2(7.4)	Nil	Nil	3(21.4)	Nil	Nil
Total	27(35.5)	9(11.8)	40(52.6)	14(35.0)	1(2.5)	25(62.5)
Age(Years)	Sex Wise Radiological Appearance of Xiphoid					
	Male			Female		
	Fused (%)	Partially Fused (%)	Separate (%)	Fused (%)	Partially Fused (%)	Separate (%)
11-20	Nil	Nil	10(21.7)	Nil	Nil	8(34.8)
21-30	1(3.6)	Nil	25(54.3)	1(6.3)	Nil	9(39.1)
31-40	10(35.7)	1(5.6)	7(15.2)	4(25.0)	1(100.0)	6(26.1)
41-50	9(32.1)	1(7.7)	3(6.5)	4(25.0)	Nil	Nil
51-60	6(21.4)	Nil	1(2.2)	4(25.0)	Nil	Nil
61-70	2(7.1)	Nil	Nil	3(18.8)	Nil	Nil
Total	28(36.8)	2(2.6)	46(60.5)	16(40.0)	1(2.5)	23(57.5)

Table 6
Cases According to their Gross & Radiological Appearance of Manubrium

Age(Years)	Sex wise Gross Appearance of Manubrium					
	Male			Female		
	Fused (%)	Partially Fused (%)	Suppressed (%)	Fused (%)	Partially Fused (%)	Suppressed (%)
11-20	Nil	Nil	10(18.5)	Nil	Nil	8(26.7)
21-30	Nil	2(18.2)	24(44.4)	Nil	Nil	10(33.3)
31-40	Nil	4(36.4)	14(25.9)	Nil	1(25.0)	10(33.3)
41-50	3(27.3)	5(45.5)	5(9.3)	Nil	2(50.0)	2(6.7)
51-60	6(54.5)	Nil	1(1.9)	3(50.0)	1(25.0)	Nil
61-70	2(18.2)	Nil	Nil	3(50.0)	Nil	Nil
Total	11(14.5)	11(14.5)	54(71.1)	6(15.0)	4(10.0)	30(75.0)
Age(Years)	Sex wise Radiological Appearance of Manubrium					
	Male			Female		
	Fused(%)	Partially Fused (%)	Separate (%)	Fused (%)	Partially Fused (%)	Separate (%)
11-20	Nil	Nil	10(15.9)	Nil	Nil	8(25.0)
21-30	Nil	Nil	26(41.3)	Nil	Nil	10(31.3)
31-40	Nil	2(40.0)	16(25.4)	Nil	1(50.0)	10(31.3)
41-50	1(12.5)	2(40.0)	10(15.9)	Nil	Nil	4(12.5)
51-60	5(62.5)	1(20.0)	1(1.6)	3(50.0)	1(50.0)	Nil
61-70	2(25.0)	Nil	Nil	3(50.0)	Nil	Nil
Total	8(10.5)	5(6.6)	63(82.9)	6(15.0)	2(5.0)	32(80.0)

Original Research Paper

Knowledge and Attitude of Medical Students on Forensic Autopsy in Ahmedabad City

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Abstract

This study explored medical students' knowledge and attitude on the medico-legal autopsy demonstrations which formed part of their training in Forensic Medicine. 200 students studying 2nd MBBS 2nd and 3rd semesters where they taught Forensic Medicine participated in the study voluntarily. The students were asked to respond anonymously to a 13 items questionnaire which dealt with their views on the autopsy practice, the knowledge of the procedure, attitude and perception towards medico legal autopsy. In present study majority of the students were aware of the situations where medico legal postmortem examination is mandatory as per Indian law and taking out of viscera for chemical analysis and histo pathological examination for the purpose of medico-legal autopsy. 96.5% of the students agreed that autopsy is necessary in medical education. 32.30% of the students were very uncomfortable on the first exposure to postmortem examination. This study showed that medical students still appreciate the medico-legal autopsy demonstration as a learning experience.

Key Words: Attitude, Medical Students, Autopsy, Forensic Medicine, Knowledge

Introduction:

The postmortem examination has been central to medical education for centuries. Virchow and Osler previously used the autopsy in the nineteenth century to understand the pathology of fatal diseases such as endocarditis and pulmonary embolisms by correlating pre and post mortem findings. [1] Autopsy findings have provided the foundation for much of modern medical knowledge.

The autopsy is beneficial in determining, the cause of death, the time of death, validity of therapeutic modalities, potential medico legal issues surrounding death, and providing data on disease and injury. [2] The autopsy sessions provide opportunities to discuss subjects like death certification, Forensic Pathology, appropriate attitudes towards deaths and communication skills essential for giving bad news or seeking consent for autopsy. [3] The main cause of the low autopsy rate seems to be changes in the system of medical education and the attitude of medical profession's. [4]

Recently; there has been a marked reduction in the number of hospital autopsies being requested. Besides curriculum reform, technological alternatives such as videos and CD-ROMs [5], the general decline in hospital autopsy rate prevailing legislation, and legal, bureaucratic, financial, political, religious reasons have all contributed to the declining use of the autopsy as a teaching tool.

Despite the fact that the literature indicates that Forensic autopsy rates, worldwide, remain fairly constant [6] there is little mention of their use in undergraduate medical training. The use of the autopsy as an educational tool is in decline and there is evidence that many recent Undergraduates and junior doctors have never attended an autopsy. [7]

The reactions of students to Forensic dissection encompass psychologico-emotional and physical components. [8] In undergraduate medical education the training of post-mortem examination on dead bodies might evoke strong emotional reactions in medical students that could counteract the intended learning goals. [9]

Material and Method:

Students of 2nd MBBS, 2nd & 3rd semester at B.J Medical College, Ahmedabad, Gujarat, were asked to fill a self administered, predesigned, multiple choice questionnaire during the year 2011. Participation in the study was voluntary. A total of 230 students were provided with the proforma of questionnaire. The survey consisted in several questions relating to

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the autopsy practice, the knowledge of the procedure and attitude and perception towards postmortem examination. The responses were made anonymously. Three remainders were given subsequently to submit this proforma, after third reminder submission of proforma treated as cancelled, so total 200 students (185 of 2nd

semester and 15 of 3rd semester) submitted questionnaire back.

Results:

All the students answered in positive about postmortem examination of body externally and internally. All the students replied in positive on the role of P.M examination in administration of justice. (Table 1)

Table 1: Questionnaires

1. Medico-legal postmortem examination is mandatory in all unnatural and sudden unexpected and suspicious death cases	Yes=178(89%)
	No. n=17(8.5%)
	Ignorant .n=5(2.5%)
2. Taking out of viscera for histopathological examination and toxicological analysis for medico legal autopsy.	Yes. n=190 (95%)
	No. n=6(3%)
	Ignorant=4(2%)
3. Postmortem examination is	Done to know the cause of death. n=198(99%)
	Mere legal formality. n=35(17.5%)
	Harassment to the relatives of the deceased .n=5 (2.5%)
	Helpful in reaching the culprit of crime. n= 173(86.5%)
4. The reaction of the students on the first exposure to postmortem examination. n=195(95.7%)	Comfortable. n=21(10.77%)
	Slightly uncomfortable. n=74(37.95%)
	Moderately uncomfortable. n=26(13.33%)
	Very uncomfortable. n=63(32.30%)
	Indifferent. n=11(5.64%)
5. Students should watch more postmortem examination	Yes. n=176(88%)
6. Wished to have postmortem examination on self/relative when required	Yes .n=165(82.5%)
	No. n=35(17.5%)
7. Given a chance would you choose not to watch P.M examination at all?	No. n=135(67.5%)
	Yes=65(32.5%)
8. The utility of P.M examination in medical education.	Yes. n=193(96.5%)
	No. n=7(3.5%),
	Should be scrapped from medical education. n=5(2.5%)
9. Disfigurement by postmortem examination. n=118(59%)	Yes. n=31(26.2%)
	No. n=87(73.7%)
10. Postmortem examination is disrespect to human body	Yes. n=15(7.5%)
	No. n=185(92.5%)
11. Source of information and knowledge about Postmortem examination.	Medical curriculum. n= 178(89%)
	Magazine and newspaper. n=33(16.5%)
	T.V. n=27(13.5%)
	Internet. n=13(6.5%),
	Friend and relative. n= 15(7.5%).

Discussion:

The autopsy is instrumental in accurately establishing the cause and manner of death in both clinical and forensic cases. Autopsies also allow confirmation, clarification, and correction of ante mortem diagnosis, as well as the identification of new and re emerging diseases, and thus they are important in both protecting the public health and improving the accuracy of vital statistics. [10] Autopsies allow students to grasp pathology in clinical contexts.

The knowledge of the physiological processes in disease states is better illustrated with autopsies. [11] The hospital autopsy continues to decline; despite good evidence of its clinical value and relevance (the medico-legal rate remains relatively constant).

Many of the factors that Influence covert learning seem beyond the control of educators, such as prior learning (including life experience), cultural or religious beliefs, conceptualizations learning, interests and psychological predispositions. However, an awareness of the complex interplay of emotions and reflection that underlies learning from autopsies should be advantageous if the attitudes of future practitioners are to be influenced whilst they are being formed. The autopsy rates in the USA have dropped over the decades from 60% to 41% in the 1960s, 22% in the 1970s, and to less than 10% currently. [12] In Northern Ireland the hospital autopsy rate fell from 22% in 1990 to 8% in 1999. [13] In China, autopsy has been nearly squeezed out of the regular medical education curricula in order to accommodate

increasing amount of modern medicine education during the teaching technique reform. This tendency has drawn much attention and is worrisome for both medical educators and medical students. [14]

In 1993, the Royal College of Pathologists recommended that at least 10% of hospital deaths should be autopsied for audit purposes. This was later amended in 2002 as it was recognized that hospitals were unable to reach the set target. [12] Most of the above rates are inflated by the number of Forensic autopsies, which suggests that the hospital autopsy rates for other purposes are very low.

This study showed that medical students still appreciate the medico-legal autopsy demonstration as a learning experience. In present study majority of the students were aware of the situations where medico-legal autopsy and preservation of viscera for chemical analysis and histopathological examination is mandatory as per Indian law. All the students answered in positive about postmortem examination involves examination of body externally and internally which is favoured by the study by Verma S.K. [15] as it is compulsory to attend postmortem examination as a part of their undergraduate teaching.

In the present study 82.5% of the student answered positive on wished to have postmortem examination on self/relative when required is favoured by Study of Sanner in Sweden where 90% of the students would not mind autopsy to be performed on them. [16] In present study 96.5% of the students agreed that autopsy is necessary in medical education. This compares favorably with the study of Botega et al [17] in Brazil and a study by Conran et al [18] in Ohio, USA, where 85% of the students also said that autopsy should be mandatory for all medical students. Joon Joon in Malaysia indicated 77.5% of the students recommended making autopsy session compulsory during undergraduate medical training. [19]

In our study 88% of the students recommended that students should watch more postmortem examination favoured by the study Victor James EKANEM. [20] The observation of autopsies by students is elective in some medical schools in the world because of religious and cultural reasons. Based on this, some students may complete their training in these centers without observing one autopsy. In present study majority (89%) of the students acquire knowledge and information about postmortem examination from their medical curricula in spite of development of print, electronic mass media and internet accessibility.

Very few students (7.5%) were of opinion that postmortem examination is disrespect to human body, which is favoured by study of Khoo Joon Joon [19]. Only 2.5% of the students opined that postmortem examination is harassment to the relatives of the deceased.

The students' emotional reactions are important, but unfortunately neglected aspect of medical training. The dissection of a dead body is not simply a technical exercise; it raises emotional feelings with regard to human mortality and dignity. Overall, this study supports those studies conducted with a quantitative methodology, which indicate that the necropsy is of value in medical education.

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Original Research Paper

Study of Internal Organ Weight and Its Correlation to Body Weight in Kumaon Region of Uttarakhand

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Abstract

The present study was conducted to determine standard organ weight of autopsy cases in Uttarakhand region. Case materials were collected from 109 autopsy cases for the one year at the department of Forensic Medicine, Govt. Medical College, Haldwani, Uttarakhand from March 2011 to March 2012. The age ranged from 15-78 years in males and 1-55 years in females and there were 23 females and 86 males. Pearson's correlation coefficient was used to see the relationship between the internal organ weights (IOW) with body weight (BW). The mean \pm Standard deviation (SD) were represented by males and females respectively: Brain $1115.51 \pm 156.42 / 1016.09 \pm 141.01$, Rt Lung $446.57 \pm 201.06 / 334 \pm 143.76$, Lt Lung $477.85 \pm 201.22 / 344.37 \pm 140$, Spleen $149.17 \pm 105.61 / 153.09 \pm 116.98$, Heart $270.28 \pm 54.41 / 204.35 \pm 57.35$, Liver $1419.80 \pm 395.27 / 1204.52 \pm 365.71$, Rt Kidney $136.65 \pm 62.24 / 111.91 \pm 32.29$, Lt Kidney $132.42 \pm 42.67 / 104.24 \pm 33.79$. It was found that weight of different organs were positively correlated to body weight in both sexes except in male brain, lung and spleen are not correlated and in female spleen is not correlated. Females had a lower organ weight compared to males. In both sexes, weight of organ was lower than the western population. After attaining the peak, all organ weights declined with the advancing age.

Key Words: Medico-legal deaths, Organ weights, Autopsy, Internal organ weight, Body weight

Introduction:

Human body organs play a significant role in almost all the ancestral branches of medical sciences including Anatomy and Forensic Science, as any deviation in weight from the normal range suggests some pathological change in the organ and thus helps in interpreting the opinion regarding the cause of death in various pathological conditions and also in finding out the relationship between trauma and disease. [1, 2] Organ weights also play a significant role in estimation of body height and weight of an individual. [3] Human organ weights besides race, age, gender etc. were also reported to be dependent on environment and socioeconomic conditions, [4] which are quite different in various parts of India like Chandigarh, Nagpur, and Bhavnagar Region. [1, 2, 5] Hence, the organ weights reported from other parts of India are not applicable to the population of Uttarakhand region of India.

As very less literature available on the subject for the population of north India in general and Uttarakhand in particular, hence the present study is an attempt to provide such information. In an autopsy, the internal organ weight (IOW) and the body weight (BW) are commonly used criteria. Usually, the deaths due to natural diseases and medical treatments, such as intravenous infusion or blood transfusion affect the IOW. [6] In addition, the post mortem changes especially decomposition and the deaths due to fire have some effects on the IOW as well. [7] So the increase or decrease of IOW compared to the BW are well recognized in many diseases.

The normal adult IOW has been studied in the United States, Western Europe, and some other countries. [8] Only a few studies that covered continental Asia were reported from Japan [9] and Thailand. [10] So we often use references of normal adult IOW from either United States or European countries.

The organ weight can be a good diagnostic criterion of autopsy if normality is accurately defined. The determination of abdominal organs in particular has significant potential clinical value. For example, liver volumes are important not only in determining diseased state and disease progression but also in estimating segmental liver volumes for

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transplantation and planning the extent of hepatectomy in cancer patients. [11] The spleen commonly increases in size in response to conditions such as infection and hematologic or metabolic disorders.[12] Kidney size bears a relation to the degree of renal diseases. So, in the present study, the authors excluded all the natural manner of death as well as decomposed cases. The unnatural death cases included accident, suicide and homicide.

Therefore, the importance of this study was to find out the normal weight of internal organs of Uttarakhand population and to determine its correlation with body weight. The objectives of the present study were to establish the table of organ weights of Uttarakhand population and to formulate a standard reference range of values, taking into account the variables of age, sex, and weight.

Materials and Methods:

The present study was carried out on 109 (86 males and 23 females) subjects who were brought for post-mortem examination at mortuary of Govt. Medical College, Haldwani, Uttarakhand between March 2011 to March 2012. The BW and IOW were measured by the mortuary technicians under supervision of a forensic expert responsible for the autopsy.

All the bodies were weighed with the electronic weighing machine. Standard autopsy protocol and procedure as described in Current methods of Autopsy Practice by J Ludwig, 1979 [13] were employed for removal of various organs. After removing the extraneous tissues and draining the blood, each organ was weighed on electronic weighing machine. The weighed organs included the heart, lungs, liver, spleen, kidneys and brain. The subjects were divided into four age groups.

Age group of the subject ranges from 15-78years in males and 1-55years in females. Then average of IOW was computed to find out the correlation between IOW with BW using SPSS statistical software. The mean, standard deviation and range were applied for the BW and IOW. The Pearson's correlation coefficient(r) was performed in analyzing the relationship between BW and IOW. A p-value of less than 0.05 was considered statistically significant. Then, the graph of the scatter plot was done to see the trend to predict the relationship between BW and IOW.

Observation and Discussion:

Trying to find out the normal internal organs weight is still going on by two methods, radiology such as ultrasound or computer tomography, and weighing the organs from

autopsy. However, there is both positive and negative effect for each method. Researcher is interested in the weighing method, directly from autopsies according to the criteria because it is part of the routine work. The organ weight will remain a good diagnostic criterion of autopsy only if normality is accurately and regularly defined. (Table 1- 3)

In females, relationship of brain, heart, lung, liver and kidney with BW were found to be statistically significant, except in spleen. In males, heart, liver and kidney were found to be correlated with BW except brain, lung and spleen. The relationships between IOW and BW is shown in the scatter diagram for male and female individually. The result revealed that if body weight increases, the weight of internal organs will increase.

Furthermore, when the authors distributed the weight of organs according to the range of age, in both the genders, the weight of the brain increased up to 40 to 60 years, lung, liver and kidney up to 20-40 year. In males, Heart weight is increased up to 20-40 year and in female up to 40-60 years. In males, spleen weight is increased up to 60 years and in female up to 20-40 years.

After attaining the peak, all organ weights declined with the advancing age. Brain weight was reduced as the age increased, because under-nutrition in the elderly as the brain contains only small amounts of glycogen and neutral fat. [14] In a study from Nagpur region [2] weights of brain and liver were reported to be maximum at the age 20 to 40 years. Comparing the weights of liver and brain, it was seen that, the mean weight of the liver was more than the mean weight of the brain in both the genders. This is in concordance with the findings of the studies on European and Japanese population. [15, 16]

1. Brain:

In the present study brain weight in males was $1115.51 \pm 156.42\text{gm}$ and $1016.09 \pm 141.01\text{gm}$ in female, which are similar to other studies. [5] Mathuramon P. et al [17] has found that the weight of male's brain was $1330.62 \pm 127.45\text{ gm}$ and that of the females $1208.71 \pm 131.44\text{ gm}$ and these findings are similar to those of Chirachariyavej T et al and studies from Europe and United States. [10, 18] in both studies male and female brain had a positive correlation with body weight. The weight from our study was lower than the weight of these studies and found that brain weight is positively correlated with BW in Females, but not in males. In the study of Singh D. et al. [19] in

Chandigarh, the weight of brain is more than our study as their dietary habits and socioeconomic conditions are different from ours.

Chirachariyavej T. [10] included cases that died of hanging and showed a slight increase in the brain weight. This was supported by Hamilton and McMahon [20] who presented the brain weight of those who died by hanging to be significantly higher than those who died of natural causes or an overdose.

2. Heart:

The heart weight in males (270.28 ± 54.41) and female (204.35 ± 57.35) in the present study was positively correlated to the BW similar to the other studies. [21-23] Heart weight is almost constant or even increased with increasing age. This phenomenon is also observed during middle age and has attracted the attention of researchers. Undiagnosed systolic hypertension is frequently seen in the middle-aged and elderly, mainly accounting for the increase in heart weight. [24]

3. Lungs:

It was found that lung weight and BW correlated to each other in females, but not in males. Right lung was 446.57 ± 201.06 & 334 ± 143.76 and left lung was 477.85 ± 201.22 & 344.37 ± 140 in male and female respectively. According to Zhu BL et al. [25], there is inter-individual variation possibly due to terminal pulmonary edema and congestion, which differ from one individual to another because in acute death the post-mortem lung weight may primarily depend on an individual's lung volume and persistent circulatory disturbance before death which is related to vital activity (gender and age) and survival time. So it causes the lungs weight to change easily after death.

4. Liver:

The liver weight was positively correlated with BW for both sexes; the values are 1419.80 ± 395.27 gm in male and 1204.52 ± 365.71 gm in female similar to the study of Chirachariyavej T. et al. [10] In our study, the liver was heavier in males because body weight makes liver heavier.

5. Spleen:

The present results on spleen weight were not correlated with BW for both sexes; Spleen of females is heavier than males. Sprogoe-Jakobsen and Sprogoe-Jakobsen U [26] and Chirachariyavej T. et al [10] found that there is positive correlation with body weight in males, but not in females.

6. Kidneys:

The mean kidney weight from the present study was 136.65 ± 62.24 (R) and

132.42 ± 42.67 (L) grams for males and 111.91 ± 32.29 (R) and 104.24 ± 33.79 (L) grams for females. The kidney weight was positively correlated to the BW for both sexes, and weight is increased in victims of drowning as compared to trauma. [27] Female had lower organ weights as compared to males this is because females are generally smaller in size and their nutritional profile is different compared to males. [28]

Conclusion:

On the basis of this study, it was found that weight of heart, liver and kidney were positively correlated to human body weight in both genders. Females had a lower organ weight compared to males except in spleen. In both sex mean organ weight was lower than the western population because of socioeconomic differences. In both the genders after attaining the peak, all organ weights declined with the advancing age. Additional cases, especially females are needed for a future study and possibly might have significant statistical evaluation for the correlation. The sample size should be increased to make the data more qualitative and reliable for referencing.

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Table 3: The norm of IOW (gm) in the form of mean \pm standard deviation (n = 109)

Variables	Male (Mean \pm SD)	Female (Mean \pm SD)
Brain	1115.51 \pm 156.42	1016.09 \pm 141.01
Rt Lung	446.57 \pm 201.06	334 \pm 143.76
Lt Lung	477.85 \pm 201.22	344.37 \pm 140
Spleen	149.17 \pm 105.61	153.09 \pm 116.98
Heart	270.28 \pm 54.41	204.35 \pm 57.35
Liver	1419.80 \pm 395.27	1204.52 \pm 365.71
Rt Kidney	136.65 \pm 62.24	111.91 \pm 32.29
Lt Kidney	132.42 \pm 42.67	104.24 \pm 33.79

Table 4: Correlation between Internal Organ Weight and Body Weight (N = 109)

Variables	Male (86)		Female (23)	
	R	P value	R	P value
Brain- BW	0.1585	0.145	0.663	0.000
Rt Lung-BW	0.0744	0.496	0.563	0.005
Lt Lung-BW	0.0342	0.755	0.595	0.003
Spleen-BW	0.199	0.066	0.198	0.365
Heart- BW	0.4187	0.000	0.847	0.000
Liver- BW	0.4191	0.000	0.686	0.000
Rt Kidney-BW	0.286	0.007	0.678	0.000
Lt Kidney-BW	0.222	0.039	0.703	0.000

Significant at p value < 0.05, highly significant at p value < 0.01

Table 1
Organ Weight (grams) in Various Age Groups in Females

Age(yrs)	Sub.	Variable	Brain	Rt. Lung	Lt Lung	Spleen	Heart	Liver	Rt. Kidney	Lt Kidney
<20	5	Mean	1019.4	268.6	268.9	126.6	176.7	1257.8	122.3	104.8
		SD	247.36	132.42	164.93	52.99	82.26	599.14	52.40	47.46
		Range	631-1235	51-372	38.5-428	32-153	33-230	255-1717	32.5-155	24-135
21-40	13	Mean	1003.08	365.85	351.31	189.46	204.19	1240.07	110.27	107.57
		S D	114.74	136.87	133.21	142.7	45.27	302.13	25.77	31.0
		Range	841-1218	145-625	180-596	58-570	139-300	805-1725	78-151	69-183
41-60	5	Mean	1046.6	316.6	401.8	85	232.4	1058.8	105.8	95
		S D	83.39	175.82	126.35	19.84	56.89	261.83	28.42	31.68
		Range	1001-1195	205-625	282-585	59-105	178-314	774-1274	80-136	65-128
Total	23	Mean	1016.09	334	344.37	153.09	204.35	1204.52	111.91	104.24
		S D	141.01	143.76	140	116.98	57.35	365.71	32.29	33.79
		Range	631-1235	51-625	38.5-596	32-570	33-314	255-1724	32.5-155	24-183

Table 2
Organ Weight (grams) in Various Age Groups in Males

Age(yrs)	Sub.	Variable	Brain	Rt Lung	Lt Lung	Spleen	Heart	Liver	Rt Kidney	Lt kidney
<20	8	Mean	1141.63	283.25	283	145.38	225.13	1182.38	111.63	124.88
		SD	130.16	91.07	98.76	30.75	60.09	236.62	28.86	27.54
		Range	1003-1323	151-449	184-447	101-192	163-347	826-1510	70-158	92-170
21-40	45	Mean	1119.65	463.13	494.56	158.98	275.09	1532.2	144.11	134.6
		SD	134.99	202.93	205.96	115.58	52.01	443.61	73.20	42.39
		Range	900-1554	144-1250	250-1300	52-626	130-402	600-2900	75-516	70-304
41-60	27	Mean	1118.37	517.37	498.31	128.11	273.63	1381.15	134.61	135.52
		SD	185.68	195.22	189.78	57.37	50.92	257.06	50.36	48.19
		Range	808-1884	201-902	248-877	51-284	196-370	900-1950	86-329	79-254
>60	6	Mean	1036.67	508.17	520.33	175.5	279.33	1067.33	123.33	112.16
		SD	209.45	212.55	215.32	222.44	65.96	375.92	51.07	36.39
		Range	800-1310	300-855	300-830	65-628	175-342	750-1775	70-203	70-167
TOTAL	86	Mean	1115.51	446.57	477.85	149.17	270.28	1419.80	136.65	132.42
		SD	156.42	201.06	201.22	105.61	54.41	395.27	62.24	42.67
		Range	800-1884	144-1250	184-1300	51-628	130-402	600-2900	70-516	70-304

Original Research Paper

Profile of Homicidal Deaths in and around Rajkot Region, Gujarat

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Abstract

The profile of 100 cases of homicidal deaths was studied in Dept. of Forensic Medicine and Toxicology, P. D. U. (Govt.) Medical College at Rajkot, the business capital of Saurashtra region of Gujarat state, during the period of 1st January, 2009 to 21st August, 2010. Incidence rate of homicidal deaths was 2.70% during this period. 38% victims were of age group 21-30 years, while 27% victims were belonging to the age group 31-40 years. 78% of all victims were male. In maximum cases (39%), time of incidence was during 06:01pm-12:00midnight, followed by 00:01am-06:00am. In 24% cases, motive of incidence was dispute because of money or property, while it was personal dispute in 21% cases. 77% deaths were as a result of infliction of mechanical injuries, amongst which, sharp force was used in 31 cases (40.26%) and blunt force was used in 26 cases (33.77%). Violent asphyxial deaths were observed in 14% cases. Head injuries were seen in 43% homicidal deaths. Found dead or brought dead victims were 74%.

Key Words: Homicide, Mechanical injuries, I. P. C. 302, Rajkot, Gujarat

Introduction:

Crime is an act of moment, whose totality is beyond expression in language. Worst of the worst and the cruelest crime that can be committed by a human being upon a human being is nothing but homicide.

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. Many would agree that the best indication of the level of violence in a given society is the annual homicide rate which is always come to the attention of the police and public, and serves as a "GOLD STANDARD" of the level of violent crime'. In medical science, deaths caused by violent act, i.e. by injury, are considered as homicidal deaths.

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Legal criterion of Homicide is the demonstration of lethal violence arouse from an unlawful act, agency, procurement or culpable omission of another person. Homicidal patterns and trends vary at different areas. Social, cultural and economical factors influence the violent criminal activities in concerned area.

Materials and Methods:

All types of murder described in I.P.C. S.300 & S.301, and Infanticide; and may be punishable under I.P.C. S.302, are included in this studied. During the study period, total 3703 autopsies were conducted, of which 100 cases were of homicidal deaths, either confirmed by investigating officers before autopsies or found to be homicide at autopsies or declared as homicide during investigation. Meticulous and thorough history regarding age, sex, religion, education, occupation, economy and social culture related to deceased; motive of incidence, method adopted for homicide, etc. were collected from relatives, concerned investigating officers, eye-witnesses, police-inquest and maranottar form. Autopsies were conducted by routine autopsy procedures and with routine autopsy instruments. Reports of chemical analysis and histopathological examination were also considered.

Observations:

Male to female ratio of victims was 3.71:1. 38% victims were belonging to age

group of 21-30 years, followed by age group of 31-40 years, 27%. Total infants were 3%. No case received above the age of 70 years in this study. (Table 1) Maximum victims were laborers (20%), followed by businessman (15%); cultivators or farmers (14%) and housewives (14%). Total preschool children and students were 5% each. (Table 2)

Time of incidence in maximum cases (39%) was between 06:01pm to 12midnight. It was same for both sexes. 22% cases occurred during 00:01am to 06:00am. These periods cover the night time and in darkness with lack of public presence, easy to commit crime and escape from scene. (Table 3) In 25% cases, place of incidence was outdoor area of city or village while in 24% cases; it was inside or nearby victim's house.

In case of male, maximum incidences (21 cases-26.9%) took place at outdoor area while in case of female, 9 cases (42.9%) were inside or nearby victim's house. In 1 case, place of incidence was in custody. (Table 4) In 24% cases, motive was dispute because of money or property, and all of them were male. In 21% cases, motive was personal dispute. In case of female, maximum incidences were due to dispute because of love/affair, 7 in numbers (33.3% of all females). Motive of infanticide was in 2% cases. In 1 case, death of one person is caused other than whose death was intended. (Doctrine of Transfer of Malice) In 18% cases motive was not known. (Table 5)

In 31% incidences, only sharp objects were used. In 26% cases, there was application of only hard and blunt objects to inflict injuries, while in 11% incidences, hard and blunt object was used with sharp objects. Firearms were used in 8% incidences. Ligature strangulation and throttling were done in 4% cases each. Drowning was done in 3% cases while burning was done in 3% cases. In 1 case, electrocution was associated with injuries caused by hard and blunt object. Skeletonized dead bodies and mutilated dead bodies in which no ante-mortem injuries found were included in group of 'unknown'. (Table 6)

Maximum number of incidences (43%) showing fatal injuries over head region, of which 32 (74.4%) were caused by blunt force. Fatal injuries over abdomen was seen in 29% incidences, amongst which 24 (82.6%) were due to sharp force. 24% cases were having fatal injuries over chest amongst which 18(75%) were having sharp force injuries. In 18% incidences, neck was bearing fatal injuries, while lower limbs having fatal injuries was seen in 6% incidences, out of which 5(83.3) were caused by sharp

force. No incidence was recorded in the study where fatal injury was inflicted over upper limb. (Table 7)

65% victims were found dead while 9% were brought dead. 26% victims were hospitalized before death, of them 13 (50%) were died within 24 hours of hospitalization. 2% victims were died after 15 days of hospitalization. (Table 8)

Discussion:

Observation of majority of researchers i. e. Gambhir et al [1,2], Mandal et al [3], Ghangale et al [4], Dikshit et al [5], Dalal et al [6], Murphy et al [7] are supporting our observation that higher incidence of homicidal death was seen in the age group of 21-30 years, followed by 31-40 years, and in male gender, may be due to higher mobility and more socially active, make them more vulnerable to get involved in violent acts in the era of competitive world.

Rekhi T et al [8] had also observed that place of incidence in majority of cases (20%) was outdoor (roadside) of city or village. In study of Mohanty et al [9], in 40.2% of cases, the location of crime was outdoors, 37.8% incidences were at the victim's house. While in our study, place of incidence in 25 cases (25%) was outdoor area of city or village while in 24 cases (24%) it was inside or nearby victim's house. Sinha et al [10] had observed that motive of incidence in majority of cases was dispute because of money or property. Same was observed by us.

Only sharp objects were used in majority of incidences followed by use of only blunt objects, same was observed in Ghangale et al [4] and Shetty et al [11], while Dikshit et al [5] and Gambhir et al [1, 2] had observed use of blunt objects in majority of cases. From this study, it is obvious that head region would be targeted by an offender when having intension to kill someone. Vij and Menon¹² had also observed the same.

Summary and Conclusions:

- Incidence Rate of homicidal deaths was **2.70**. Maximally affecting age group was 21-30 years, with male predominance.
- Majority of victims were laborers, followed by businessmen and farmers/cultivators.
- Higher incidences were reported during night, at outdoor area and followed by inside or nearby victim's house, mainly due to dispute because of money or property, followed by personal dispute.
- 77% were died because of mechanical injuries, maximally due to sharp force

infliction, followed by death due to asphyxia in 14% incidences.

- Fatal injuries over head were observed in majority of cases.
- Maximum victims were either found dead at spot or received dead at hospitals.

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Table 1: According to Age and Sex of Deceased

Age Grp (yrs)	Male	Female	Unknown	Total
< 1 year	01	01	01	03
01 – 10	03	01	00	04
11 – 20	04	01	00	05
21 – 30	31	07	00	38
31 – 40	18	09	00	27
41 – 50	13	02	00	15
51 – 60	05	00	00	05
61 – 70	03	00	00	03
TOTAL	78	21	01	100

Table 3: According to Time of Incidence

Time of Incidence	Male	Female	U.K.	Total
00:01am-06:00am	18	04	00	22
06:01am-12:00noon	04	04	00	08
00:01pm-06:00pm	12	03	00	15
06:01pm-12:00midnight	33	06	00	39
Unknown	11	04	01	16
TOTAL	78	21	01	100

U.K. =Unknown

Table 8: According to Duration of Survival

Moment Of Death	Male	Female	U.K	Total
Found Dead	49	15	01	65
Brought Dead	08	01	00	09
Hospitalized				
within 6 hrs	08	00	00	08
6-24 hrs	04	01	00	05
24-48 hrs	03	00	00	03
2-7 days	04	02	00	06
7-15 days	01	01	00	02
>15 days	01	01	00	02
TOTAL	78	21	01	100

U.K. =Unknown

Table 4: According to Place of Incidence

Place	Male	Female	U.K.	Total
Inside or nearby victim's house	15	09	00	24
Inside or nearby accused house	00	02	00	02
Outdoor (Roadside/Street side)	21	04	00	25
Working place/ Cultivation area	07	01	00	08
Public place	04	01	00	05
Open field	03	00	00	03
Peripheral area of city/village	10	01	00	11
Forest area	03	00	00	03
In water source	01	02	00	03
Highway side	06	00	00	06
In custody	01	00	00	01
Not known	07	01	01	09
TOTAL	78	21	01	100

U.K. =Unknown

Table 2: Cases According to Occupation

Occupation	Cases
Cultivator/Farmer	14
Laborer	20
Service man	07
Business man	15
Driver	06
Criminal	03
Prisoner	01
Student	05
Infant/Preschool child	05
Unemployed	05
Housewife	14
Unknown	05
TOTAL	100

Table 5: According to Motive of Incidence

Motive of Incidence	Male	Female	U.K	Total
Personal dispute	15	06	00	21
Family dispute	04	01	00	05
love affair	12	07	00	19
Money/property	24	00	00	24
Dispute because of business	04	00	00	04
Sudden provocation	00	01	00	01
Dispute during robbery	02	02	00	04
Infanticide	00	01	01	02
Custodial death	01	00	00	01
I.P.C. 301	01	00	00	01
Not known	15	03	00	18
TOTAL	78	21	01	100

Table 7: Cases According to Mode of Injury & Affected Body Part Bearing Fatal Injuries

Region	Blunt Force	Sharp Force	Firearm	Total
Head	32	07	04	43
Neck	09	06	03	18
Chest	02	18	04	24
Abdomen	02	24	03	29
Upper limb	00	00	00	00
Lower limb	01	05	00	06

Table 6
Cases According to Method and Weapon Used to Inflict Fatal Injuries

Method & Weapon		Male	Female	U.K.	Total	
Mechanical injuries	Sharp cutting penetrating object	20	05	00	25	31
	Sharp cutting heavy object	03	01	00	04	
	Sharp cutting heavy object + sharp cutting penetrating object	01	01	00	02	
	Hard and blunt object	22	03	01	26	11
	Hard and blunt object + Sharp cutting penetrating object	06	01	00	07	
	Hard and blunt object + sharp cutting heavy object	03	00	00	03	
	Hard and blunt object + sharp cutting penetrating object + sharp cutting heavy object	01	00	00	01	
	Penetrating object	01	00	00	01	07
	Firearm injury	07	00	00	07	
	Firearm injury + Sharp edged piercing object	01	00	00	01	
Asphyxial death	Ligature strangulation	01	03	00	04	08
	Throttling	03	01	00	04	
	Smothering	01	00	00	01	
	Smothering + Gaggling	01	00	00	01	01
	Smothering + compression of chest	00	01	00	01	
	Drowning	01	02	00	03	
Miscellaneous	Electrocution + hard and blunt object	01	00	00	01	03
	Burns	01	02	00	03	
Not known		04	01	00	05	
TOTAL		78	21	01	100	

U.K. – UNKNOWN

Instructions for Life Membership of IAFM

1. ELIGIBILITY

Any qualified medical person who is engaged actively in the field of Forensic Medicine or medico-legal work and has interest in the objectives and purposes of the Academy.

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3. FILLING UP THE APPLICATION FORM

- Form shall be in legible writings; in triplicate with photographs(3) of applicant.
- Application shall be proposed & seconded by life members of IAFM.

4. SUBMISSION

- Duly filled application form in triplicate shall accompany fees of Rs.3000/- (Three thousand only) in form of demand draft in favour of "Treasurer, Indian Academy of Forensic Medicine" payable at Indore.
- Application form and fees shall be forwarded to Treasurer Dr. S.K. Dadu, Professor & Head, Department of Forensic Medicine, MGM Medical College, Indore-452001 (MP).**
- A photocopy of application & postal slip may be retained by applicant for follow up.

5. ACCEPTANCE

- All applications received shall be screened by President, General Secretary & Treasurer.
- Fees shall be refunded back to applicant in case found not eligible.
- Qualifying applicant will be awarded life membership after the General Body approves the same and his/her name shall be enrolled in Life Members List there upon.

DR.C.B.JANI

General Secretary Indian Academy of Forensic Medicine

Original Research Paper

Alcohol Drinking Patterns: A Sample Study

*D.S. Bhullar, **Satinder Pal Singh, ***A. S. Thind, ****K.K. Aggarwal, *****Adish Goyal

Abstract

Alcohol and its ill effects have been a part of human civilization since times immemorial. A prospective study examined 100 cases of alcohol intake (males only). It was found that the most common age group of starting alcohol intake was 21-30 years age group (60%). The urban population was mainly affected (57%). The most commonly used beverage was whisky (41%) followed by beer (20%). The most common reason for starting alcohol intake was found to be curiosity (67%). The majority of the cases were victims of physical degeneration (52%). Almost all cases showed degeneration in the form of delirium tremens, Korsakoff's psychosis or acute hallucinosis. The study also found that 25% of the cases had suffered from road accidents while under the effect of alcohol. Only a minority of the cases (3%) were members of Alcohol Anonymous or other such organization involved in encouraging people to give up alcohol. The results of the present study are likely to increase the awareness of this problem and help the concerned authorities to shape the requisite alcohol control policies.

Key Words: Alcohol intake, Whisky, Delirium tremens, Hallucinosis, Road accidents

Introduction:

India is one the most populous countries of the world. Geographically it occupies less than 3% of the total land area of the world but it supports more than 16% of the total world population. Neither is the problem of alcohol in India new nor is the prevalence alcohol intake uniform. It varies from 7% in Gujarat to 75% in Arunachal Pradesh. The per capita consumption is 2L/adult/year.

After adjusting for undocumented consumption (illicit beverages as well as tax evaded products) which account for 45-50% of the total consumption, it is likely to be around 4L/adult/year. [1]

Material and Methods:

The present study included 100 cases. Prepared proforma were distributed among 100 2nd year medical students and instructed to fill in the details of a near relative after thoroughly examining the cases. The data collected was the compared with various other national and international studies. The female gender was excluded from the study as studies have shown that women are mainly abstainers (over 90%).

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Females, those affected are mainly from the tribal groups and tea plant workers both of which form an insignificant groups in the state of Punjab. [2]

Observations:

The most common age group for starting alcohol ingestion was the 21-30 years age group. The next most common age group was 11-20 years age group. The age group showing minimum incidence for starting alcohol ingestion was 41-50 years age group. No case was detected in 0-10 year age group. (Table 1)

In this study most of the cases preferred to take drinks occasionally (59%). 20% of the cases preferred to take drinks on daily basis. Least number of cases (6%) preferred to take drinks thrice weekly. (Table 2)

In our study the most common reason for starting alcohol ingestion among the cases was curiosity (67%) followed by depression (27%) cases. The least common cause for starting alcohol ingestion was jealousy (1%) cases. Only 5 cases had a different reason to start alcohol ingestion. (Fig. 1) It also showed that most of the victims (57%) belonged to the urban area. (Fig. 2)

In present study the single most common type of beverage preferred by the cases was whisky (41%) followed by beer (20%). 20% of the cases preferred the use of more than one type of drink. The least commonly used beverage were found to be brandy, rum and country liquor each having a share of 1% of the total cases studied. (Fig. 3)

Out of 100 people surveyed, 44 felt annoyed by drinking, 36 felt the need to cut down their drinking, 33 people felt guilty about their drinking and 23 cases admitted to taking drinks in the morning. (Table 3)

From Present study it is evident that 52 cases showed signs of physical degeneration, 34 cases showed signs of moral degeneration. Least number of cases showed involvement mental degeneration (8 cases). 6 cases showed signs of more than one type of degeneration.

Physical degeneration included 12 cases of lack of personal hygiene and 40 cases of gastritis. Moral degeneration included involvement in crime in 12 cases; doubt about the fidelity of wife was present in 15 cases while all other signs of moral degeneration were totaled at 5. (Table 4)

It is clear that 62% cases showed signs of delirium tremens, 37% cases were affected with Korsakoff's psychosis and 33% cases showed signs of acute hallucinosis. (Table 4A) out of the total 100 cases studied, only 3 joined Alcohol Anonymous while the majority (97%) of the cases not was not associated with any such organization and showed no willingness to share their experiences.

Discussion:

The findings of the present study are in contrast with the findings of Benegal et al which showed that the mean age of starting taking alcohol decreased from 28 years to 20 years. [1] The present study is also in disagreement with another study [3] which showed that the mean age of starting alcohol intake is 19.45 years. The present study is also in disagreement with the findings of another study [4] that the age of starting taking alcohol is 19 years.

The present study found that in 25 % cases were associated with accidents and this finding is in comparison with the findings of WHO global Status report on Alcohol which showed that 25% of the India's road related accidents were related to alcohol. [5]

The study also shows similar results with another study [3], however the rate of incidence of accidents related to alcohol in that study is 40 %.The present study is also in comparison with the WHO findings which showed that whisky and arrack were the drinks of choice. [5]

The study is conflict with the findings of Gupta et al [6] which showed that country liquor is the preferred drink. The present study is in comparison with the findings of Haider and Chaudhary who showed that urban population was mainly affected. [7]

The present study is in conflict with the WHO report that rural population was more frequently affected. [5]No relevant studies were available for comparison with rest of the parameters studied in the present study.

Conclusion:

The present study showed that the problem of alcohol is a serious one and is likely to grow in the coming times. The ill effects brought by the alcohol on the health of the person and possible financial implications on the family are a cause of concern. There is need to conduct more research along with educating the people particularly among the young age groups so that suitable preventive measures and life style medications can be adopted.

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Table1: According to the Age Group in which an Individual Started Alcohol Ingestion

Age group (Yrs)	Cases
11-20	17
21-30	60
31-40	16
41-50	3
Above 50	4
Total	100

Table 2: Frequency of Alcohol Ingestion

Frequency of Alcohol intake	Cases
Daily	20
Twice a week	15
Thrice a week	6
Occasionally	59
Total	100

Table 3: Self Analysis of the Cases based on CAGE Criteria

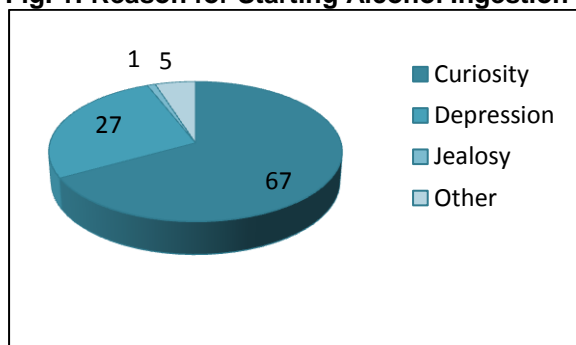
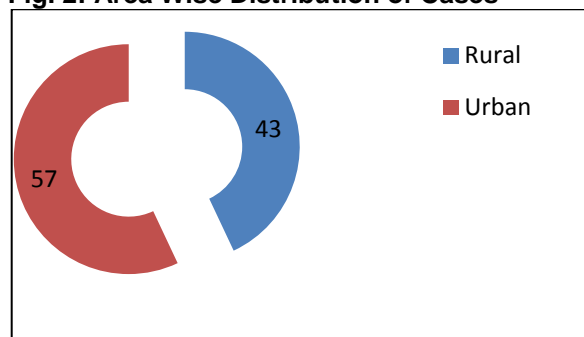
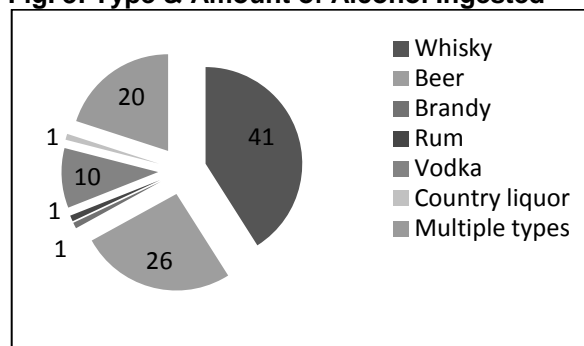
Self Analysis	Cases
Cases that felt the need to cut down drinking	36
Cases that felt annoyed by his drinking	44
Cases that felt guilty about his drinking	33
Cases who take a morning drink (Eye opener question)	23

Table 4: Signs of Degeneration

Signs of Degeneration	Cases
Physical	52
Mental	8
Moral	34
More than one type	6
Total	100

Table 4A: Signs of Mental Degeneration

Signs of Deterioration	Cases	Percentage
Delirium tremens	62	62%
Korsakoff's Psychosis	37	37%
Acute hallucinosis	33	33%

Fig. 1: Reason for Starting Alcohol Ingestion**Fig. 2: Area Wise Distribution of Cases****Fig. 3: Type & Amount of Alcohol Ingested**

Original Research Paper

Patient's Awareness, Attitude, Understanding and Perceptions towards Legal Nature of Informed Consent

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Abstract

Patient's autonomy is an imperative issue in the health service area. It is a known fact that patient's awareness of legal and ethical issues related to the consent process is often limited. The present study was therefore conducted to ascertain patient's awareness, attitude and perceptions towards Legal nature of informed consent. A structured interview schedule was developed and handed out to 555 patients in the Surgery department during January 2011 to June 2011. A great deal of misconception regarding the legal status of consent was seen. 88% of participants believed that they had no right to change their mind after signing the consent. 61.6% trusted their doctor to do the right thing and did not mind what happened to them provided they were made better. Level of understanding was satisfactory in only 32% of patients. The study concludes that there exists a vast discrepancy between the informed consent that perceived by patients. Current consent procedures seem inadequate as a means for the expression of autonomous choice and their ethical standing can be called into question.

Key Words: Informed consent, Legal, Education level, Patients' Rights

Introduction:

Autonomy of patients is an important issue in the health service area. Informed consent is an autonomous action by a subject or patient that authorizes a professional either to involve the subject in research or to initiate a medical plan for the patient. [1] It is the fundamental mechanism whereby the physician informs the patient about the options for the diagnosis and treatment of the patient's illness.

It is not just a form to be signed as a hospital formality, but a process, which ensures respect for persons through provision of thoughtful consent for an option to decide on the best possible treatment in disease processes, so that the patient can make a rational voluntary decision regarding what he/she wants to be done. [1, 2]

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Informed consent is the process of agreeing to take part in a study based on access to all relevant and easily digestible information about what participation means in particular, in terms of harms and benefits. [3]

Informed Consent originates from the legal and ethical rights of the patient have to direct what happens to his/her body and from the ethical duty of the physician to involve the patient in his/her health care. The most important goal of informed consent is that the patient should have an opportunity to be an informed participant in his health care decisions so it acts as a safeguard to ensure the preservation of individual rights. [1]

Patients often feel powerless and vulnerable and it is a proven fact that patient's awareness of legal and ethical issues related to the consent process is often limited. The informed consent process should be seen as an invitation to him to participate in his health care decisions. The objective of this study is to define patient's awareness of legal issues, attitude towards consent. Additional objective of this study is to determine what patients want to know and to find out whether or not the patients actually understand what has been explained to them.

Materials and Methods:

The present observational cross sectional study was carried out in the Surgery Department between January 2011 to June

2011 at Maharishi Markandeshwar Institute of Medical Sciences and Research (MMIMSR), Mullana (Ambala). Information was collected by interviewing the patients using a structured interview schedule. In this study a structured interview schedule was developed and handed out to 555 patients in the Surgery department of the hospital who had just undergone surgery and who were counseled before their elective surgery and signed their consent forms. Interview schedule was given to 10 such patients initially for pilot testing. Final interview schedule was developed after a few modifications in the questions.

A detailed proforma for the purpose of recording socio-demographic profile of patients, extracting information regarding awareness, attitude & understanding towards informed consent and their legal issues. A few questions were framed to determine what patients want to know. To assess patients' understanding to what has been explained to them, a score was calculated. 5 questions were framed and points were allocated to their answers; 5 points if they understood well, 3 if they had some understanding and 0 if they had no understanding.

The points were added to give their total points. If patient obtained a score of less than 25% of the total score, he/she was said to have a poor understanding. Similarly, a score of 25-49% was judged as unsatisfactory; 50-74% as satisfactory and any score of 75% or above was judged to be good. The collected data were coded and SPSS version 11.5 was used for analysis. Interpretation of the collected data was done by using appropriate statistical methods. IChi-square test was applied to test for proportions wherever applicable.

Observations & Results:

Of the 555 patients approached, 31 patients refused to participate and interviewed 524 patients. The response rate was 94.41%. Out of total, 24 interviews were discarded during data analysis due to lack of internal consistency. The mean age was 41 years.

(A) Patient's awareness, attitude & understanding towards consent and their legal issues:

Despite the legal importance of the consent and its presence in the signed documents as a standard procedure yet 75.0% patients falsely believed that it was a legal requirement. An almost similar percentage of respondents (68.8%) thought that signing the consent meant waiving their rights to any compensation. Most (88.0%) of the patients

under study thought that they had no right to change their minds after signing the consent. Many of the patients (75.2%) believed that they would be left to die hadn't they signed the consent. 83.8% signed the consent form so that they can undergo required operative procedure. (Table 1)

(B) What do patients really want to know about their treatment?

Most of the patients were interested to know about duration of the operation, possible risks & complications involved if they undergo the operation, chances of successful operation and cost of treatment. 63.6% were not bothered to know what will be done during the operation provided they were made better. (Table 2)

(C) Role of patients in decision making about the treatment:

Most (69.2%) of the patients were happy to allow doctors to determine their treatment but they wanted to know about their condition, the treatment and the important side effects. Only a few patients (11.6%) wanted to make final decision themselves. 61.6% trusted their doctor to do the right thing and did not think detailed explanation was important. (Table 3)

(D) Patient's skill to understand to what has been explained to them:

The level of understanding was similar in male and female (53.6% in male and 52.6% in female, $p > 0.05$). According to the level of education, those who were illiterate had a mean score of 44.6%, those who had primary education only had a mean score of 46.6% and those who were educated had a mean score of 68.2% ($p < 0.01$). Looking at the values the level of understanding is not different between those who had a primary level of education and those who did not have formal education but it was significantly better in those who had higher education.

Overall the level of understanding was poor in 17%, unsatisfactory in 33%, satisfactory in 32% and excellent in 18% of the patients.

Discussion:

Although patients want to know their legal rights in hospital but their awareness of legal and ethical issues related to the consent process is often limited. Adequate information before a surgical procedure is fundamental to give informed consent. Information should include a description of the benefits, risks, and complications of the intended procedure as well as alternative treatment options. [5]

Several studies have shown that written information has beneficial effects. Patients who were given written information have better

understanding and postoperative recall of information. [6, 7]

The present study revealed that 75.0% patients falsely believed that it was a legal requirement. 68.8% thought that signing the consent meant waving their rights to any compensation. Most (88.0%) of the patients thought that they had no right to change their minds after signing the consent. Similar observations were also made by another study from Egypt. [8]

It was found in this study that majority of the patients were interested to know about duration of the operation, possible risks & complications involved if they undergo the operation, chances of successful operation and cost of treatment. Our findings confirm the results of another study from New Zealand. [9] Not surprisingly our study shows that many patients have limited knowledge of the legal implications of signing or not signing consent forms and do not recognize written consent as primarily serving their interests. Similar observations were also made by Akkad A. [10]

Some authors postulate that providing information about risks and complications causes undue and unnecessary anxiety. [11] Pimentel et al [12] investigated the desire for information in patients with cancer and reported that most of the patients wanted to know as much as possible about their illness and treatment. [13]

Some patients explicitly state that they want their doctor to make the final decision about their care. [14] On this basis it might be argued that informed consent is often an illusion, even when doctors go through the motions of obtaining it, and that more time should be spent instead on the provision of a high standard of technical care. Beresford and colleagues argue that some patients want little or no information about therapeutic risks and that the standard of the disclosure of the reasonable patient should not be applied to them. [15, 16]

Our study sample is chiefly limited to low socioeconomic class patients who are deprived of proper education, arriving in surgery department at a teaching hospital of rural Haryana. Similar studies in other settings with different populations with more diverse sample would be practical. Some impact of recall bias

also needs to be considered. Despite this the dissociation between what consent should be and what it is in the present is rather alarming.

Conclusion:

The study concludes that there exists a vast discrepancy between the informed consent that perceived by patients hence current consent procedures seem inadequate. The difference in perception and limited knowledge of the legal implications of signing or not signing consent form indicates that consenting in its current form is not informed and should be reassessed in order to achieve patient autonomy.

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Table 1
Patient's Awareness, Attitude & Understanding towards Consent and their Legal Issues

In your opinion	Yes	No	Don't know
Consent forms are just a formality.	278 (55.6)	214 (42.8)	8 (1.6)
Consent forms are necessary.	311 (62.2)	185 (37.8)	4 (0.8)
Signing the consent form is a legal requirement.	375 (75.0)	92 (18.4)	33 (6.6)
Signing the consent form removes your right to compensation.	106 (21.2)	344 (68.8)	50 (10)
Consent form is to protect the doctor against being sued.	358 (71.6)	20 (4.0)	122 (24.4)
Consent form is to protect the patient's rights.	129 (25.8)	177 (35.4)	194 (38.8)
Signing the consent form confirms that operation and its effect have been explained to me.	396 (79.2)	18 (3.6)	86 (17.2)
I have signed the consent form so that i can undergo operative procedure.	419 (83.8)	36 (7.2)	45 (9.0)
You have the right to change your mind after signing the consent form.	16 (3.2)	440 (88.0)	44 (8.8)
If you can't sign the consent form, can your relative sign on your behalf.	178 (35.6)	262 (52.4)	60 (12.0)
If you are not able to sign the consent form, the operation cannot take place, even if this means you could die.	376 (75.2)	117 (23.4)	7 (1.4)

Table 2
Response of Subjects to Determine what do they wanted to know about their Treatment?

What patients want to know	Agree	Don't agree
Reason for operation.	276 (55.2)	224 (44.8)
What will be done during the operation?	182 (36.4)	318 (63.6)
For how much time operation will be done?	337 (67.4)	163 (32.6)
Important risk and possible complications involved in having the operation and recurrence.	269 (53.8)	231 (46.2)
All complications.	318 (63.6)	182 (36.4)
Information about Post OP care.	213 (42.6)	287 (57.4)
After how many days you should resume your work?	287 (57.4)	213 (42.6)
Chance of successful result of your operation.	386 (77.2)	114 (22.8)
Any special precaution to be taken after operation.	128 (25.6)	272 (74.4)
Any special dietary advice to be considered after operation.	222 (44.4)	278 (55.6)
Cost of treatment.	349 (69.8)	151 (30.2)
Any other.	-	-

Table 3
Opinion of Patients regarding their Role in Decision making about the Treatment

Opinion of patients regarding treatment	Yes	No	Don't know
I don't want to know anything but i will do what doctor recommends.	308 (61.6)	182 (36.4)	10 (2.0)
I want to know about my treatment but will do what doctor recommends.	346 (69.2)	154 (30.8)	-
I should make final decision after discussion of pros and cons of the treatment.	58 (11.6)	267 (53.4)	175 (35)

Original Research Paper

A Study of Pattern of Burn Injury Cases

*Arpan Mazumder, **Amarjyoti Patowary

Abstract

Fire was perhaps, first double edged sword, it has served as well as destroys mankind. Invention of Fire was greatest invention towards the human civilization. Burn is an injury which is produced by the application of dry heat such as flames, radiant heat or heated substance over the body service. The term burn is restricted to the local effects of dry heat. By law all dry heat lesions have been designated as burns. Burn injuries are among the most devastating of all injuries and a major global public health crisis. Burns are the fourth most common type of trauma worldwide, following traffic accidents, falls and interpersonal violence. Burns have tremendous medico-legal importance as they may be considered to be the commonest cause of unnatural death in India.

This present study is a retrospective study undertaken at the mortuary of Forensic Medicine, Gauhati Medical College and Hospital. The study includes all the burn injury cases coming to the mortuary for autopsy during the year 2011. The main objective is to gather epidemiological information, to find the pattern and causes of death in different burn cases.

Key Words: Burns, Shock, Autopsy, Epidemiological information, Dry heat

Introduction:

Though fire has become the most useful agent, yet it has proved to be one of the most destructive enemies of man. Fire destroys property, wipes out thousands of lives every year and thereby cause wastage of human resources. Burn injuries are caused due to contact with dry heat. [4, 5] Burn is an injury which is produced by the application of dry heat such as flames, radiant heat or heated substance over the body service. [2, 6] The term burn is restricted to the local effects of dry heat. By law all dry heat lesions have been designated as burns. [8]

Burn injuries have long been described as among the most serious injuries that may afflict a human being. [9] The most common cause of flame burns in modern society is accident. [13, 14] Burn is a unique but significant mode of suicide and homicide everywhere in the world. Burns are the fourth most common type of trauma worldwide, following traffic accidents; falls and interpersonal violence [11] have tremendous medico-legal importance as they may be considered to be the commonest cause of unnatural death in India.

Burns [10] Illiteracy and negligence in proper use of fire and fire producing materials in poor socio-economic group of people are also the reason for burn incidents in them. In spite of recent advancement in medical sciences, pathogenesis of burn injuries are yet to be ascertained for the successful management of burn cases and to prevent death and deformity following burns.

Materials and Methods:

Present study is a retrospective study undertaken in the Department of Forensic Medicine, Gauhati Medical College. The study includes all the cases of Burn injury coming to the mortuary of the department of Forensic Medicine, Gauhati Medical College & Hospital for autopsy during the study period starting from the 1st of January 2011 till 31st of December, 2011. Details of the cases were collected from the police papers, the inquest reports, hospital records and the autopsy reports. The main objective is to gather epidemiological information, to find the causes of death in different Burn injury cases, the sex ratio and the various factors of such injury.

Observation and Results:

During the study period, a total of 2652 autopsies were carried out in the mortuary of Department of Forensic Medicine, Gauhati Medical College and burn injury comprised of 9.12% of the total cases with 242 numbers of cases. As for the age of the victims, most of the victims were between 21-30 years of age,

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followed by 11-20 years age group. The lowest number of the cases was reported in the age group of < 1 yr as well as the age group of 61–70 yrs. (Graph 1) most of the victims did female comprise 74.7% cases out of the 242 cases studied during the study period; the male comprising of the rest 62 cases (25.3%). (Graph 2) In present study most victims belong to the Hindu community comprising 79.3% cases out of the 242 cases studied during the study period, the rest were from Muslim community. (Graph 3) As for the nature of the injury, accidental burns topped the list with 229 cases (95%) the rest being suicidal in nature. (Graph 4)

In most of the victims the burn injury covers 90-100% of the total body surface area followed closely by 50-60% of the total body surface area involvement. (Graph 5)

Our study shows that soot particles were found in trachea in only 18.5% of the cases, the rest of the cases were devoid of the soot particles in the trachea. (Graph 6) Most of the victims receive treatment (86.7%) and rest of the victims died on spot or on the way to the hospital without receiving any treatment. Shock is the most common cause of death (122 cases), followed by exhaustion (62 cases) and septicemia (58 cases). (Graph 7)

Shock is common in 1-2 days and it is rare after 5-6 days. Exhaustion predominates in the 7-8 day period and it is rare before the 5th day. Septicemia is common in victims who survive more than 10 days. Only in one case, which was brought after 1 month and declared brought dead, the cause of death was found to be septicemia. (Graph 8)

Discussion:

Most of the victims are between 21-30 years of age, which is similar to the findings of the similar study conducted by K. C. Das, D. Nath and D. Buchade and group. [1, 3, 7] The age group 21-30 years is the young adult group and is the most common age for marriage in this area of study. Most of the victims were working women and they do not follow the safety measures due to lack of time or knowledge resulting in such incidents.

Most of the victims were female and belong to the Hindu community, which is similar to the findings of Reddy, K.C. Das, D. Nath P. Singh. [9, 3, 7, 12] The reason for the Hindu predominance is that in this part of the world Hinduism is the most commonly followed religion and so is the increase in the Hindu victims. As for the female predominance, females are mostly involved in cooking and the most

common cause of fire in the accidental series of the study was as a result of stove bursts.

In this study most of injuries are accidental in nature, which is similar to the findings of K. C. Das, D. Nath and D. Buchade. [1, 3, 9] It is very difficult to say that a burn injury is accidental or suicidal or homicidal in nature.

Until and unless an eye witness is there one cannot say that a burn injury is accidental or suicidal in nature. The only way to prove homicidal nature is the Dying Declaration, which is very difficult to obtain either due to negligence or lack of knowledge on the part of the police.

Most of the victims had 90-100% body surface area involvement, which is similar to the findings of K.C. Das and D. Nath. [3, 9] In this part of world the ladies use the saree, makhela, and salwar, kameej as their regular wearing garment. So once it got fire it is very difficult to remove the cloths resulting in maximum damage.

Soot particles are found in trachea in 19% of cases, which is different from the finding of Dr. K.C. Das [3], who found soot particles in trachea in 18.05% cases and D. Nath [9] who found in 34.07% cases. Most of the victims died in the hospital after receiving treatment, which include intravenous fluid and also some oral medication. Many of the cases occur in some open spaces like corridor or balcony or some open spaces in front of the house (in villages). This two may be the cause of absence of soot particles in the trachea in most of the victims.

Shock is found to be the most common cause of death in most of the victims, which is similar to the findings of K.C. Das and D. Nath. [3, 9] Shock (neurogenic, hypovolemic) is more common in 1-2 day period after burn injury. Most of the injuries were epidermal to dermo-epidermal in nature, which were most painful resulting in neurogenic shock. Any kind of injury including burn injury was the common source of infection, which resulted in septicemia and septicaemic death. Lack of care on the part of the doctor was the main reasons for the septicaemic deaths in the burn victims.

Conclusion:

The most important step in reducing the burn incidence is through mass education. Following the safety instructions like putting the lights off while going out, wearing tight and cotton cloths while cooking, not leaving a fire source unattended etc. will definitely help to reduce the incidence of burn injuries.

The specialized care given to seriously burned patients is time consuming and very expensive. Here too, prevention is better than

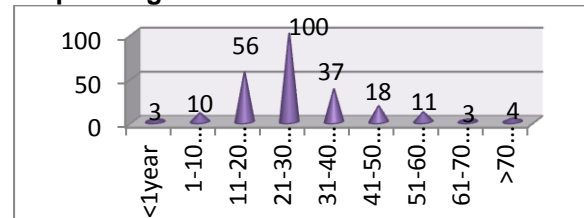
cure. Effective prevention requires a thorough understanding of the major risk factors. [9]

The government needs to concentrate in this direction and the NGOs, social groups, including the doctors need to put in more sincere effort. The government must appoint more doctors in the burn units. The NGOs and social groups must arrange a periodic effort in educating the rural peoples. Steps should be taken not only to minimize burn mortality but also to prevent and reduce their incidence at least in cases where human errors and human greed plays a role.

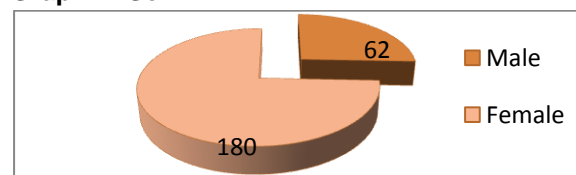
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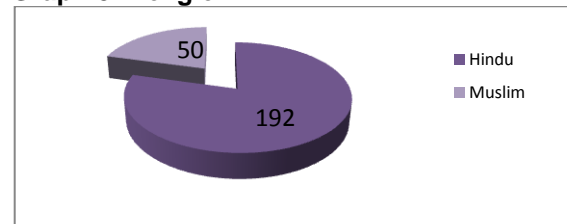
Graph 1: Age



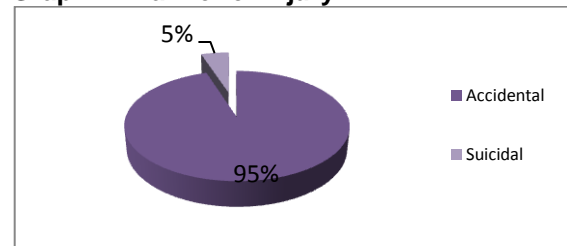
Graph 2: Sex:



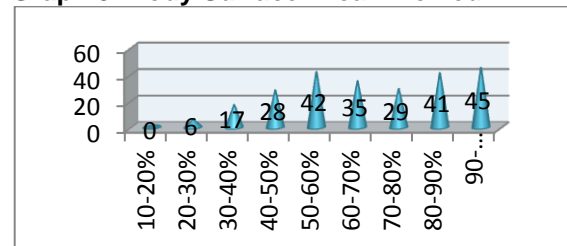
Graph 3: Religion



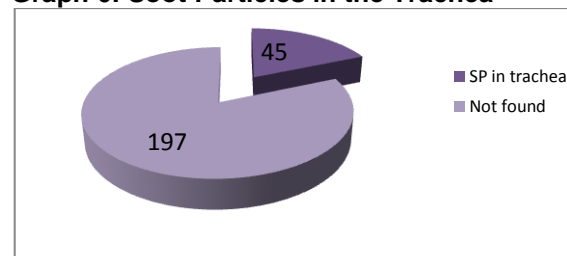
Graph 4: Manner of Injury



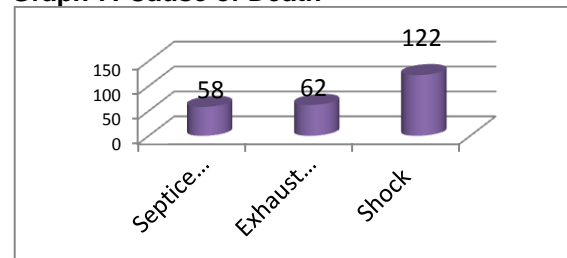
Graph 5: Body Surface Area Involved



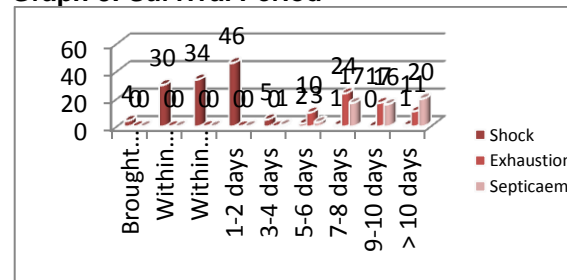
Graph 6: Soot Particles in the Trachea



Graph 7: Cause of Death



Graph 8: Survival Period



Original Research Paper

Pattern of Injuries in fall from Height

*J.V.Kiran Kumar, **A.K. Srivastava

Abstract

The cases of fall from height are now becoming more common due to multi-storeyed culture in urban population. In this study of fatal cases of fall from heights majority of falls are of males, in age group 21-50 years, from terrace and balcony due to lack of appropriate fencing. Most of the deaths are accidental and consumption of alcohol is a major predisposing factor. In majority cases body was found within 2 meters from the base of the building. In one unique case the body was found 8 meters away from the building in which the person jumped from the terrace while running to escape from the police. As in such case, if a person jumps after a pre-running there will be an associated initial velocity at the moment of take-off, which can be calculated from vertical height and horizontal distance by using the formula, $v_o = (gx^2/2(x.\sin\theta - y \cos\theta) \cos\theta)^{1/2}$. Though such cases are not very common but when a pre-running before a jump is present, determination of initial velocity is definitive of an intentional act of the person.

Key Words: Height of fall, Initial velocity, Horizontal distance, Cranio-cerebral damage

Introduction:

The pattern of injuries in cases of falls from heights is dependent on the height, body weight, velocity, nature of surface impacted, orientation of body at the moment of impact and the elasticity and viscosity of tissue of the contact body region, out of which height of fall is the major determining factor. [2] As a person falls from height, the Kinetic energy keeps on increasing due to acceleration during the fall and is maximum at the moment of impact. This amount of kinetic energy is transferred to the body of the person at the moment of impact causing injuries. (Fig. 1) Hence the severity of injuries is dependent on the height of fall.

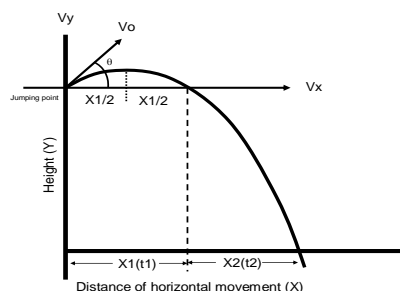
Initial velocity can be calculated from the height and horizontal movement in the falling case at various speculative angles by the formula " $v_o = (gx^2/2(x.\sin\theta - y \cos\theta) \cos\theta)^{1/2}$ ".

In a study it was found that an initial velocity between 2.70 and 9.15m/s supports a jumping activity with pre-running assistance before the jump. [2]

Hence, a falling fatality with an initial velocity exceeding 2.70m/s should not be mistaken for accidental or homicidal cause of death.

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Figure 1: [1]

Determination of the anatomical site which first impacts the ground (the primary site of impact) is useful in reconstruction of the event. In this study, an attempt has been made to determine the site of primary impact and the manner of death from the pattern of injuries.

Material and Methods:

The material of present study is 30 cases of deaths due to fall from height, brought over a period of one year to the Mortuary, Dept. of Forensic Medicine, Maulana Azad Medical College and associated hospitals, New Delhi for medico legal autopsy.

Information regarding case details including the height of fall and location of body from the base of the building (horizontal distance) was obtained from police inquest papers, by interview of the police officer, and relatives and friends accompanying the dead body. The height of fall and the horizontal distance were confirmed by measuring these

entities personally at the crime scene in every case. The pattern of injuries on the body was determined by thorough external and internal examination during the medico-legal autopsy.

Results and Discussion:

In this study of falls from heights majority of the cases were of Males (86.6%) between 21-50 years of age (60%). Female victims were few and contributed only to 13.3%. (Table 1) This result coincides with the findings in the study conducted by Lalwani S et al. [3] Two-third of falls occurred at home commonly from the Balconies / Verandahs or terrace due to lack of appropriate fencing/barrier. (Table 2)

In one case, a father was holding his baby in his arms in the balcony of his house when the baby slipped from his arms and while trying to save the baby he fell from the balcony. In another case, a 10 year old boy in an orphanage was sliding on the railing along the stairs when he fell from a height of 5.1 meters. A thief supposedly climbed a drain pipe on to the terrace of a house and was seen by the lady sleeping on the terrace. When the lady raised an alarm, the thief out of fear tried to descend hurriedly from the same drain pipe and fell from a height of 14.4 meters.

In majority of cases victims fell from a height of less than 10 meters (66.6%). Fall from a height of more than 20 meters was seen in only 5 cases (16.5%). In most of the cases the victims fell close to the building (76.6%) within 1 meter from the base of the building. (Table 3) Only in one case the body was found 8 meters away from the building, in which a thief jumped from the terrace (4th floor), after running a few steps, to escape from the police. An attempt was also made to find relation between the height of fall and horizontal distance but no conclusive correlation was seen.

In deaths due to fall from height majority of the victims first struck the ground either by head (46.6%) or by the side of the body (36.6%). (Table 4) The same results were seen in the study conducted by Goonetilleke UKDA. [4] Victims who fell on feet as primary impact contributed only to 13.3% which were intentional falls (either suicide or jumping to escape from police). It was also observed that persons who died due to fall from lesser heights (usually from 1st floor), head was commonly the site of primary impact and cranio-cerebral damage was the cause of death. Majority of cases of falls with primary side impact were those which occurred from greater heights. Also, it was seen that head injury and intracranial hemorrhages and brain parenchymal injury occurred in substantial

number of cases of side impact (9 out of 11 cases). Amongst the cases with primary head impact, multiple fractures of skull bones were seen in almost all cases. Only in 2 cases there was no fracture of the skull bones but intracranial hemorrhage and cerebral damage were present. (Table 5)

Besides skull bones, fracture of Cervical vertebrae and of upper limb bones were present in substantial number of cases of primary head impact cases. Fracture of femur was commonly seen in cases with primary side impact while fractures of leg bones were seen in cases with primary feet impact.

Internal organs like liver, spleen and lungs were found to be damaged only in cases of primary side impact. (Table 6) Liver was the organ which was most commonly involved (4 out of 11 cases). In one case, although the overlying ribs were fractured, laceration of the liver was present on its undersurface.

Spleen showed multiple lacerations in 3 cases but fracture of the overlying ribs was not seen in these cases. These findings were indicative that damage to these internal organs was due to deceleration. Hence spleen was the most common organ involved by deceleration.

This is a finding in similarity with the study conducted by Steedman DJ [5], in which splenic injury was found to be the commonest cause of haemoperitoneum. Kidneys were not found to be injured in any of the cases in our study. As to the cause of death, cranio-cerebral damage was most common occurring in two-third of cases.

Besides its occurrence in cases of primary head impact, it was also seen in substantial number of cases of primary side impact. Hemorrhagic shock was the cause of death in all cases of primary feet impact. (Table 7) Most cases of death due to fall from heights were accidental (90%). (Table 8)

The finding is same as in the study by Richter D et al. [6] Suicidal intent was seen only in 3 cases (10%). Inappropriate fencing/barrier on Terrace or balcony/Verandah was the most common reason behind accidental falls. Consuming alcohol and other intoxicating agents was also one of the major contributing factors to fall in substantial number of cases.

Conclusions:

- Most cases of deaths due to falls from heights occurred in adult males in the age group 21-50 years. Majority of falls were accidental from balconies/Verandahs or terrace.

- In this study, head was seen as the site of primary impact in most of the cases of falls from lesser heights (first floor) and side of the body was seen as the site of primary impact in falls from greater heights.
- Femur was involved with primary side impact cases. Deceleration injuries involving the internal organs occurred with primary side impact. Spleen was the most common visceral organ affected due to deceleration.
- Cranio-cerebral damage was the most common cause of death.

Recommendations:

The terraces and balconies/verandahs at homes and other places should be properly fenced. A uniform policy in this regard should be framed by the Government and made compulsory to be included in the blueprint of the building which should be verified by Development authority at the time clearance as well as after completion of the project. Crime scene investigation and preservation of viscera for toxicological analysis is suggested in all the cases of fall from height.

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Table 4: Site of Primary Impact

Site of primary impact	Number	%
Head	14	46.6
Feet	4	13.3
Pelvis	0	0
Side of body	11	36.6
a. right side	8	26.6
b. left side	3	10.0
Unknown	1	3.3
Total	30	100

Table 1: Age and Sex of victims

Age grps (yrs)	Males		Females		Total	
	No.	%	No.	%	No.	%
0-10	2	6.6	0	0	2	6.6
11-20	4	13.3	0	0	4	13.3
21-30	9	30.0	1	3.3	10	33.3
31-40	3	10.0	1	3.3	4	13.3
41-50	6	20.0	1	3.3	7	23.3
51-60	2	6.6	1	3.3	3	10.0
Total	26	86.6	4	13.3	30	100

Table 2: Place of fall

Place of fall	At Home	Outside home	Total
	No. (%)	No. (%)	No. (%)
Terrace of building	5 (16.6)	2 (6.6)	7 (23.3)
Drain pipe	0 (0)	1 (3.3)	1 (3.3)
Balcony/Verandah	11 (36.6)	2 (6.6)	13 (43.3)
Flyover	0 (0)	1 (3.3)	1 (3.3)
Construction site	0 (0)	4 (13.3)	4 (13.3)
Stairs/ladder	3 (10)	0 (0)	3 (10)
Sliding on railing	1 (3.3)	0 (0)	1 (3.3)
Total	20 (66.6)	10 (33.3)	30 (100)

Table 3: Correlation between Height of fall and Horizontal Distance

Height of fall (mtrs.)	Horizontal distance in meters					Total No. (%)
	0-0.5	0.6-1	1.1-1.5	1.6-2	>2	
0-5	4	8	--	--	--	12 (40.0)
5.1-10	2	5	--	1	--	8 (26.6)
10.1-15	--	2	1	1	1	5 (16.6)
15.1-20	--	--	--	--	--	--
20.1-25	--	1	--	--	1	2 (6.6)
25.1-30	--	1	1	--	--	2 (6.6)
30.1-35	--	--	--	1	--	1 (3.3)
Total	6	17	2	3	2	30 (100)

Table 8: Manner of Death in relation to Primary Impact

Manner of death	Head	Feet	Side	Unk.	Total No. (%)
Suicide	1	2	--	--	3 (10.0)
Homicide	--	--	--	--	--
Accident	13	2	11	1	27 (90)
Cause of accident					
Intoxication	3	--	5	--	8 (26.6)
Absence of barrier	6	--	4	--	10 (33.3)
Slipping on stairs/Ladder	3	--	2	1	6 (20)
saving son from falling	--	--	1	--	1 (3.3)
climbing for theft	1	--	--	--	1 (3.3)
Voluntary jump	--	1	--	--	1 (3.3)

Unk=unknown

Table 7
Cause of Death in relation to Primary Impact

Cause of death	Head impact	Feet impact	Side impact	Unknown impact	Total No. (%)
Cranio-cerebral damage	13	--	7	--	20 (66.6)
Hemorrhagic shock	--	4	2	--	6 (20.0)
Combined effect of both	--	--	2	--	2 (6.6)
Spinal cord damage	1	--	--	1	2 (6.6)
Total	14	4	11	1	30 (100)

Table 5
Injury to Head in relation to Primary Impact

Organs involved	Head impact (14)	Feet impact (4)	Side impact (11)	Unknown impact(1)	Total (30)
Skull bones					No. (%)
Frontal bone alone	1	--	2	--	3(10.0)
Temporal bone alone	1	--	1	--	2(6.6)
Occipital	2	--	1	--	3(10.0)
Parieto-temporal	3	--	1	--	4(13.3)
FPT	--	--	1	--	1(3.3)
Occipito-Parietal	--	--	1	--	1(3.3)
Fronto-parietal	2	--	2	--	4(13.3)
FPTO	2	--	--	--	2(6.6)
Separation at Coronal suture	1	--	--	--	1(3.3)
Cerebral damage without skull fracture	2	--	--	--	2(6.6)
Total	14	--	9	--	23(76.6)
Intracranial Hemorrhage					
SAH alone	1	2	--	1	4(13.3)
SAH + SDH	5	--	5	--	10(33.3)
SAH + EDH	--	--	--	--	--(0)
SAH+SDH+EDH	2	--	1	--	3(10.0)
SAH+SDH+C/H/N	3	--	3	--	6(20.0)
SAH+C/H/N	1	--	--	--	1(3.3)
SAH+SDH+EDH+C/H/N	2	--	--	--	2(6.6)
Total	14	2	9	1	26(86.6)

FPT – Fronto-parieto-temporal bones; FPTO – Fronto-parieto-temporo-occipital bones; SAH – Subarachnoid hemorrhage; SDH – Subdural hemorrhage; EDH – Extradural hemorrhage; C/H/N –Contusion, hemorrhage, necrosis of brain.

Table 6
Injury to Other Bones and Visceral Organs in relation to Primary Impact

Other bones	Head impact	Feet impact	Side impact	Unknown impact	Total NO. (%)
Feet + Ribs	--	1	--	--	1(3.3)
Feet + Legs + Ribs	--	2	--	--	2(6.6)
Feet + Pelvis +Vertebra	--	1	--	--	1(3.3)
Femur alone	--	--	1	--	1(3.3)
Femur + Vertebra	1	--	--	--	1(3.3)
Femur + Ribs	--	--	4	--	4(13.3)
Femur + Ribs +Sternum +Pelvis	--	--	2	--	2(6.6)
Pelvis only	--	--	1	--	1(3.3)
Vertebra only	3	--	--	1	4(13.3)
Ribs only	--	--	3	--	3(10.0)
Upper limb bones only	2	--	--	--	2(6.6)
Total	6	4	11	1	22(73.3)
Visceral organs					
Intestine + Lungs	--	--	1	--	1(3.3)
Lungs + liver	--	--	1	--	1(3.3)
Lungs + Liver +spleen	--	--	1	--	1(3.3)
Liver +spleen	--	--	2	--	2(6.6)

Original Research Paper

Rationally Used Antidotes in Organophosphorus Poisoning Prevents Suicidal Death

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Abstract

A retrospective study was undertaken in a Block Primary Health Centre to evaluate the utilization of two antidotes, atropine and pralidoxime, in Organophosphorus poisoning (OPP). This study was carried out with data from prescription record sheets of OPP patients. Data was statistically analyzed in respect of demographic profile, signs of atropinization and the health outcome after treatment with antidotes. Demographic profile of obtained 181 OPP cases revealed 100% suicidal tendency, 72.93% female, 70.17% in age group of 15-24 years and 84.53% from rural population. Nausea, vomiting, excessive salivation, sweating, meiosis (82.20%), blurred vision and disturbances of consciousness (7.93%) were the main presenting sign-symptoms. Following stomach wash, 17.12% patients improved; rest 82.88% received antidotes (atropine to all and pralidoxime to 58.66% cases). Cured patients were 41.33% treated with atropine only and 34.66% after pralidoxime addition; rest got referred to the higher centre. Positive responses after atropinization were 83.33% for pupillary size and secretions and 80.66% for pulse rate. Majority of the OPP patients can be cured with atropine only in adequate doses without promoting for costly antidote (pralidoxime). Thus, cost of treatment can be reduced and suicidal death can be prevented.

Key Words: Organophosphorus poisoning, Pralidoxime, Atropine, Health outcome

Introduction:

Organophosphorus poisoning (OPP) results from exposure to or consumption of hazardous Organophosphorus compounds (OPCs), a diverse group of chemicals used in agricultural, domestic and industrial settings. OPCs are common household insecticides, and used extensively in agricultural and horticultural schedules. They are used worldwide for a few decades for pest control and the protection of crops, weeds and plants from pests resulting in enhanced agricultural and horticultural productivity. [1-3]

For easy availability and accessibility in the home OPCs are the leading cause of poisoning, ill-health and death (both suicidal and accidental) particularly in developing countries like India, Sri Lanka, Bangladesh etc. [1-7] Committing suicide consuming OPCs is very common among rural Indian population where agriculture is the most common occupation. In agricultural area of West Bengal, a state of India, OPP is also very common. [4 - 6]

As the pesticides are readily available at the moments of stress, their complete removal from the home may result in a decline in the incidence of suicide attempts. Controls on the most toxic pesticides may have a favorable impact on suicide. [6] Reduction of psychosocial stressors at the community level may constitute an important strategy in suicide prevention. However, widespread use of OP pesticides in the developing world makes the reduction of deaths by primary prevention a difficult task. It is important to treat cases in hospitals to reduce the morbidity and mortality.

The mainstay of treatment involves atropine, a central and peripheral muscarinic receptor antagonist, and pralidoxime, cholinesterase reactivator. [8-10] Basic pharmacology suggests that early antagonism of pesticide toxicity should be associated with

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better outcomes. Literature search revealed paucity in data exploring the situation of OPP and its treatment pattern in rural Bengal. With this backdrop we conducted this study in a rural hospital.

Objectives:

1. To evaluate the utilization of atropine and pralidoxime for the patients of OPP and subsequently their health outcome at a Block Primary Health Centre (BPHC).
2. To evaluate the relationship among demographic profile of the patients, type of OPC consumed exerting impact on poisoning and the health outcome after specific treatment.
3. To observe and document the fate of the OPP patients.

Materials and Methods:

We designed an observational (non-interventional), open label, data based retrospective study carried out at Magrahat BPHC, West Bengal. Data were collected from the hospital records of the OPP patients treated in that BPHC. Study materials were the patients' admission tickets, history sheets, bed head tickets or treatment sheets available at the record room. A written permission was obtained from Block Medical Officer of Health (BMOH) of the BPHC for handling of those papers. Study protocol was duly approved by Institutional Ethics Committee.

Patients' data from April 2010-September 2011 were collected in a pre-designed Case Record Form. Collected data were analyzed in respect of Patients' demographic profile, Time taking to reach hospital, Type and amount of OPC consumed, Treatment received (stomach wash, antidotes: atropine & pralidoxime, other medications), Signs of atropinization (pupil size, secretion, pulse rate, temperature), Outcome of treatment (cured and discharged, referred to higher tier and death). Obtained data were analyzed by descriptive and inferential statistical methods by using SPSS 16.0.

Results:

Data of total 181 patients were obtained during 1½ years. All patients were admitted directly with a history of self-poisoning with an OP pesticide. Demographic profile (Table 1) shows that suicidal tendency (100 %) was most commonly found among female (72.93 %) with an age group of 15-24 years (70.17%), and 84.53% cases were reported from rural population. Poison ingested was identified from the patients' or relatives' histories, and the bottle brought with the patients who had ingested a

range of OPC (Table 2). Brand name of OPC was mentioned on history sheets, when generic name was obtained through web search. Phorate and Chlorpyrifos were the commonly used poisons (OPCs).

Odour of OPC was present in all cases. Nausea, vomiting, excessive salivation, sweating, meiosis (82.20%), blurred vision and disturbances of consciousness (7.93%) were the main presenting sign-symptoms. Pulse rate and blood pressure on admission were within normal range. Temperature was not recorded. Patients had presented within different lag periods of ingestion (Table 2).

Each patient was treated in accordance with a standard management protocol. All patients received ongoing general supportive care and it became apparent that treatment was received in the initial resuscitation time.

Profile on OPP consumption and treatment (Table 2 & 3) reveals all patients got stomach wash with normal saline; of which 17.12 % with time lag of <1 hour got cured and discharged following an observatory period, rest 150 patients received specific antidotes with titrated doses of atropine and/or pralidoxime. About 41.33 % patients were cured with atropine alone after stomach wash with time lag of 1-3 hours. Whereas, 34.66 % patients needed pralidoxime in addition to be cured with a time lag of 3-5 hours.

About 24 % patients were referred to the higher centre even after proper treatment. Among the categorical responses after atropinization (Table 4) 83.33% cases showed positive responses. Few patients (Table 3) required other supportive medications like theophylline (18 %), dexamethasone (12 %) and diazepam (10 %).

Discussion:

Aggressive use of agrochemical pesticides results in continuing hazards and is associated with high morbidity and mortality in the rural areas. Patients of our study on admission demonstrated manifestations of OPC activity at muscarinic and/or nicotinic receptors.

Meiosis, no pinpoint pupil (1 mm), was the most common sign as observed by the treating physicians. Few patients had a reduced level of consciousness. Our study revealed that all were suicidal cases without death; critical patients were referred to higher referral centers. Self-poisoning with pesticides is one of the most predominant means of suicide in rural areas, [2] this corroborates with our findings. In our study preponderance of suicide attempt was in the age group of 15-24 years, and number of female

suicide attempters exceeded that of the male attempters which was in contrast of other studies [11-15] performed in tertiary care hospitals where males outnumbered females. Cause of self-harm, occupational, socio-economic and educational status and quantity of poison consumed could not be revealed as we had to depend only on retrospective data which were lacking in such rural health centre. Prompt treatment after the identification and diagnosis of the poisoning cases was the motto of BMOH of that BPHC.

Agriculture is the main livelihood of people in surrounding area of the BPHC. As a general rule farmers of this area use OPCs as pesticides and insecticides to yield high crops. As there is no control on the sale or purchase, different varieties of pesticides are easily available through an open local market, even sold from grocery shops in the villages of this region. Strategic psychosocial intervention might be beneficial in suicide prevention, but it is not feasible in such remote area. Thereby medical management remains the mainstay of prevention of suicidal death from acute OPP.

In the present study patients were managed by ensuring an adequate upper airway, removal of poison by gastric lavage and by specific pharmacological therapy. Atropine showed significant positive categorical responses. Atropine sulphate and pralidoxime chloride are the two most widely used effective salts for treating OPP, [1, 8] but specific salt of those two antidotes were not recorded in our study. Number of controversies exists on the most effective treatment. [1, 3, 8–10, 16, 17] In the past, atropine alone was used as antidote for treatment of OPP.

In our study most of the patients got cured with atropine. Textbooks suggest that atropine reverses only muscarinic effects of acetylcholine, therefore, neuromuscular effects are not inhibited by atropine and patients can develop respiratory failure due to paralysis of respiratory muscle. Oximes on the other hand, reverse the nicotinic effects. So, oximes are said to improve the result of the treatment of OPP when they are added to atropine. A few studies have questioned the role of oximes in OPP.

The reports claim that oximes, especially in lower doses, do not convey any added advantages over atropine alone. [1, 8–10, 16, 17] Since oximes are expensive drugs and can also have major side effects, oximes may not be given in OPP if the reports are true. From our study it could not be concluded that addition of pralidoxime whether exerts any effect on the outcome or not, as only 34.66 % patients were

cured with pralidoxime in addition to atropine. Addition of pralidoxime might increase the probability of survival.

Many textbooks consider OPP to be broadly similar and equally responsive to treatment. But differences in chemistry have major consequences for effectiveness of treatment for specific pesticides. [2, 8] Patients can suddenly develop peripheral respiratory failure while conscious after recovering from cholinergic crisis. This is an important cause of death in patients who have been resuscitated and stabilized on admission to hospital. [1, 3, 8]

Recovery rate depends on various factors such as the OPC consumed, the amount ingested, the time interval for hospitalization, and the general health of the patient. Chances of recovery were higher in our study when the patient was hospitalized at the earliest indication, small amount and less toxic OPC ingested, and management could be started earlier. Findings of this study highlight the usefulness of antidotes in the management of OPP and also advocate the cautious use of pesticides at community level and to store them safely beyond the easy reach of young adults and female members who were the major victims in our study.

The study has some limitations:

1. Poor documentation of data mainly because of scarcity of better trained staffs in that BPHC; relationship between demographic profile and OPP could not be established,
2. Actual health outcome is not reflected as there is lack of evidence based guidelines for case management in the rural hospital,
3. Actual number of OPP cases is well in excess of what was recorded in this study;
4. All cases do not attend the rural hospital for various reasons, mainly because the BPHC lacks the capacity to manage many cases and improper hospital infrastructure for proper medical care of poisoning cases.

Conclusion:

Skilled and prompt treatment can provide a good outcome for a potentially lethal condition. Majority of the OPP patients may be cured with timely administration of atropine only in adequate doses without promoting for purchasing costly antidote (pralidoxime). Thus, cost of treatment can be reduced, and suicidal death may be prevented with improved management of pesticide poisoning.

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Table 1: Demographic Profile of OPP Patients (N=181)

Parameters	Frequency (%)	Parameters	Frequency (%)
Age (years)		Sex	
15-24	127 (70.17)	Female	132 (72.93)
25-34	25 (13.81)	Male	49 (27.07)
35-44	18 (9.94)	Residence	
≥ 45	11 (6.08)	Rural	153 (84.53)
Mode of poisoning		Sub-urban	28 (15.47)
Suicidal	181 (100)	Marital status	
Accidental	0	Married	108 (59.66)
Homicidal	0	Unmarried	58 (32.04)
Cause of self-harm : No data		No data	15 (8.30)
Occupation & Socioeconomic status : No data		Educational status : No data	
in addition (1 ampoule = 1gm)	11 (7.33) 77 (51.33)	1 gm 2 gm	Referred: 36 (24.00) (Received Atropine + PAM)
Other medications			No record
Theophylline	27 (18.00)		
Dexamethasone	18 (12.00)		
Diazepam	15 (10.00)		

Table 3: Treatment Received by the Patients (N = 181)

Type of treatment	Patients (%)	Dose	Outcome: No. (%)
Stomach Wash	181 (100)		Cured : 31 (17.12)
Antidotes received	150 (82.88)		
Atropine (1 ampoule = 1 mg)	n=150 150 (100)		n=150 Cured : 62 (41.33) (with atropine alone)
	28 (18.67) 39 (26.00) 62 (41.33) 13 (8.67) 8 (5.33)	Mg >200 150-200 100-150 50-100 <50	
Pralidoxime (PAM)	88 (58.66)		Cured : 52 (34.66)

Table 2
Profile on OPCs Consumption by the Patients (N=181) after Reaching the Health Centre

Time lags (hours)	Frequency (%)	Treatment received	Amount of OPCs ingested
<1	31 (17.12)	Stomach wash (SW)	½ bottle
1 – 3	62 (34.26)	SW + Atropine	½ bottle
3 – 5	78 (43.10)	SW + Atropine + PAM	¾ bottle
>5	10 (5.52)	SW + Atropine + PAM	full bottle
Generic OPCs	-	Brand Names	
Methyl parathion	18 (9.94)	Metacid, Parahit,	Actual quantity not recovered.
Phorate	78 (43.10)	Thimet 10G	
Chlorpyrifos	15 (8.30)	Lethal, Tricel	
Chlorpyrifos +Cypermethrin	49 (27.07)	Lethal Super 505	
Quinalphos	11 (6.08)	Agroquin	
Dimethoate	10 (5.52)	Rogori, Roger	

Time lags = Time to admission since ingestion, PAM = Pralidoxime

Table 4
Categorical Responses by the Patients (N=150) after Atropine Injection

Type of response	Secretions No. (%)	Pupil size No. (%)	Pulse rate No. (%)	Temperature No. (%)
Positive response	125 (83.33)	125 (83.33)	121 (80.66)	Not recorded
No response	25 (16.67)	25 (16.67)	29 (19.34)	

Original Research Paper

Pattern of Injuries in Fatal Road Traffic Accidents in Warangal Area

*Jakkam Surender

Abstract

Road traffic injuries are one of the major causes of morbidity and mortality especially in developing countries including India. Accidents by two wheeler are more in number than others. The objective of the present study was to analyze the pattern of injuries in two wheeler road traffic accidents and find out the measures for the prevention. This study was made on 297 victims, who died of two wheeler accidental injuries which were autopsied at Kakatiya Medical College, Warangal during the period of January 2009 to June 2011.

The study shows that deaths, are more in the age group of 21 to 40 years (56.5%), Males (87.5%) are vulnerable than females (12.5%). People from Middle socioeconomic status died more (63.64%) than others. Most of the deceased are riders (60%). More number of deaths is occurring in the late night hours. Lacerations (85.18%) are commonly occurring injuries than contusions and abrasions. Head and neck (56.22%) is the most common part to receive injuries in two wheeler accidents. Head injury (47.48%) is the most common cause of death. Most of the people are died between 6 to 24 hours (27.27%) after the accident.

Key Words: Road traffic accidents, Two Wheeler, Injuries, Victims, Head & neck

Introduction:

Road traffic accidents are the major cause for sudden un-natural deaths. A hale and healthy man going out of his home returns as a dead body. Motorized two wheelers are replacing the traditional bicycles in all families in Indian rural population. This evolution process started with mopeds and scooters but now they completely replaced by more advanced motorcycles. The two wheelers introduced in to Indian market by the multi-national companies in the recent past are not tested to the riding conditions of Indian countryside roads.

The designing of these vehicles is made according to the riding conditions of western countries or sophisticated roads. They have a great pick up and high speed. Driving a two wheeler vehicle is definitely risky than a four wheeler vehicle on the same road. The risk to the rider or pillion rider increases by many folds during, the ride; they are Faulty vehicle, Faulty rider, Unfavorable environmental conditions, and Overloaded vehicle. [1] Whatever the cause may be, once the accident occurs and person falls from the vehicle, it definitely results in either morbidity or mortality.

Hence a study is made on the deaths resulted from fatal two wheeler accidents, to know the pattern of injuries occurring in fatal accidents over the rider or pillion rider to assess the outcome of future two wheeler accidents and their prognosis.

Material and Methods:

The present study is made on dead bodies, died of accidents involving two wheelers, which are subjected to Post-mortem examinations in the mortuary of Mahatma Gandhi Memorial Hospital, Kakatiya Medical College, Warangal, for duration of 18 months from January 2009 to June 2011.

Inclusion Criteria:

Riders and pillion riders died in the two wheeler accidents. All age groups from both sexes Spot deaths and deaths occurred during transit and during treatment.

Exclusion Criteria:

Deaths occurring in road traffic accidents due to other vehicles, non-motorized two wheelers and pedestrians deaths occurred by two wheelers were excluded.

Inquests, First information reports, Statements made by the relatives, Panchanama etc. are collected from the Police and Post-mortem examination reports are collected from the Department of Forensic Medicine, Mahatma Gandhi Memorial Hospital, Kakatiya Medical College, Warangal. Relatives are enquired about some more details which are not incorporated in

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the above documents, when they attended mortuary, at the time of post-mortem examination. Scene of offence is visited in cases where there is discrepancy present between the inquest and the post-mortem examination findings. Photographs of scene of offence are taken in such cases. Some photographs of the scene of offences are collected from the police.

After collecting the above information, a data sheet is prepared, analyzed and tabulated. The observations are made out and compared with the standard information available in the literature from other parts of India, Sri Lanka and the Western Countries also.

As a part of the present study, many constraints are identified, as the history regarding the wearing of the helmet; consumption of alcohol; scene of offence description; distraction by the pillion rider etc. are not elicited properly either in the Inquest or during the personal enquiry. All this information is incorporated in the present study.

Results:

The total number of dead bodies subjected in a year to post-mortem examination is increasing. It clearly says that the load on the mortuary is increasing day by day. Out of the above figures, road traffic accidents have taken 474 lives in 2009; 513 lives in 2010 and 218 lives in the year 2011 up to June. Deaths occurring after the involvement of two wheeler is surprisingly large and they are 114 (7.31%) in 2009; 124 (6.92%) in 2010 and up to June 2011 the no. of deaths are 59 (7.60%). The present study shows that males are more vulnerable for two wheeler accidents and their deaths toll 260 (87.5%) lives of total, and females are only 37 (12.5%). (Fig. 1)

The magnitude of deaths occurring in young age group is relatively large. In 31 to 40 years age group it is 88 (29.6%) and in 21 to 30 years age group it is 80 (26.9%). It means from 21 to 40 years of age the death by two wheeler vehicular accidents are 168 (56.5%). Then it is declining on to the extremes of age. (Fig. 2)

The educational qualification is varying among the deceased. Literates are 228 (76.77%), Illiterates found in this study are 50 (16.83%) and in the remaining 19 (6.40%) no information is available in regard to their educational status. (Table 1)

Many of the deceased are from sub-urban population 128 (43.10%); people from rural areas are 87 (29.29%) and the remaining 82 (27.61%) are from urban population. More males are from sub-urban area i.e. 115

(44.23%); 72 (27.69%) are from rural and the remaining 73 (28.08%) are from urban areas. Among the females from rural are i.e. 15 (40.54%) next are from sub-urban area 13 (35.14%).

It is found that most of the people are from middle socio economic group the number of people died in that group are 189 (63.64%). There are people from high socio economic group whose number is 80 (26.93%). The rest of them are from low socio economic group whose number is 28 (9.43%).

Most of the deceased males are riding the two wheeler 156 (60%) and the rest of them 104 (40%) are pillion riders. It is reverse in case of females as the riders are only 3 (8.11%) and the remaining 34 (91.89%) are pillion riders. (Table 2)

Alcohol was found in stomach contents of only 22 (7.41%), who are males of adult age groups. In the rest of 275 (92.59%) people including male and females had no alcohol smell.

The numbers of deaths resulting from two wheeler accidents are found to be more, in the late night hours (10 pm to 3 am), 116 (39.06%). Morning hours (6 am to 12 Noon) appear to be the next fatal time 69 (23.23%) deaths. Accidents occurring in the early morning hours (3 am to 6 am) have (2.69%) deaths in this study. (Table 3)

The victims of two wheeler accidents succumbed to the injuries at varying period after the accident. Among them most of the deaths occurred between 6 to 24 hours, as there are 81 (27.27%) deaths are reported in that time. Deaths occurring immediately on the spot tolled 66 (22.22%) lives. (Table 4)

In the present study there is not much information was made available either in the inquest, panchanama of scene of offence or on personal enquiry about the wearing of helmet at the time of accident. However in 34 (11.45%) males, death occurred even after wearing the helmet. (Fig 3)

In this study Split, cut and stretch lacerations are present in 253 (85.18%) persons; whereas avulsions are seen in 15 (5%) persons. The next commonly seen injury is contusion, which is present in 203 (68.35%) deaths. Grazed abrasions are seen in 173 (58.24%) persons, 74 (24.9%) persons received different types of fractures involving long bones and flat bones. In 36 (12.12%) persons penetrating injuries are seen, which are produced by different projecting objects either from vehicle or from the surroundings. In two

persons only amputation of limbs are seen. (Table 5)

Head and neck received injuries in maximum cases 167 (56.22%) persons; while chest received in 110 (37.03%) persons; abdomen is involved in 118 (39.73%) cases; and the spinal injuries are seen in 37 (12.45%) deaths. (Table 6) Head injury has become the Cause of Death in maximum cases 141 deaths (47.48%); Blunt injury of abdomen is the Cause of Death in 21 cases (7.07%) and in 12 cases (4.04%) injury to the limbs is opined as the Cause of Death. The frequency of involving the parts of the body in both sexes, to cause the death is almost similar, except injuries to the chest are found more in males and injuries to the abdomen are seen more frequently in females in the present study. (Table 7)

Self falls taken the lives in 79 cases (26.61%), of which 17 (5.7%) are due to uneven road, 21 (7%) are due to hit to a culvert, 17 (5.7%) are due to hit to a mile stone, 16 (5.38%) are due to hit to a tree, 3 (1.01%) are due to hit to a buffalo, and 5 (1.68%) are due to hit to a speed breaker. Four wheeler hits such as lorry / tipper or other heavy vehicles are responsible for 54 deaths (18.18%). Hit by another motor cycle killed 43 persons (14.48%). Hit by an auto rickshaw resulted in 21 deaths (7.07%). Car and jeep hits taken 26 lives (8.75%). RTC buses also responsible for 14 deaths (4.71%).

Tractors are seen in 6 fatal hits (2.02%). Bullock carts are found to involve in 3 deaths (1.01%). Whereas in 51 deaths (17.17%), it was an unknown vehicle hit and run resulted in fatal accident. Self-hits and hit by another motor cycle has killed 84 (28.28%) persons due to Head injuries. 64 (21.54%) deaths due to multiple injuries are resulted from hits made by heavy vehicles like Lorries, buses, cars, vans or unknown vehicles. 17 (5.72%) deaths, in which Cause of Death was given as blunt injury to chest was resulted by heavy vehicular hits; similarly another 17 (5.72%) deaths resulted from blunt injury to the abdomen are the result of hit by heavy vehicles. Heavy vehicular hit also resulted in deaths in 10 (3.36%) persons due to isolated injuries to the limbs.

Discussion:

In the present study, a total of 297 cases of fatal tow wheeler accidents of all age group and both sex were studied for duration of 18 months. The percentage of deaths occurring due to involvement of two wheelers is constantly around 7% in all the years, but the number of deaths due to accidents is increasing in proportion to the total number of deaths. [2, 3]

Always the number of deaths occurring in males is more due to two wheeler accidents. This may be attributed to the regular usage of two wheelers by male population than female population. [4] As the usage of two wheelers by young age group people is more; number of accidents in the age group will be more and the number of deaths is also proportional to them. Few children, who are less than 10 years, also found to lose their lives in the present study, and all of them are pillion riders. [5, 6]

Literacy played no role in causation of accidents or deaths. A good number of people are from literate area, who met with accidents which resulted in death. The present study highlights that people from sub-urban regions are involved in accidents to a greater number. And people from rural and urban areas are involved almost equally.

This is because of usage of two wheeler is increasing in populations from different sets of people. Most of the people in the present study are from middle socio economic group; next group is from high socio economic group and a less population is involved from low socio economic group. This can be interpreted as to the affordability of the people to maintain the vehicle. Most of the deceased males are riding the two-wheeler, whereas most of the females are pillion riders.

History of consumption of alcohol and odour of alcohol in the stomach contents is noticed in few cases. It does not mean that in the remaining people alcohol consumption is not present. The gravity is showing the tip of an iceberg. However in all the female deceased there is no alcoholic odour present in the stomach contents.

The number of fatal accidents occurring in the late night period is obviously more. This may be because of the unfavourable conditions prevailing to the two wheeler riders. The next fatal time observed is the morning hours. This may be because of the number vehicles coming on to the road in that time. One more observation made in the present study is less number of accidents occurring the early morning time. This is also can be due to less number of vehicles moving on the road at that time. [7, 8]

Most of the deaths resulting from the two wheeler accidents are within 24 of their occurrence. This can be attributed to the severity of the injuries. Very few deaths are occurring after that time. This may be because of the better medical care what they are getting. [9] Protection extended by the helmet cannot be clearly made out in the present study. However in a few deaths helmet was worn by the victim,

but the Cause of Death in them is due to multiple injuries. But it clearly shows that wearing helmet protects the head from injuries. [10] Abrasions including the grazes are the predominant injuries seen in the present study. However lacerations and contusions are sharing the major part of the injuries.

Fractures and penetrating injuries are also seen. Amputations and avulsions are seen in few deaths usually in run over accidents. [11] In majority of the deaths head and neck is involved more. The order of involvement of regions of the body is upper limbs, lower limbs, chest and abdomen. The least involved region is spine. It clearly shows that head and neck is the most unprotected area of the body which is subjected to injuries. Spine is the least vulnerable area as it is well protected part of the body. [12-14] Head injuries are the major Cause of Death in the present study followed by multiple injuries. Isolated injuries to the limbs is the least fatal to cause the death. However the multiple injuries include injuries occurring to all regions of the body. Hence it is not possible to identify the most vulnerable region in the body for two wheeler accidents that can result in the death of the victim. However head and neck are more prone to injuries, if proper protection is not given to them. [15]

The distribution of Cause of Death is almost similar and equal in percentage in both sexes, except in the trunk. More deaths are occurring in males because of the injury to the chest and in females because of injury to the abdomen. This may be because of the direct exposure of the upper trunk in males to the projecting objects of the vehicle or surroundings.

Self-hits i.e. person hitting a fixed object present on the side of the road is the major reason for fatal accident and most of them are resulted in head injuries. It clearly shows that wearing of helmet could definitely have saved the lives at least in some of them. Heavy vehicular hits is another major cause for accidents and in most of them it resulted in multiple injuries or blunt injuries to the chest and abdomen or injuries to the limbs, resulting in fatal fractures of the bones of the limbs. [16]

The observations made in the present study can be compared with the study made in Punjab, where it is observed that, the maximum number of accidents was due to two wheeler vehicles (scooter/motorcycle) which had the involvement of heavy and light four wheeler vehicles in the most road accidents. As for regional injuries, head/face injuries dominated the cause of deaths in fatal accidents, followed by limb injuries. Maximum deaths occurred due

to fracture injuries followed by abrasions, contusions, leading to haemorrhage. [17]

Conclusion:

Deaths due to accidents are around 29% of total un-natural deaths and two-wheeler is alone taking around 7% of total autopsies.

Males are predominant gender than females which are succumbing to the two wheeler accidents. People from 21 to 40 years age group are more vulnerable for two wheeler accidents. The magnitude is decreasing to the extremes of age. Literacy is not playing any role in preventing the accidents. Sub-urban people are more victimized in the two wheeler accidents in the present study.

People from middle socio-economic group are involved more in number, than people from high socio-economic group, because they usually use four-wheeler from their transit.

The present study showed that male riders are dying more and female pillion riders are dying more. Role of alcohol in causation of fatal accidents is not clearly elicited in the present study, as neither the history regarding consumption of alcohol, nor the examination of stomach contents for the presence of alcohol is inconclusive. But the electronic and print media clearly showed that, the drunk and driving leads to fatal accidents on the national highway.

Protection by the helmet is also inconclusive. This is because in majority of the deaths the history of wearing of helmet is not incorporated in the data. But records are showing that, they reduce fatalities by reducing head injuries, but they may lead cervical spine fracture or strangulation by chin strap in crushed injuries. Fatal two- wheeler accidents are occurring more in late night, i.e. between 10 pm to 3 am. Many of the deaths resulting from two wheeler accidents are reported within 24 hours of the accident. Abrasions including grazes are the common types of injuries.

Amputations are least frequently observed injuries, in two wheeler accidents. Head and neck are more frequently injured regions of the body. Most of the self falls and hits by another motor cycle resulted in head injuries; and hits by heavy vehicles resulted in multiple injuries, blunt injury of chest or abdomen and injury to the limbs which are proven to be fatal.

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Table 1: Educational Status

Educational status	Male	Female	Total (%)
Literates	213	15	228 (76.77)
Illiterates	37	13	50 (16.83)
No information	10	9	19 (6.40)

Table 2: Position of the Victim

Position on the Vehicle	Male	Female	Total
Rider	156(60%)	3(8.11%)	159
Pillion Rider	104(40%)	34(91.89%)	138

Table 3: Time of Accident

Time of Accident	Male	Female	Total (%)
Early Morning (3am to 6am)	8	0	8(2.69)
Morning (6am to 12 N)	64	5	69(23.23)
Afternoon (12N to 3pm)	26	12	38(12.79)
Evening (3pm to 7pm)	25	9	34(11.45)
Early Night (7pm to 10pm)	25	7	32(10.78)
Late Night (10pm to 3am)	112	4	116(39.06)

Table 7: Cause of Death (according to PME report)

Cause of Death	Male	Female	Total (%)
Head Injury	123	18	141(47.48)
Injury to the Chest	25	1	26(8.75)
Blunt injury to the Abdomen	12	9	21(7.07)
Injury to the Limbs	11	1	12(4.04)
Multiple Injuries	89	8	97(32.66)

Table 4: Period of Survival after Accident

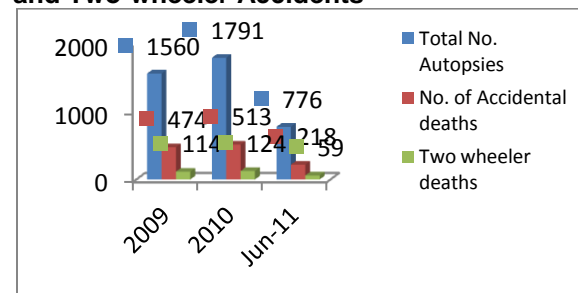
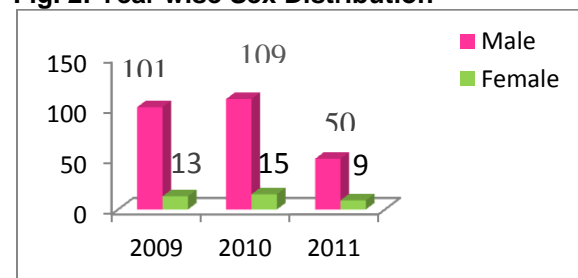
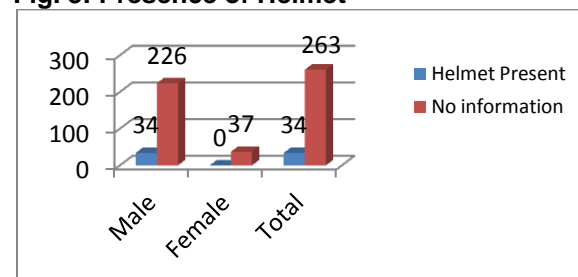
Period of Survival	Male	Female	Total (%)
Spot death	59	7	66(22.22)
On the way to Hospital	37	9	46(15.49)
< 6 hours	48	10	58(19.53)
6 to 24 hours	75	6	81(27.27)
1 to 3 days	22	3	25(8.42)
4 to 7 days	18	1	19(6.40)
> 7 days	1	1	2(0.67)

Table 5: Magnitude of Injuries

Injuries	Male	Female	Total (%)
Abrasions (Except Grazes)	112	12	124 (41.75)
Grazed Abrasions	148	25	173(58.24)
Contusions	174	29	203(68.35)
Lacerations (Except Avulsions)	225	28	253(85.18)
Avulsions	14	1	15(5)
Penetrating injuries	28	8	36(12.12)
Fractures	58	16	74(24.9)
Amputations	2	0	2(0.67)

Table 6: Parts of the Body injured

Part of the Body injured	Male	Female	Total (%)
Head and Neck	142	25	167(56.22)
Chest	98	12	110(37.03)
Abdomen	102	16	118(39.73)
Upper Limb	127	26	153(51.51)
Lower Limb	125	15	140 (47.13)
Spine	29	8	37(12.45)

Fig. 1: Incidence of Road Traffic Accidents and Two-wheeler Accidents**Fig. 2: Year wise Sex Distribution****Fig. 3: Presence of Helmet**

Original Research Paper

Pattern of Medico-legal Cases in Rural Area of Faridabad, Haryana

*Abhishek Yadav **N. K. Singh

Abstract

The Government of India has stressed upon the importance of tertiary health care in rural areas. This study was undertaken to see the benefit of the same by studying the profile of Medico-legal Cases in Goldfield Institute of Medical Sciences and Research (GFIMSR) situated in the rural area of Distt. Faridabad, Haryana. The study also aimed at analyzing the data with regard to various criteria and to use the same for betterment of patient care in the emergency department.

The study was conducted in a retrospective manner and all the Medico-legal cases which came to the emergency department of the hospital between Jan 2009 to June 2012 were studied. The males were the dominant group (67.6%). The most of the victims were of the age group 21-30 years (45.1%). The poisoning cases had the highest incidence in relation to the cause of admission (36.9%). Assault cases constituted the dominant group in relation to manner of the cases (39.6%). Most of the patients (53.2%) reported in the hospital within one hour of sustaining the injury/other causes.

Key Words: Medico-legal cases, Tertiary care, Assault, Poisoning, Road Traffic Accidents

Introduction:

There always has been a lack of good medical facilities in rural areas of our country. The government also has been making various strategies to improve health care situation in rural India. The Goldfield Institute of Medical Sciences and Research (GFIMSR) is situated in the rural area of Distt. Faridabad, Haryana.

Before, proceeding we will have a look at the district profile of Faridabad. The district of Faridabad is situated in Haryana, where it is bounded by Union Territory of Delhi (National Capital) on its north, Gurgaon District on the west, Palwal District on the south and State of Uttar Pradesh on its east. [1]

Faridabad district is divided into two sub divisions viz. Faridabad & Ballabgarh and GFIMSR falls in Ballabgarh subdivision. The population of Faridabad is 17, 98, 954 as per census 2011 [2], with 20% of the population being rural. [3]

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The Goldfield Institute is the first to provide a hospital in this area, started with the aim to provide tertiary care to the rural population of Faridabad.

It is a well known and established fact that the initial few hours are golden period which can save the life of a patient in a case of emergencies. The nearest urban area from GFIMSR is about 20-25 Kms away and in case of emergency the time elapsed while transferring the patient from the rural area to urban center is too much which can seriously endanger the patient life. The emergency department of the hospital should always be well equipped and trained to handle all kind of cases coming to them. Our study is aimed to observe all the above mentioned facts by studying the profile of Medico-legal cases in the hospital.

Aim and Objectives:

1. To study the pattern of MLC Cases, with regard to various criteria like age, sex, manner, hospital outcome etc.
2. To observe the benefit of a tertiary care hospital in rural setup.
3. To analyze the data and use it for betterment of patient care in the Emergency Department.

Material and Methods:

The study was done in a retrospective manner of all the MLC cases coming to the emergency department of Goldfield Institute (GFIMSR), during the period of Jan, 2009 to

June, 2012. The data was collected from MLC registers, hospital case files, and telephonic conversation with the relatives or police wherever possible. The collected data was analyzed for the age, sex, cause & manner of injury, time of injury, time period between injury and reporting to casualty, hospital stay & outcome.

Result and Observations:

Out of all cases, the age group 21-30 years constitutes most of the cases (45.1 %), followed by 11-20 years (24.3%) and then 31-40 years (18.9%). The males were dominant group (67.6%) of the cases. (Table 1)

Our study shows that poisoning was the predominant cause in all medico-legal cases (36.9%), followed by assault (29.7%) and road traffic accident (27%). (Table 2) Most of the poisoning cases were suicidal (78.1%), while no homicidal case was reported. The males were the dominant group in accidental cases while females were the majority in suicidal cases. (Table 3)

Present study shows that the incidence of assault and accidental cases were more or less equal (39.6% and 38.7% respectively), while suicidal cases were comparatively low (30.6%). (Fig.1)

In our study 53.2% of the cases reported within one hour of injury and 22.5% reported between one to two hours. (Fig. 2) Most of the admitted MLC cases were discharged after treatment (81.8%), while only 10% of the cases were Leave Against Medical Advise (LAMA) and only one case was brought dead(0.9%).(Fig.3)

Discussion:

In the study, a total no of 111 cases were studied, which have reported to the emergency department between Jan, 2009 and June, 2012. The males were the dominant group (67.6%), which is in accordance with the similar studies. [4-6] This is due to the fact in rural areas males are more actively involved in outdoor activities whether job or agriculture work, and females are mostly involved in household activities.

The most of the victims were of the age group 21-30 years (45.1%), followed by 11-20 years (24.3%) and then 31-40 years (18.9%). The dominance of the group 21-30 years is consistent with the similar studies [4-6] and due to the fact that this is the most active age group whether in agriculture, job or education. The higher incidence in the 11-20 years than 31-40 years is because that the persons in rural area are involved in family agriculture work along with

their education from an early age, as compared to urban areas, where this age group is mostly involved in the education only. Besides, they have to travel a larger distance to reach urban area where their school, colleges, educational institutes etc are located.

The conditions of the roads are also not very good in the rural areas which make the travelers susceptible to accidents, which is evident from the fact that 27% of the cases were of road traffic accidents.

The very interesting finding of our study was the poisoning cases having highest incidence (36.9%). It is because hospital is set up in a rural area with most of the households involved in agriculture work, so the poisons are available at a relative ease in the house than in an urban area. A very important finding was that 78.1% of poisoning cases were suicidal, and only 21.9% cases were due to accidents, despite more exposure of agricultural poisons while working in the fields. The number of females was also higher than males in suicidal poisoning cases. The similar findings were reported by Kar et al. [7]

This shows that the atrocities are still being prevalent in our society against the females, due to which they are forced to take such extreme steps.

The assault cases also had higher incidence (39.6%) in relation to manner of cases than accidental manner (38.1%), as families in the rural area are mostly joint families, so if a fight occurs between any two individuals, it usually has more tendencies to evolve onto group fights. Moreover issues like dispute in division of parental property etc are present in big families in rural areas and run in several generations. Besides the lower level of education, comparative lack of proper policing due to larger land area, caste based atrocities, and Panchayat dominance leading to lack in faith in the district administration, are also many factors leading to higher number of assault cases. The benefit of a tertiary care hospital in the rural setup is clearly evident from the observations that 53.2% patients reported in the hospital within one hour of sustaining the injury/other causes and 22.5 % in the next hour.

Out of all the 111 patients, 81.8 % were discharged after successful treatment from the same hospital. This shows the effectiveness of the early initiation of the treatment in case of emergency. If these patients had to go to the urban centers, then it would have taken a much more time, because of the distance and the poor conditions of the roads. Besides the travelling would have only worsened their condition. The

clinical outcome would have been also different from the present scenario where most of the cases were treated successfully.

The Government of India over time and time again has stressed upon the need of tertiary health care in rural areas. The same fact has been stressed upon in the Planning Commission report on tertiary care institutions for 12th five year plan. [8] The above findings also substantiate the aim of the Indian Government to provide tertiary health care in rural area by setting up of Medical Colleges and Hospitals.

Conclusion:

1. Males and young age group are most commonly involved group in Medico-legal cases.
2. Suicidal poisoning cases have a high incidence in rural population. So emergency department should be well equipped with all the antidotes and the drugs which are used for the treatment of agricultural poisons.
3. The benefit of tertiary health care center is clearly evident from the results. So, if such centers could be established in rural areas of each district with teaching and training facilities, it will definitely be a boon for rural population of India.

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Table 3: Manner of Poisoning versus Sex Distribution

Manner	Male	Female	Total
Suicidal	13	19	32
Accidental	8	1	9
Homicidal	0	0	0
Total	21	20	41

Table 1: Age and Sex Wise Distribution

Age (in years)	Male	Female	Total	Percentage
0-10	02	02	04	3.6
11-20	21	06	27	24.3
21-30	34	16	50	45.1
31-40	12	09	21	18.9
41-50	05	03	08	7.2
51-60	01	00	01	0.9
Total	75 (67.6 %)	36 (32.4 %)	111	100

Table 2: Cause of MLC with Sex Distribution

Cause Of Injury	Male	Female	Total
Assault	25	8	33
Road traffic accident	24	6	30
Poisoning	21	20	41
Burns	2	1	3
Strangulation	1	1	2
Hanging	1	0	1
Factory accidents	1	0	1
Total	75	36	111

Fig. 1: Manner of Cases

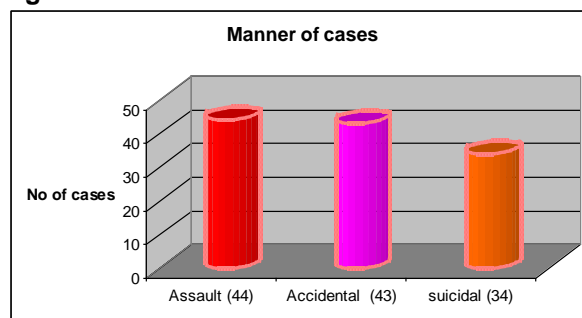


Fig. 2: Time Period between Injury & Reporting to Casaulty

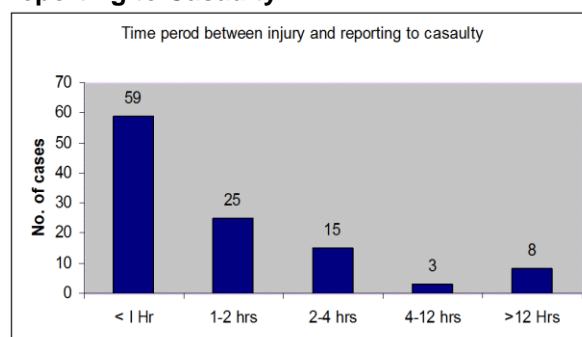
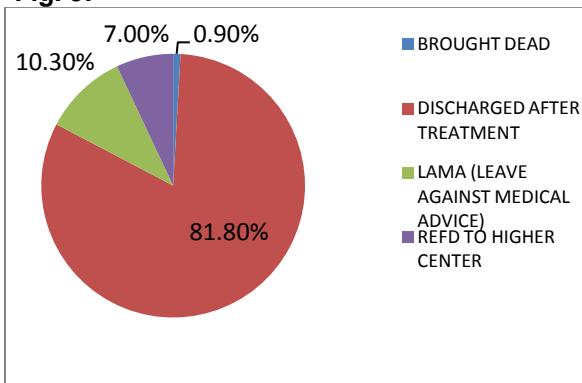


Fig. 3:



Original Research Paper

A Study of Gross Postmortem Findings in Cases of Hanging and Ligature Strangulation

*Mohammed Musaib M. Shaikh, **H. J. Chotaliya, **A.D. Modi, ***A. P. Parmar, ****S. D. Kalele

Abstract

This present study was performed on cases of death due to compression of neck by ligature material due to hanging and strangulation brought for post-mortem examination at mortuary of Sir Takhtasinhji General Hospital and Govt. Medical College, Bhavnagar, Gujarat, India during January 2011 to December 2011. A total of 1044 post-mortem examinations were conducted, out of which 90 cases were of compressed neck by ligature. Out of them 86 cases were of hanging and 4 cases were of ligature strangulation. We observed that dribbling of saliva was present in some cases of hanging but not present in any case of ligature strangulation. Similarly fracture of hyoid bone and thyroid cartilage were present in cases of hanging while not present in any case of ligature strangulation. Larynx, trachea and cervical vertebra were not fractured in any case of hanging and ligature strangulation. All cases of hanging were suicidal while three cases of ligature strangulation were homicidal and one case was accidental.

Key Words: Hanging, Ligature strangulation, Hyoid Bone, Thyroid Cartilage, Compression of neck

Introduction:

Violent asphyxial deaths is one of the most important cause for unnatural deaths among which hanging and ligature strangulation are commonly encountered in the professional life of forensic expert during day to day autopsy.

Deaths resulting from hanging and ligature strangulation show features amongst which the ligature mark at the neck is considered to be decisive. However characteristic finding, the ligature mark, found around the neck in both hanging and strangulation creates doubt in many cases.

It is easy to diagnose hanging and ligature strangulation when one finds the classical features. However all features are seldom present together. The application of pressure on the neck often results in findings, which are quite variable. A proper assessment of various post-mortem findings is therefore necessary under such circumstances. Apart from the typical ligature mark, atypical ligature marks are also seen leading to lot of curiosity in the mind of autopsy surgeon during the day-to-day postmortem examination.

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Hence authors have made a prompt and sincere attempt to study external and internal features in the neck in cases of hanging and ligature strangulation.

Materials and Method:

A prospective study was conducted on 90 cases of compressed neck by ligature due to hanging and strangulation out of 1044 cases brought for autopsy to the mortuary of Sir Takhtasinhji General Hospital and Govt. Medical College, Bhavnagar, during period of January 2011 to December 2011. Detailed information with the crime scene investigation findings and photographs were collected and thoroughly studied before conducting post mortem examination. Irrespective of information collected, both external and internal post mortem findings were observed very carefully with standard autopsy protocol. The findings are recorded and analysis was done between various findings of hanging and ligature strangulation.

Observation:

In the present study, we found that ligature mark was obliquely placed in all cases of hanging and above the level of thyroid cartilage in 72.09% cases and at the level of thyroid cartilage in 27.91% cases, while in all cases of ligature strangulation the mark was transverse and below thyroid cartilage. Out of 90 cases of neck compression, in internal appearance of underlying soft tissues of neck were pale, white and glistening in all cases of

hanging while in all cases of ligature strangulation it showed extravasation of blood.

Dribbling of saliva was present in 38.37% cases of hanging but not present in any cases of ligature strangulation. Bleeding from mouth and nose found in all cases of ligature strangulation but only in 1 case (1.16%) of hanging. Facial congestion and cyanosis present in 34.88% cases of hanging while in all cases of ligature strangulation.

In 86 cases of hanging, hyoid bone was fractured in 10 cases (11.63%). Out of 10 cases, 7 cases (8.14%) were male and 3 cases (3.49%) were female. While in 2 cases (2.33%) of hanging thyroid cartilage was fractured, which both were male. Hyoid bone and thyroid cartilage, cricoid cartilage were not fractured in any case of ligature strangulation. Larynx, trachea and cervical vertebra were not fractured in any case of hanging and ligature strangulation.

In the present study 70 cases (81.39%) of hanging did not show any periligature injuries around the ligature marks, while in all cases of ligature strangulation periligature injuries were present around ligature mark.

Only in one case of hanging, incised wound was present on antero-lateral aspect of left wrist joint, with multiple small hesitation-cuts, present just below the wound. In all cases i.e. 4 cases of ligature strangulation, there were external injuries (i.e. contusion, laceration, abrasion) out of them intracranial injury was also observed in one case.

Discussion:

In the present study of total 90 cases of neck compression by ligature, 86 cases (95.56%) were of hanging and 4 cases (4.44%) were of ligature strangulation.

Dribbling of saliva was found in 33 cases (38.37%) of hanging and not found in any cases of ligature strangulation. The findings are consistent with those of Ashok Kumar Samanta et al [1] who observed 32.31% cases with dribbling of saliva. Sarangi M.P. [2] found dribbling of saliva in only 14 cases (11%) of hanging and did not find in any cases of ligature strangulation. Dribbling of saliva is sure sign of hanging having taken place during life. Paliwal P K. et al [3] with the help of investigative and reconstructive Forensic Medicine to decodify the mystery of death by saliva found in the form of drop over the lower lip as observed in the photographs taken from the scene of crime, they opined it was ante-mortem hanging.

Bleeding from mouth and nose was seen only in one case of hanging while it was

present in all 4 cases of ligature strangulation, which is also consistent with observations of Sarangi M.P. [2] Involuntary discharge of urine was present in 12 cases, fecal discharge present in 11 cases and semen on glans penis present in 10 cases of hanging while involuntary discharge of fecal matter was present in only one case of ligature strangulation.

Table 5: Incidence of Fracture of Hyoid Bone in Cases of Hanging Compared With Other Workers

S.N.	Authors	Fracture of hyoid bone
1	Sarangi et al ²	9.4% cases
2	Chormunge Patil et al ⁴	7.14% cases
3	Tripude B H et al ⁵	64.51% cases
4	Sheikh M I. et al ⁶	5.08% cases
5	Meera et al ⁷	3.57% cases
6	Present study	11.63% cases

Out of 90 cases of neck compression in 5 cases (5.55%) associated injuries to other body parts were present. In which 1 case (1.16%) was of hanging along with multiple incised wound at left wrist i.e. hesitation cut marks and rest 4 (100%) were of ligature strangulation along with contusion, abrasions and head injuries. Presence of other bodily injuries due to resistance and/or violence besides the ligature mark around the neck suggests only homicidal death but not about the manner of constriction.

In case of hanging, incidence of fracture of hyoid bone (11.63%) in present study is almost similar with study of Sarangi et al [2] and Chormunge Patil et al [4] but lower than study of Tripude B H. et al. [5] In ligature strangulation incidence of fracture of hyoid bone was 14.28% observed by Sheikh M I. et al⁶ and 12.5% by Chormunge Patil et al. [4] These are different from present study in which hyoid bone was not fractured in any case of ligature strangulation.

In present study, incidence of injury to thyroid cartilage was observed in 2.33% cases, which is similar to study of Meera et al [7], who observed injury to thyroid cartilage was in 2.38% cases. Fracture of cricoid cartilage, tracheal rings and cervical vertebrae were not observed in any cases of neck compression which was similar to observation of Meera et al [7] and Chormunge Patil et al. [4]

Periligature injuries in the form of abrasion bruise and rope burns were present in 16.28% cases of hanging and in 1 case (25%) of ligature strangulation. The rope burns (friction burns) are due to friction of the ligature material against the skin due to slippage of the material. The above features were observed in the studies conducted by Pradeep Kumar et al. [8] Nail scratch marks inflicted by the struggling

victim to free himself present in 2 cases (2.33%) of hanging and all cases of ligature strangulation. In 86 cases of hanging, on the basis of circumstances of death and postmortem findings the manner of death was suicidal.

While in four cases of ligature strangulation in three cases, the manner of death was homicidal and in one case it was accidental. Accidental strangulation is not very common, but it may occur when an article of clothing, a neck band, a cord, or a chain is tightly drawn round the neck all of a sudden, occasionally seen in male worker, who are caught by moving belt of machine. In present study, a case of accidental ligature strangulation in 28 years female was observed who had her sari caught on the machine where she was working. Similar case of accidental ligature strangulation was observed by Zine K U. et al. [9]

Conclusion:

Dribbling of saliva present in case of hanging while rarely [10] in case of ligature strangulation. Post mortem findings like bleeding from mouth and nose, cyanosis, involuntary discharge of urine, fecal matter, semen on glans penis, periligature injuries, fracture of hyoid bone, thyroid cartilage, larynx and trachea in cases of hanging and strangulation are non-specific and variable depending upon composition of ligature material, force applied on neck and its duration. However either singly or in combination these findings helpful when ligature mark creates element of doubt in cases of hanging and ligature strangulation.

It can be concluded that presence of other bodily injuries suggest only manner of death not about hanging or ligature strangulation. In doubtful cases final opinion will be made depending upon circumstantial evidence, crime scene investigation and autopsy findings.

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Table 1: Distribution of External Postmortem Findings

External PM findings	Hanging	Ligature strangulation
Dribbling of saliva	33 (38.37%)	0
Bleeding from mouth and nose	1 (1.16%)	4 (100%)
Facial congestion and cyanosis	30 (34.88%)	4 (100%)
Discharge of Urine	12 (13.95%)	0
Faecal discharge	11 (12.79%)	1 (25%)
Semen on glans penis	10 (11.62%)	0
Injuries to other body parts	1 (1.16%)	4 (100%)

Table 2: Distribution of Periligature Injuries

Periligature Injuries	Hanging	Ligature strangulation
Abrasion, Bruise, Rope Burns	14 (16.28%)	1 (25%)
Nail Scratch Marks	2 (2.33%)	4 (100%)

Table 4: Manner of Death (On the Basis of Circumstances of Death and Postmortem Findings)

Type of Neck Compression	Manner of Death		
	Suicidal	Accidental	Homicidal
Hanging	86	0	0
Ligature strangulation	0	1 (25%)	3 (75%)

**Table 3
Distribution of Injuries to Bones and Cartilages of Neck**

Type of Neck Compression	Hyoid Bone Fracture	Thyroid cartilage Fracture	Larynx and Trachea Fracture
Hanging	10 (11.63%)	2 (2.33%)	0
Ligature strangulation	0	0	0

Review Research Paper

Role of a Medical Doctor at Scene of Crime

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Abstract

Is it logical to include a doctor in scene of crime investigation team in the given framework of criminal investigation in India? No simple answers are available to the question making rounds during scientific deliberations on ways & means to improve quality of criminal investigation in India. Proponents of the notion argue that a medical doctor at scene of crime is best equipped with the knowledge essentially needed to assist the investigators to make optimum use of scanty resources available with regards to analysis of biological evidences. They also claim that the doctors are always helpful in solving medico-legal intricacies inherent in majority of criminal cases. However, others feel that on account of improper training, poor motivation & dedication on the part of investigators & doctors both, lack of sufficient manpower etc. if implemented the idea is doomed to fail miserably in India.

Keys Words: Doctor, Medico-Legal, Crime Investigation, Scene of Crime

Introduction:

For any criminal case to be proved beyond reasonable doubt to the satisfaction of the courts of law, a thorough and methodical criminal investigation is the foremost requirement. Majority of such cases involve an element of assault or injury to a victim & one or more scene of occurrences/crimes. A fair investigation must include (besides interrogation of concerned persons & others) identification & collection of various physical evidences including biological ones and interconnecting them before presentation in the courts of law. [2, 4] Evidently therefore, the gathering of evidences must begin from the scene of crime itself & that too at the earliest. It is furthermore easy to appreciate that the investigation into offences against human body will warrant a fair knowledge of structure, function & its anomalies of human body at some or other point to corroborate & relate chain of events.

Police Investigators & Photographs are No Substitute for Medical Experts at Scene of Crime:

Criminal investigation in India is mostly conducted by the police investigators.

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The existing criteria of their selection & on the job training do not lay emphasis on requisite medical jurisprudence.

The investigators are one of the first persons to visit scene of crimes & to plan & decide upon further course of action. Due to growing need & demand for objective, methodical and scientific methods of investigation however, investigating officers have started asking & arranging for scene of crime visit by Forensic Scientists & others.

Presently, scene of crime investigation teams in India do not have a medical man (Medico-legal expert/Forensic Pathologist/General Medical Practitioner) as a member barring few exceptions. Not surprisingly, therefore investigations usually lack quality in terms of interpretation of complex medico-legal complexities.

Similarly, photographs of scene of crime, howsoever well intentions may be, at the best serve as good alternative but cannot substitute for a medical man's observation, having visited scene of crime. The dictum of "Eyes cannot see what mind does not know" explains the above statement very well. Selection of areas focused or angles of photography make a lot of difference to the perspective in which a photograph may be interpreted by different men. A medical man can be of great help in guiding even an expert photographer in medico-legal aspects to extract what really is intended to be.

**Original Evidence
Altered/Disrespected may practically
mean Evidence Lost:**

Though most of the biological evidences in the form of blood, seminal fluid, vaginal smears, hair, viscera, tissues, pieces of skin, nails etc. are collected & preserved by doctors, but almost always away from scene of crime, when the body has been shifted & transported to mortuaries, usually many hours or even couple of days after the first visit by investigating officers to scene of crime.

For example in cases of poisoning, vomitus found at scene of crime is known to have maximum concentration of poison. Whereas viscera collected much after consumption of poison (usually after most of the gastric contents have either been vomited out or evacuated by gastric lavage) obviously contains far too less concentration. It is not surprising therefore, that in many of these cases viscera test negative for the poison in question.

It is ironical but an unfortunate fact that police insists to preserve viscera at autopsy, whereas no sincere effort is made to preserve vomitus from scene of incidence or over clothing or even first gastric lavage sample.

Doctors have little & insufficient Background Information of the Case if any:

This is all the more noteworthy in the light of the abovementioned fact, that the doctors recording & documenting medico-legal reports (autopsy reports included) have practically nil background information on circumstances of the case in many parts of the country including Madhya Pradesh.

Various recommendations regarding mandatory furnishing of relevant history of the case, panchanama, copy of FIR, scene of crime report, photographs as & when feasible along with requisition for medico-legal examination are seldom respected & complied. It is not a rare sight to find mere mention of "reported to be a case of assault" or "cause of death is unknown" in the columns of history of the medico-legal reporting proforma.

Relevant History & Facts of the Case do help in Proper Interpretation by a Doctor: [5]

Medical science (like any other biological science) is an inexact science. In a living case, the physical clinical signs & symptoms may be interpreted differently forming multiple differential diagnoses, which may be narrowed down to a few after thorough laboratory & radiological investigations and proper history taking.

In postmortem cases though, in absence of a detailed & reliable background information (history by attendants, if any present, may be one-sided, biased & unreliable) and with very limited access to diagnostic &

analytical aids (combined with inordinate delays in dispatching collected materials, long pendency of cases at Forensic Science Laboratories, poor infrastructural facilities, lack of properly trained staff at FSLs), the misinterpretation of findings may at times be unavoidable.

Lack of Interaction, Communication & Liaisoning between Investigating Officer & Medical Expert:

The introduction of various artifacts like those due to transportation, storage, decomposition etc. with passage of time make it very difficult to interpret the findings correctly particularly in the current scenario where very few investigating officers talk to doctors directly regarding all such cases. [1, 6]

Lack of Motivation & Proper Training of Doctors in Medico-Legal Work:

Majority of doctors performing medico-legal work are poorly trained & non-specialists in Forensic Medicine. The undergraduate curriculum & thereafter internship program of MBBS students, is unable to lay adequate emphasis on this obligatory duty towards state. Moreover, the doctors are least inclined & motivated to perform such duty with conviction & sincerity that it demands. Rather, they are usually found trying to avoid & sometimes resist on being asked to do medico-legal work.

Lack of Professionalism in Medico-Legal Duties by Doctors:

Medical evidence, like medical profession in general, has traditionally been enjoying respect & reliance it deserved in the courts of law. However, various court judgments have started casting serious aspersions on medical reports in more & more number of cases and passing strictures on medical practitioners, as poor & non-corroborative medical evidences lead to poor rates of conviction in criminal cases.

Analysis Report of Biological Evidence Collected Not Made Available to the Doctor For Interpretation & Final Opinion:

In many states including Madhya Pradesh, the medical officers collecting biological evidences, do not get reports of analysis afterwards to enable him to form/modify/substantiate his opinion, if any expressed immediately after medical examination, in the light of facts or observations as noted in his medico-legal report. Neither police nor prosecutors pay any attention to this missing link. It is clearly evident, that no uniform or standard operative procedure/protocol is in place regarding medico-legal reporting services.

It is in the above mentioned background, therefore that the concept of visit to scene of crime by medical expert deserves sincere discussions & deliberations in our country.

What is intended to be achieved by a Visit of a Doctor to Scene of Crime?

1. Provides an opportunity to gain firsthand knowledge of vital circumstantial evidences needed to decipher postmortem findings to answers to queries regarding time, cause & (more importantly) manner of death, time, mechanism & nature of injuries. [7,8]
2. Minimizes misinterpretation of facts due to introduction of artifacts due to passage of time. [8]
3. Most important time to judiciously select biological evidences to be collected in order to achieve maximum utility of their analytical reports. Irrational collection of evidences overburdening police & FSL staff can be avoided. [1]
4. Best opportunity for interaction & liasoning between various experts involved in the case i.e. Investigating Officer, Forensic Scientist, Fingerprint/Ballistic/Handwriting Expert/ Photographer [1]
5. Always a learning experience to a medical man. May help in driving away sense of "not quite belonging to the task" & misconceptions regarding working of criminal investigation system. Strength & limitations of all the parties involved in the team are made known to each other.

Surgical gloves	Measuring tape & steel tape roll
Hand lens	Digital camera
Clean containers (glass & plastic)	Polythene & paper envelopes
Cotton swabs	Glass slides
Glass marking pencils	Suitable thermometer
Notebook, pen, markers, pencils	Disposable syringes, glass vials (EDTA & oxalate)
Stethoscope	Flashlight
Surgical knives with spare blades, forceps, scissors, blunt probes	

A few articles may be added depending upon specific requirement in a particular case.

Prerequisites:

- On receipt of a request for a visit to scene of crime, a doctor should depart/accompany the team punctually
- Formal written requisition may not be made available before visit, however the same may be made available afterwards on return
- It is always better if team members including members of scene of crime units, investigating officer & doctor assemble at a common place before departing for the

Reinforces medical man's confidence in himself by acknowledging his contribution to the joint exercise.

6. An opportunity to explain importance of early analysis of an evidence in a particular case, objectives of analysis, precautions in handling or transportation and place where the analysis may be undertaken (it is not very rare to note at a very late stage during investigation that a bone preserved for DNA test was sent to another laboratory or tissue for histopathology being sent to FSL only to be returned back after a while as the concerned laboratory did not entertain such samples).

Limitations & Roadblocks:

1. Lack of motivation, incentives & proper training of doctors in dealing medico-legal cases
2. Poor interdepartmental liasoning & cooperation (between police & health as the later may have a feeling that this is not their job)
3. Absence of uniform medico-legal work guideline or protocol
4. Inertia on the part of the investigating officers
5. Visit may come out to be journey to one of very difficult to reach, unhygienic/dirty places on earth [1]

Crime Scene Investigation Kit for Medical Personnel: [4, 6]

A standard kit may comprise of:

scene preferably at control room or police station, where the IO briefs the team of the preliminaries

- On reaching the spot, the doctor must first of all identify himself to all concerned
- Must carry scene of crime kit with him
- An assistant preferably a medical man (may be postgraduate student, an intern or even a colleague) is always an asset to have at scene for helping taking down notes or help in dissection, if needed
- An enquiry should be made as to whether an experienced class IV employee has been arranged or not to assist in collection &

labeling of evidences and small dissections/cleaning of body, if needed. If not, it is great to have one of the seasoned morgue attendants, provided he can be spared

- Services of an expert/trained crime scene photographer or fingerprint expert should be requested, if feasible

Do's & Don'ts at Scene of Crime:

- A doctor is not supposed to touch or alter anything until the same has been identified, documented & photographed. He has to ask/inform the IO before moving anything. He should not lead but follow the police around the scene. [7]
- The most detrimental effect of a medical man's visit can be encountered when he jumps the gun shortly after reaching & inspecting the scene by pronouncing about cause, manner, time of death or the weapon causing certain injuries. A guarded opinion can however be given, if other possibilities can reasonably be ruled out. [1]
- One of the very first things that a doctor is supposed to do on reaching is to check for any clinical sign of life, howsoever the onlookers may think it to be a futile exercise & thereby be certain about death. If otherwise, immediately he must arrange a call for an ambulance, simultaneously doing whatever he can at the spot to resuscitate the person.
- If the person's death is so imminent as to be certain of him/her not reaching nearest hospital before death & the person happens to be able to communicate, dying declaration must be recorded [6]
- He must enquire about [6] Brief history about incidence if available, Prior manipulations/handlings (before his arrival), Original position/posture of the body, condition of clothing & surroundings
- Go through the photographs taken prior to his arrival if any & ensure snapping relevant parts/areas from medico-legal point of view
- Make a sketch of position & condition of body in relation to surroundings and depict relevant details for example injuries in assault cases, ligature material, knot, suspension point in hanging/strangulation cases etc. in body diagrams.
- Take notes of [8]
- Points of identification in unidentified bodies
- Description of clothing & signs of struggle/assault, stains, fibers/hairs or foreign objects found therein
- General observations about the scene, any evidence of struggle

- Description of rigor mortis, hypostasis, signs of decomposition etc. for estimation of time since death
- Presence or absence of defense wounds in hands/forearms in assault cases
- Markings of weapons, bullets, cartridges or cartridge cases must be done for identification after exercising due care to preserve hair, fibers, stains or fingerprints
- Pattern, approximate quantum & position of blood over body parts, at the scene or weapons must be described
- Any materials or evidences which are likely to be distorted or lost during shifting/transporting body to mortuary should be collected eg. loose fibers or hair with adhesive tape, combing of loose hair from pubic region and perianal or vaginal swabbing in sexual assault cases, nail scrapping if indicated, swabbing of hands in firearm cases, ligature material
- All the materials like clothing etc. may be left in situ to be preserved during detailed autopsy
- Presence of drag marks or shifting of body from some other place must be noted
- Autopsy at scene of crime itself should always be strongly resisted. Body should rather be transported to mortuary wrapped in a plastic sheet

It is best if the pathologist who attends the scene is the one who conducts the autopsy, particularly in the more complex cases. This is not always feasible, particularly in a busy or understaffed department. However, the information gleaned at the scene should be passed on to the other pathologist prior to autopsy.

Disadvantages from Not Visiting the Scene of Crime: [8]

- Fresh injuries may be added during transit to mortuary
- Injuries may be masked due to onset of decomposition
- Rigor mortis may get broken down during transit
- Clothing may get disarranged, fresh tears & blood stains may be introduced
- Addition of fresh trace elements, dirt, stains etc.

Retrospective Visit to the Scene: [2, 6]

In a situation where a medical person's visit to scene could not be arranged before dead body had been shifted, the same exercise done afterwards is still likely to yield positive results. Visit enables to gain better understanding of

nature of surroundings, which is mostly different from the account of other people's description. The same knowledge goes on to help immensely during cross examination in courts of law as well.

Measures to Increase Practical Feasibility of Doctor's Visit to Scene of Crime:

- The rationale & protocol of a doctor's visit to scene of crime need to be incorporated in a uniform medico-legal manual, which is the need of the hour
- The general awareness regarding utility/contribution of a doctor at scene of crime needs to be augmented amongst police investigators, judiciary & Forensic Scientists. Induction & on the job training programs of these functionaries needs to incorporate medico-legal aspects involved in different crimes for their sensitization
- The curriculum of undergraduate medical courses needs to lay more emphasis on doctor's contribution to scene of crime visits in particular & devising better alternative teaching & training methodologies to empower medical graduates to handle medico-legal problems in the field in general
- A separate cadre for medico-legal services is needed at state/central level to meet the requirements of criminal investigation or law enforcement system in the country
- A clear & strong message is needed to be handed over to doctors entrusted with medico-legal responsibilities that this is an obligatory duty towards state & society and any laxity, indifference or negligence simply cannot be tolerated
- Better & more frequent interaction is needed between law enforcement agencies & medical professionals
- Doctor's visit to scene of crime should not be designed to become a perfunctory, routine or casual exercise. Rather it should be carried out only in cases where there is a likelihood of a worthy outcome or a doctor demands it. For example: this exercise can be done away with in cases of recovery of a dead body from water or death from

poisoning (unless the case is suspicious as in case of CO poisoning)

Summary:

1. Conventionally, presence of a doctor at scene of crime had been an exception rather than a routine event
2. Doctors with their background of medical/medico-legal knowledge (with proper motivation & sensitization) can contribute immensely to the quality of investigation in vast spectrum of criminal cases
3. Police apparently is too busy, not sure about rationale behind doctor's presence at scene. Doctors on the other hand are reluctant and consider this job to be "alien to their profession" quite often than not
4. Visit of a doctor to a scene of crime certainly brings down level of uncertainty/indetermination of medical opinion regarding cause, manner or mechanism of death. Investigators usually doctors about their shaky, hesitant or over defensive approach in medico-legal matters. The same approach leads to a battery of usually irrational, over defensive evidence collection during autopsy causing undue delay in investigation and a waste of already constrained manpower & resources
5. Concept of visit of a doctor to scene of crime needs to be introduced not as a routine & obligatory exercise but to be undertaken only in selected cases which warrant such an exercise

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Review Research Paper

Domestic Violence: The Dark Truth of Our Society

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Abstract

Domestic violence can be defined as a pattern of behavior in any relationship that is used to gain or maintain power and control over an intimate partner. Abuse can be physical, sexual, emotional, economic or psychological actions or threats of actions that influence another person. This includes any behaviors that frighten, intimidate, terrorize, manipulate, hurt, humiliate, blame, injure or wound someone. Domestic violence can happen to anyone of any race, age, sexual orientation, religion or gender. It can happen to couples who are married, living together or who are dating. Domestic violence affects people of all socioeconomic backgrounds and education levels. The management of domestic violence essentially requires combined effort of law enforcement, social welfare and health care services. Although efforts have been made in this direction, the attended cases represent just the tip of the iceberg, as majority of the cases are not reported due to social pressures from family members or social stigma of defamation. Real change in these cases can only be brought about by changing the mindset of society through education and better law enforcement.

Key Words: Domestic violence, Health care, Law enforcement, Abuse, Social welfare

Introduction:

Domestic violence, also known as domestic abuse, spousal abuse, battering, family violence, intimate partner violence (IPV), is defined as a pattern of abusive behaviors by one partner against another in an intimate relationship such as marriage, dating, family, or cohabitation. Domestic violence, so defined, has many forms, including physical aggression or assault (hitting, kicking, biting, shoving, restraining, slapping, throwing objects), or threats thereof; sexual abuse; emotional abuse; controlling or domineering; intimidation; stalking; passive/covert abuse (e.g., neglect); and economic deprivation. [1]

Alcohol consumption [2] and mental illness [3] can be co-morbid with abuse and present additional challenges in eliminating domestic violence. Awareness, perception, definition and documentation of domestic violence differ widely from country to country, and have evolved from era to era. Domestic violence and abuse is not limited to obvious physical violence.

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Domestic violence can also mean endangerment, criminal coercion, kidnapping, unlawful imprisonment, trespassing, harassment, and stalking.

Types of Domestic Violence:

All forms of domestic abuse have one purpose: To gain and maintain control over the victim. Abusers use many tactics to exert power over their spouse or partner as dominance, humiliation, isolation, threats, intimidation, denial and blame.

1. Physical Abuse:

Physical abuse is abuse involving contact intended to cause feelings of intimidation, pain, injury, or other physical suffering or bodily harm. It includes hitting, slapping, punching, choking, pushing, burning and other types of contact that result in physical injury to the victim.

Physical abuse can also include behaviors such as denying the victim of medical care when needed, depriving the victim of sleep or other functions necessary to live, or forcing the victim to engage in drug/alcohol use against his/her will. If a person is suffering from any physical harm then they are experiencing physical abuse.

This pain can be experienced on any level. It can also include inflicting physical injury onto other targets, such as children or pets, in order to cause psychological harm to the victim.

2. Sexual Abuse and Marital Rape:

Sexual abuse is any situation in which force or threat is used to obtain participation in unwanted sexual activity. Coercing a person to engage in sexual activity against their will, even if that person is a spouse or intimate partner with whom consensual sex has occurred, is an act of aggression and violence.

3. Emotional Abuse:

Emotional abuse (also called psychological abuse or mental abuse) can include humiliating the victim privately or publicly, controlling what the victim can and cannot do, withholding information from the victim, deliberately doing something to make the victim feel diminished or embarrassed, isolating the victim from friends and family, implicitly blackmailing the victim by harming others when the victim expresses independence or happiness, or denying the victim access to money or other basic resources and necessities. Degradation in any form can be considered psychological abuse.

Emotional abuse includes conflicting actions or statements which are designed to confuse and create insecurity in the victim. These behaviors also lead the victims to question themselves, causing them to believe that they are making up the abuse or that the abuse is their fault. Women or men undergoing emotional abuse often suffer from depression, which puts them at increased risk for suicide, eating disorders, and drug and alcohol abuse.

Emotional abuse can include verbal abuse is defined as any behavior that threatens, intimidates, undermines the victim's self-worth or self-esteem, or controls the victim's freedom. Verbal abuse is a form of emotionally abusive behavior involving the use of language. Verbal abuse can also be referred to as the act of threatening. Through threatening a person can blatantly say they will harm you in any way and will also be considered as abuse.

4. Economic Abuse:

Economic abuse is a form of abuse when one intimate partner has control over the other partner's access to economic resources. [4] Economic abuse may involve preventing a spouse from resource acquisition, limiting the amount of resources to use by the victim, or by exploiting economic resources of the victim.[4]

The motive behind preventing a spouse from acquiring resources is to diminish victim's capacity to support him/herself, thus forcing him/her to depend on the perpetrator financially, which includes preventing the victim from obtaining education, finding employment,

maintaining or advancing their careers, and acquiring assets.[4, 5]

Effects:

1. Physical:

Bruises, broken bones, head injuries, lacerations, and internal bleeding are some of the acute effects of a domestic violence incident that require medical attention and hospitalization.[6] Some chronic health conditions that have been linked to victims of domestic violence are arthritis, irritable bowel syndrome, chronic pain, pelvic pain, ulcers, and migraines. [7] Victims who are pregnant during a domestic violence relationship experience greater risk of miscarriage, pre-term labor, and injury to or death of the fetus. [6]

2. Psychological:

Among victims who are still living with their perpetrators high amounts of stress, fear, and anxiety are commonly reported. Depression is also common, as victims are made to feel guilty for 'provoking' the abuse and are frequently subjected to intense criticism. It is reported that 60% of victims meet the diagnostic criteria for depression, either during or after termination of the relationship, and have a greatly increased risk of suicidal tendencies. [8]

In addition to depression, victims of domestic violence also commonly experience long-term anxiety and panic, and are likely to meet the diagnostic criteria for Generalized Anxiety Disorder and Panic Disorder. The most commonly referenced psychological effect of domestic violence is Post-Traumatic Stress Disorder (PTSD).

PTSD (as experienced by victims) is characterized by flashbacks, intrusive images, exaggerated startle response, nightmares, and avoidance of triggers that are associated with the abuse. These symptoms are generally experienced for a long span of time after the victim has left the dangerous situation. Many researchers state that PTSD is possibly the best diagnosis for those suffering from psychological effects of domestic violence, as it accounts for the variety of symptoms commonly experienced by victims of trauma.

3. Financial:

Once victims leave their perpetrator, they can be stunned with the reality of the extent to which the abuse has taken away their autonomy. Due to economic abuse and isolation, the victim usually has very little money of their own and few people on whom they can rely when seeking help. This has been shown to be one of the greatest obstacles facing victims of domestic violence, and the strongest factor

that can discourage them from leaving their perpetrators.

Causes of Violence:

There are many different theories as to the causes of domestic violence. These include psychological theories that consider personality traits and mental characteristics of the perpetrator, as well as social theories which consider external factors in the perpetrator's environment, such as family structure, stress, social learning. As with many phenomena regarding human experience, no single approach appears to cover all cases.

Whilst there are many theories regarding what causes one individual to act violently towards an intimate partner or family member there is also growing concern around apparent intergenerational cycles of domestic violence.

1. Psychological:

Psychological theories focus on personality traits and mental characteristics of the offender. Personality traits include sudden bursts of anger, poor impulse control, and poor self-esteem. Various theories suggest that psychopathology and other personality disorders are factors, and that abuse experienced as a child leads some people to be more violent as adults. Correlation has been found between juvenile delinquency and domestic violence in adulthood.[9] Studies have found high incidence of psychopathy among abusers. [9, 10] Some research suggests that about 80% of men in these domestic violence studies exhibited diagnosable psychopathology and typical personality disorders.

2. Jealousy:

Many cases of domestic violence against women occur due to jealousy when one partner is either suspected of being unfaithful or is planning to leave the relationship. [11, 12]

3. Behavioral:

Behavioral theories draw on the work of behavior analysts. Applied behavior analysis uses the basic principles of learning theory to change behavior. This program leads to behavior therapy. Often by identifying the antecedents and consequences of violent action, the abusers can be taught self control.

4. Social Stress:

Stress may be increased when a person is living in a family situation, with increased pressures. Social stresses, due to inadequate finances or other such problems in a family may further increase tensions. [13] Violence is not always caused by stress, but may be one way that some people respond to stress.[14, 15]

Families and couples in poverty may be more likely to experience domestic violence, due to increased stress and conflicts about finances and other aspects. [16]

5. Mental Illness:

Many psychiatric disorders are risk factors for domestic violence, including several personality disorders: all Cluster BPDs, (especially antisocial), paranoid and passive-aggressive. Bipolar disorder, schizophrenia, drug abuse, alcoholism and poor impulse control are also risk factors. [1, 17] It is estimated that at least one-third of all abusers have some type of mental illness.

6. Marital Conflict Disorder:

The American Psychiatric Association planning and research committees for the forthcoming DSM-5 (2013) have canvassed a series of new Relational disorders which include Marital Conflict Disorder without Violence or Marital Abuse Disorder (Marital Conflict Disorder with Violence). There is current considerable controversy over whether male-to-female marital violence is best regarded as a reflection of male psychopathology and control or whether there is an empirical base and clinical utility for conceptualizing these patterns as relational."

Consequences of Domestic Violence:

There are varied consequences of domestic violence depending on the victim, the age group, the intensity of the violence and frequency of the torment they are subjected to. Living under a constant fear, threat and humiliation are some of the feelings developed in the minds of the victims as a consequence of an atrocious violence. The consequences of the domestic violence in detail can be broadly categorized under – the Effect on the victim himself/herself and the family, Effect on the society and the Effect on nation's growth and productivity. The 'Effect on the victim' has been further subcategorized for women, men, children and olds.

Management:

The response to domestic violence is typically a combined effort between law enforcement, social services, and health care. The role of each has evolved as domestic violence has been brought more into public view. Domestic violence historically has been viewed as a private family matter that need not involve the government or criminal justice. [18] Police officers were often reluctant to intervene by making an arrest, and often chose instead to simply counsel the couple and/or ask one of the parties to leave the residence for a period of

time. The courts were reluctant to impose any significant sanctions on those convicted of domestic violence, largely because it was viewed as a misdemeanor offense.

1. Medical Response:

Medical professionals can make a difference in the lives of those who experience abuse. Many cases of spousal abuse are handled solely by physicians and do not involve the police. Sometimes cases of domestic violence are brought into the emergency room, [19] while many other cases are handled by family physician or other primary care provider. [20] Medical professionals are in position to empower people, give advice, and refer them to appropriate services. The health care professional has not always met this role, with uneven quality of care, and in some cases misunderstandings about domestic violence.

2. Law Enforcement:

In 1983, Domestic Violence was recognized as a specific criminal offence by the introduction of section 498-A into the Indian Penal Code. This section deals with cruelty by a husband or his family towards a married woman. Four types of cruelty are dealt with by this law:

- Conduct that is likely to drive a woman to suicide,
- Conduct which is likely to cause grave injury to the life, limb or health of the woman,
- Harassment with the purpose of forcing the woman or her relatives to give some property,
- Harassment because the woman or her relatives is unable to yield to demands for more money or does not give some property.

The punishment is imprisonment for up to three years and a fine. The complaint against cruelty need not be lodged by the person herself. Any relative may also make the complaint on her behalf. The above section relates to the criminal provisions of a more stringent offence. The civil law does not however address this phenomenon in its entirety.

There was a need of provision in law with more pliable remedies to offer within the broader framework of civil and criminal laws. A law was enacted keeping in view the rights guaranteed under the article 14, 15 & 21 of the constitution to provide for a remedy under civil law which is intended to protect the woman from being victims of domestic violence and to prevent the occurrence of domestic violence in the society.

3. Counseling for Person Affected:

Due to the extent and prevalence of violence in relationships, counselors and therapists should assess every client for

domestic violence (both experienced and perpetrated). If the clinician is seeing a couple for couple's counseling, this assessment should be conducted with each individual privately during the initial interview, in order to increase the victim's sense of safety in disclosing domestic violence, in the relationship. In addition to determining whether domestic violence is present, counselors and therapists should also make the distinction between situations where battering may have been a single, isolated incident or an ongoing pattern of control. The therapist must, however, consider that domestic violence may be present even when there has been only a single physical incident as emotional/verbal, economic, and sexual abuse may be more insidious. [21]

4. Counseling for Offenders:

The main goal for treatment for offenders of domestic violence is to minimize the offender's risk of future domestic violence, whether within the same relationship or a new one. Treatment for offenders should emphasize minimizing risk to the victim, and should be modified depending on the offender's history, risk of reoffending, and criminological needs.

It has been demonstrated that domestic violence offenders maintain a socially acceptable façade to hide abusive behavior, and therefore accountability is the recommended focus of offender treatment programs.

Successful completion of treatment is generally associated with old age, higher levels of education, lower reported drug use, non-violent criminal histories, and longer intimate relationships. Anger management alone has not been shown to be effective in treating domestic violence offenders, as domestic violence is based on power and control and not on problems with regulating anger responses.

Treatment of offenders involves more than the cessation of abusive behavior; it also requires a great deal of personal change and the construction of a self-image that is separate from former behavior while still being held accountable for it. [22]

Conclusion:

Despite efforts made by various sections of society and the Government to curb the menace of domestic violence against women, there is a rise in domestic violence. This can be curbed by:

- Educating women about her rights.
- Community screening for domestic violence.
- Providing adequate assistance to the victim.
- By offering safe shelters, crisis intervention, advocacy, and education and prevention

programs.

- Provision of strict laws and punishment for offence of domestic violence.

To conclude it is therefore necessary that every strata of society must contribute to ensure a violence free life for every woman.

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Case Report

Murder Masked in Mud (Slush): A Case of Rare Happening

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Abstract

Medico-legal autopsy is carried out on the bodies of different kinds like fresh/decomposed, complete or incomplete/mutilated, skeletonised and burnt/ashes and so on. Dead bodies recovered from the canal/running water are usually in decomposed condition, however cold weather retards decomposition. We received an identified intact corpse recovered from canal completely covered with soft mud, which was brought for expert opinion from a peripheral hospital with the remarks that this is the body of an assault and in advanced stage of decomposition; the medico-legal practitioner referred the body as such without taking pain to wash the mud to visualize the same. Before conducting the post-mortem examination body was thoroughly washed with running water, after which multiple external injuries were observed over the body. Had he simply washed the body thoroughly & conducted the autopsy than the cause of death would have been pronounced then and there.

Key Words: Soft mud, Decomposed body, Contusions, Rib fractures, Subdural & Subarachnoid haemorrhages

Introduction:

Decomposition of a dead body is not an uncommon finding in forensic practice. Usually dead bodies are brought for postmortem examination recovered from running water/canal which are in state of decomposition. The dead body decomposes at varying rate which depends on various external and internal factors. The decomposition of dead body starts after two days in hot and humid conditions but generally rate of decomposition slows down if body is submerged in water. The process of decomposition takes longer time especially in winter season.

Brief History:

A farmer in the month of January, 2011 went to his fields as usual but did not turn up to his home, his relatives have suspicious of it and started searching. During the search, his body was found after about seven days lying in a nearby water canal (*nahar*) having shallow muddy water. The body was completely smudged in the soft mud. (Fig. 1)

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His wife told to the police that in recent past he had appeared in a court as a prime prosecution witness in a criminal case and hence some of the assailant villagers have animosity of it and want to take revenge of him so they have beaten him to death. The investigating officer had mentioned in the inquest form under the column of cause of death as kicks and blows to the body. Considering the allegations the medical officer instead of taking the pain of examining the body there thought it is better to refer the body to higher centre.

Post-Mortem Findings:

We received a naked dead body of male person completely covered all over with somewhat dry sticky soft mud.

External Examination:

Externally body had no appreciable marks of injury. First, the body was washed and cleaned thoroughly with running water to visualize the same. (Fig. 2a, 2b) The scalp hair were 2-4cm long, blackish with about 30% gray; the eyes and mouth closed; the moustaches 0.2-0.3 cm blackish; the facial features were well maintained and identifiable; During the process of cleaning, epidermis was peeled off. The scalp hair - peeled off with moderate traction; the chest was tense; and the abdomen was distended.

The following injuries were observed externally over the body after removing the soft mud:

Multiple reddish bruises were observed over different parts of the body namely on the

(1) left cheek (7x7cm); (2) Blackening around left eye; (3) over the forehead (18x6cm); (4) bridge of nose; (5) left cheek (7x7cm); (6) forehead (18x6 cm); (7) bridge of nose; (8) over left side of anterior abdominal wall (4x4 cm),

in anterior axillary line, 17 cm away from umbilicus and 11 cm above antero-superior iliac spine; (9) abraded bruise (4x2 cm) situated over left side of anterior thoracic wall, 12 cm below left nipple and 6.5 cm away from midline; (10) situated over dorsum of right forearm (10x4 cm) just above right wrist joint; (11) situated over medial aspect of right leg (2x1.5 cm), 26 cm below right knee joint; (12) situated over anterior aspect of left leg (7x2 cm) situated 31 cm below knee joint; (13) situated over dorsum of left forearm (5x4 cm), just above wrist joint;

(14) situated over lateral aspect of left arm (3.5x3 cm), 20 cm below shoulder joint; (15) situated over right side of back of trunk (14x10 cm), 4 cm away from midline and 10 cm below shoulder blade; (16) situated over back of trunk (20x8 cm), left to midline, 14 cm below shoulder blade; (17) situated over the back in midline over lumbar region (7x5 cm). (Fig. 3a,3b)

On dissection the extravasation of blood was appreciated under all these bruises indicating that these were antemortem in nature.

Internal Examination:

The scalp was found ecchymosed all over; and both cerebral hemisphere were having diffuse subdural and subarachnoid haemorrhages. (Fig. 4a,4b) The 8th,9th,10th ribs were fractured on left side under injury number nine. The fractured ribs were showing infiltration of blood with laceration of underlying pleura.

The 9th and 10th ribs of right side were fractured anteriorly with fractured ends showing infiltration of blood. The diaphragm was lacerated over right side. The right lobe of liver was showing a laceration of size 10x6 cm. (Fig. 5) The peritoneal cavity was containing dark red fluid blood of about one and half litre.

Considering the above mentioned injuries, the cause of death in this case was pronounced as the cumulative effect of intracranial damage with hemorrhage and shock consequent upon blunt force impact to the head, chest, abdomen and other body parts as described supra; all the injuries were antemortem and recent in duration and were caused by some-one-else.

Discussion:

We are getting dead bodies recovered from the running water/ canal in decomposed conditions but probably it was the first time that a dead body completely covered with soft mud was

received for expert opinion during the last about 30 years period. The assaulted body was well maintained & preserved probably due to the embalming effect of covering of soft mud all over the body with added effect of cold winter weather being in the month of January.

A bruise is defined as the extravasation of blood in the tissues as a result of blunt force impact to the body. [1] The bruises are accompanied by a painful swelling and crushing or tearing of the subcutaneous tissues without solution of the continuity of the skin. The swelling is due to the rupture of the small subcutaneous blood vessels producing in the cellular tissues extravasations of blood, which is known as ecchymosis. [2]

In the living subjects the appearance of the deep bruises may sometimes take several hours, if not days before it shows up externally; at times it may not show up externally at all. Thus it is better to examine the patient, if available, 24 hours to 48 hours after the first examination to note, if any evidence of slowly developing deep bruise is present. [3]

Whereas during post-mortem examination, the presence of bruises in the form of extravasations/effusion of blood can be diagnosed, by dissecting the parts carefully as has been done in the present case to know the consequences of the same as to the cause of death.

Conclusion:

We want to emphasize through this case that seeing the unusual condition of the dead body the medico-legal practitioner should not be in panic and sincerely apply not only his scientific knowledge but also general acumen to look for the injuries as has been done in this case by simply first washing and cleaning the dead body from the soft mud and then proper autopsy for finding out the injuries resulting in to the death so that unnecessary referral to higher centre can be avoided and the police and the relatives may not be further harassed.

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Fig. 1: Body found Smeared in Mud



Fig. 2a: No Apparent Injury on Front Aspect after cleaning



Fig. 2b: Body after Cleaning in Running Water Showing No Apparent Injury on back



Fig. 3a: Incisions showing Effusion of Blood indicating ante mortem Bruises



Fig. 3b: Arm showing Effusion of Blood indicating ante-mortem Bruises



Fig. 4a: Effusion over Left side scalp



Fig. 4b: Brain showing Diffuse Subdural and Subarachnoid Haemorrhages



Fig. 5: Liver Showing Multiple Lacerations with Blood in Peritoneum



Case Report

Right Ventricular Dysplasia: Cause of Death in a Young Male

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Abstract

Right ventricular dysplasia (RVD) is a cardiomyopathy, which is characterized by fatty, or fibro fatty infiltration of myocardium and it is the most common cause of sudden cardiac death in the young. It may be manifested clinically as ventricular arrhythmias with left bundle branch block (LBBB) that may lead to cardiac arrest. So, this condition is also known as Arrhythmogenic right ventricular dysplasia (ARVD). The diagnosis of ARVD is based on the presence of major and minor criteria encompassing genetic, electrocardiographic, pathophysiologic, histopathological factors and imaging modalities. An early and accurate diagnosis followed by appropriate therapy for this condition is increasingly important for it may prevent lethal arrhythmias. Here we are reporting a case of young army man who was died suddenly of RVD along with brief discussion about the Pathophysiology, clinical features, and criteria for diagnosis and differential diagnoses of the condition.

Key Words: Right ventricular dysplasia, Cardiomyopathy, Sudden death, ARVD

Introduction:

Right ventricular dysplasia (RVD) is a right ventricular cardiomyopathy of unknown etiology, with frequent autosomal familial occurrence. [1, 2] RVD is characterized by fatty or fibro fatty infiltration of right ventricular (RV) myocardium, progressive thinning of the wall with chamber dilatation, and is the commonest cause of sudden cardiac death in the young. The disease usually affects the right ventricle, and is difficult to detect. [2, 3]

It may manifest clinically as ventricular arrhythmias with left bundle branch block (LBBB) leading to cardiac arrest, Hence known as Arrhythmogenic Right Ventricular Dysplasia (ARVD). An early and accurate diagnosis followed by appropriate therapy for this condition is important to prevent lethal arrhythmias. [2] In context with the Indian population particularly in the newly formed hilly state of Uttarakhand such studies as per best of our knowledge has not been done before. Therefore, we would like to report this case from the area.

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Case Report:

A well-built 22-yrs old soldier was found dead in his bed at home. An apparent cause of death could not be identified.

Post-mortem examination was performed to find the cause of death, which revealed a non-significant old injury mark in the chest of the deceased. Other findings were unremarkable. To find out the exact cause of the death, specimen of the heart, pieces of lung, liver, spleen and kidney were sent for the histopathological examination, in the Department of Pathology.

Pathological Findings:

On gross examination, the heart was apparently normal. Its measurements were 12.0x8.0x7.0 cm with 310.0 grams in weight. On opening the heart, the RV wall showed replacement of the myocardium by pale-yellowish fibro fatty tissue. There was marked thinning of the wall at the apex and the muscle layer was almost completely replaced by the adipose tissue. The RV wall thickness varied from 0.8 to 0.3 cm.

Microscopically, the RV wall showed segmental fibro fatty infiltration between the cardiac muscle fibers mainly towards the apex region. Blood vessels were congested. Pieces of lung, liver, spleen and kidney showed non-specific congestive changes. On the basis of history of the deceased, macroscopic and microscopic findings of the heart, the diagnosis of RVD was made. It is a potential cause of RV arrhythmias with left bundle-branch block (LBBB) and leading to pulmonary edema and

congestive lesions that is apparently the cause of death in this case. [Fig. 1 & 2]

Discussion:

A book on autopsy pathology quoted that the heart from a patient with RVD exhibited fibro fatty tissue replacing muscle in the RV apex, free wall of the right ventricle adjacent to the diaphragm, or anterior infundibulum. [4]

In the present case, the heart appeared normal grossly and on opening it, RV wall demonstrated areas in which the muscle has been replaced by fibro fatty tissue. According to Corrado D et al, Calkins H and Gerlis LM et al, RVD is a myocardial disease that is usually familial and is characterized by fibro fatty replacement of the RV myocardium, clinically by ventricular arrhythmias of RV origin, which may lead to sudden death in young people and athletes. [5-7] Anderson EL et al and others also reported this condition in men younger than 35-years of age in right ventricle, although left ventricle or septum may be involved in more extensive cases. [8-10]

Our case was an apparently healthy soldier of 22-years who was found dead in his bed, and showed segmental involvement of RV free wall by the adipose tissue although there might be ventricular arrhythmias before death, which could not be revealed. There was no family history of previous sudden death of any young member in the family. Corrado D et al defined sudden death as unexplained death of natural causes with instantaneous loss of functions or within 1 hour of the onset of symptoms or collapse [5] as probably occurred in this case, the young found suddenly dead without any apparent symptoms.

In different literatures, ARVD revealed diffuse or segmental loss of the myocardium of RV free wall replaced by fibro fatty tissue and involving diaphragmatic, apical, and infundibular regions, so called "triangle of dysplasia". [3-5] Our case revealed progressive thinning of RV wall with diffuse and patchy replacement of myocardium by adipose tissue.

Originally, "dysplasia" was used for developmental anomaly of the RV myocardium. [11] With better understanding of presentations and morphologic changes, a non-ischemic, most likely genetically determined, atrophy of the RV myocardium, which manifests in adolescents and young adults doesn't support the developmental defect theory. And because of progressive myocardial disease of unknown etiology, it is included among the cardiomyopathies in the classification proposed by the task force of World Health

Organization/International Society and Federation of Cardiology. [5]

Hein WMK et al described fatty and fibro fatty variants of ARVD. Fatty form shows complete replacement of myocardium exclusively in right ventricle without thinning of the wall while fibro fatty variant is associated with significant thinning of the RV wall. Other malformations of the right ventricle associated with ARVD may be dilatation of ventricle, aneurysms, and segmental hypokinesia. [2]

ARVD shows progressive replacement of RV myocardium by fibro-fatty tissue [9, 10], most commonly in the region of the "triangle of dysplasia" [8]; which usually leads to dilatations or aneurysms having paradoxical systolic motion. The left ventricle and septum usually are spared, although they may be involved in more extensive cases. [13] In addition, the conduction system of the heart is usually spared and the presence of arrhythmias can be explained by the dispersal of electrically conducting myocytes that incite tachycardia as the dysplastic event progresses. [8]

Extensive study of the available literature on ARVD couldn't establish the exact etiopathogenesis. However, literature addressed some hypotheses regarding the etiopathogenesis of ARVD. The hypothesis concerns apoptosis, a programmed cell death, which leads to progressive myocardial loss followed by fibrofatty replacement and enhances the electrical vulnerability of the right ventricle, which causes potentially life-threatening arrhythmias. [14]

According to dysontogenic theory, ARVD regarded as a congenital disorder in which abnormal development of right ventricle may lead to dysplasia. Degenerative or metabolic disorder may affect RV myocardium and replaced by fat and fibrous tissue. In the inflammatory theory, the fibrofatty replacement is a healing process in the context of myocarditis. [15, 16]

Several reports suggested a familial occurrence of ARVD of about 30%–50%, with variable penetrance, and polymorphic phenotypic expression. Several genetic disorders responsible for ARVD have been identified on chromosome 14 and recently on chromosome 3. [2]

Patients with ARVD may present at any age but often young or middle aged (19-47 yrs) with male predominance (~3:1 ratio). Progressive nature of the disorder is responsible for wide range of clinical manifestations, and is classically characterized by RV tachycardia with LBBB. [2] Palpitations, fatigue, syncope,

tachycardia, peripheral edema and non-specific complaints such, as abdominal pain and mental confusion are common presenting symptoms. In some cases, cardiac arrest and sudden death following physical exertion may be the initial presentation. [8] ARVD represents a spectrum of different abnormalities, which ranges from an asymptomatic form consisting of ventricular ectopic beats to biventricular heart failure with or without arrhythmias and sudden death in young patients and athletes. [2]

The electrocardiogram (EKG) in patients with ARVD usually shows a regular sinus rhythm, with an epsilon wave just beyond the QRS complex in lead V₁, and an inversion of T waves in precordial leads V₁–V₃. [17]

According to Anderson EL et al, screening for ARVD should begin with a thorough personal and family history, ideally of first-and second-degree relatives. A history of palpitations in young person, or a family history of sudden death at an early age should raise the suspicion for ARVD. They also reported normal physical findings in about half of ARVD patients with widely split S2 as a clue if present.

On resting EKG, >half cases showed T-wave inversion in the anterior precordial leads (V1 through V6) and epsilon waves (small deflection just beyond the QRS complex). In case of dilated right ventricle, asymmetry of the chest wall may be appreciated. [8]

In 1994, the Task Force of Working Group on Myocardial and Pericardial Disease of the European Society of Cardiology and the Task Force of Scientific Council on Cardiomyopathies of the World Heart Federation proposed a scoring system based on major and minor criteria for establishing the diagnosis of ARVD. According to which, to fulfill the appropriate criteria for ARVD, the patient's condition must meet 2 major or 1 major and 2 minor or 4 minor criteria.

- Severe dilatation and reduction in RV ejection fraction/localized RV aneurysm,
- Epsilon waves/localized prolongation (110 ms) of the QRS complex in precordial leads,
- Sustained LBBB type of VT,
- Familial disease confirmed at necropsy or surgery, are included in major criteria.

Whereas minor criteria include-

- Minor global RV dilatation/ejection fraction reduction with normal left ventricle/mild segmental dilatation of the right ventricle or regional RV hypokinesia,
- Inverted T-waves in the right ventricle leads beyond V1,

- Frequent ventricular extra-systoles with LBBB morphology,
- Family history of premature sudden death. [8]

The preferred method for making the diagnosis is based on histological evidence of fibro-fatty myocardium. But biopsy lacks sufficient sensitivity because of the segmental nature of the disease process. [18, 19]

Although there are wide range of differential diagnoses which include anatomical abnormalities like atrial septal defect, biventricular dysplasia, Naxos disease (ARVD associated with palmo-plantar keratosis), Uhl's anomaly and RV infarction etc; and arrhythmic abnormalities like benign extra systoles, bundle branch reentry, dilated cardiomyopathy ventricular tachycardia (VT), idiopathic RV arrhythmias, supraventricular tachycardia. [18, 19] Here we emphasize on ARVD and the Uhl's anomaly because of involvement of RV wall, their progressive nature and about similar pathogenesis.

In ARVD, the RV free wall is partially or almost entirely replaced by fat and wall thickness is usually normal due to fatty replacement [12] and ventricular arrhythmias manifest in adolescence or adulthood. Septum and left ventricle are usually spared. [13]

Ventricular arrhythmias range from asymptomatic ventricular premature complexes to monomorphic ventricular tachycardia and even sudden death. In Uhl's anomaly patient frequently has congestive heart failure and presents at earlier age. The pathology of the Uhl's anomaly is also usually but not always limited to the right ventricle. [20]

The parietal myocardium is thin and translucent and the endocardium is in apposition with the epicardium without intervening muscle. There is no apparent replacement of muscle by fatty tissue. [7] In contrast to ARVD where the classic presentation is usually with ventricular arrhythmias, patients with Uhl's anomaly generally present with cyanosis, dyspnoea and right sided heart failure, usually in infancy or early childhood. Uhl's anomaly has not been documented to have a genetic basis. [7]

Conclusion:

ARVD is among the commonest cause of sudden death in young persons with autosomal inheritance, therefore it would be a good practice to plan some ways to diagnose this condition particularly in those individuals choosing their carrier as in army, paramilitary or any force and in the field of sports; so that they

can choose their carrier accordingly and get the proper treatment for the condition.

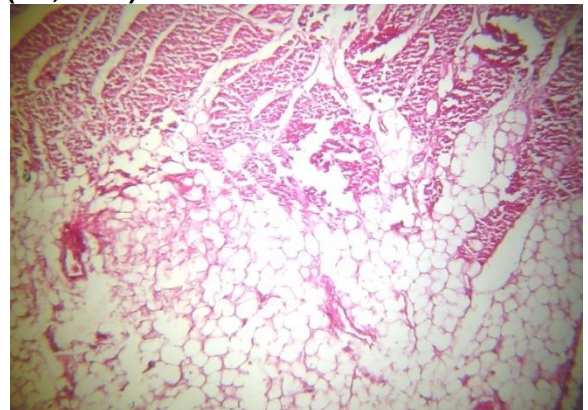
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Fig. 1: Heart Showing Right Ventricular Free Wall Replaced By Yellowish Fibro-fatty Tissue



Fig. 2: Right Ventricular Wall Showing Myocardium Replaced By Adipose Tissue (HE, X100)



Case Report

Chronic Arsenic Poisoning Through Ground Water in Firozabad District: A Case Report

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Abstract

Two members of a family from district Firozabad Uttar Pradesh admitted in S.N. Medical College & Hospital Agra on 11/08/2010 with complaints of tingling & numbness of hands and feet, loss of appetite, abdominal pain and irregular nausea, vomiting & loose motion. On examination the skin of palm & sole was thick, hard, rough, bluish-brown in color and peeled at places showing hyperkeratosis. Both were suspected as a case of chronic arsenic poisoning. Then all the family members were called. They have more or less similar features and also the rain drop pigmentation on the skin, Aldrich Mee's line on the nails and loss of touch sensation over the hand and feet. The level of Arsenic is investigated in blood & urine and found raised. The source of arsenic was explored and found increased in drinking water that was taken out from hand pump.

Key Words: Chronic poisoning, Hyperkeratosis, Rain drop pigmentation, Aldrich Mee's line, Tingling

Introduction:

Arsenic is one of the natural constituents of earth's crust. It is usually present as Arsenite and arsenate salts which are toxic to human health. Beside these large numbers of arsenical compounds are also present in water, air, foods and medicinal preparations. High concentration of arsenic in earth's crust in certain parts of country, especially of West Bengal and Sub-Gangetic plain may contaminate ground water causing chronic arsenic toxicity. [1-2] Drinking water is also contaminated with arsenic from arsenical pesticide, natural mineral deposits or improperly disposed arsenical chemicals.

Chronic poisoning may also occur among persons engaged in the smelting and refining of ores, in the subliming of white arsenic, in the manufacture of sheep-dips, weed killers, paints, dyes, cosmetics, drugs etc. [3]. Chronic arsenical toxicity may develop insidiously after 6 months to 2 years or more depending upon the intake of arsenic-contaminated water or exposure. [4]

Symptoms of chronic poisoning are vague in beginning such as loss of weight & appetite, decreased salivation, colicky pain, irregular bowel habits etc.

Cutaneous lesions are more regular, characterized by thick, hard, rough hyperkeratotic skin especially of palm & sole and peeled at places. There are diffused/ mottled pigmentation (raindrop appearance) on the skin of covered areas mainly of chest, back and limbs. [5-7]

The nails become brittle showing white bands- Aldrich Mee's lines. There are non-pitting edema on the lower eyelids and feet around ankle joints. In the later stage liver & spleen enlarged ascites and peripheral neuropathy. Sensory symptoms, numbness & tingling predominate to motor manifestation weakness & atrophy of distal muscles and wrist & foot drop. Arsenic is present in almost all the tissues and organs including blood, urine, faeces, hair and nails. [8]

Case Report:

Two persons aged 68 years and 28 years, father and his son, R/o Raja ki tal Ali Nagar, District Firozabad Uttar Pradesh were admitted in Department of Medicine S.N. Medical College & Hospital Agra on 11/08/2010 with complaints of decreased appetite, loss of weight, peeling of skin of palm & sole, tingling & numbness of distal part of arms & leg and bluish discolorations of skin of foot & sole for six months. They were diagnosed as the case of Chronic Arsenic poisoning.

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The source of arsenic was explored and it was drinking water from hand pump. The arsenic level in water was increased 1.2mg/l to maximum permissible level .05mg/l they were using this water for about 6 years when they shifted Firozabad from Mumbai.

Other members of family were also examined and all eight (four males and four females between 7 to 68 years of age) were showing the evidence of chronic poisoning. The percentage of these features present in family members are shown in the table:

Table 1: Clinical Features of Chronic Arsenic Poisoning in Family Members

Clinical Features	No.	Percentage
Fast & rapid pulse	8	100
Increased temperature	4	50.0
Loss of weight & appetite	8	100
Hoarse & husky voice	3	37.5
Eyes congested & swelling of eyelid	6	75.0
Metallic taste	3	37.5
Decreased salivation	5	62.5
Nausea & vomiting	2	25.0
Colicky pain	5	62.5
Constipation	5	62.5
Loose motion	3	37.5
Silvery coating of tongue	4	50.0
Red & soft gum	5	62.5
Skin dry & peeled on palm & sole	5	62.5
Skin eruptions (warts) & hyperkeratosis	8	100
Flushing/bluish coloration of skin	7	87.5
Rain drop pigmentation	6	75.0
Nails brittle & Aldrich Mee's lines	6	75.0
Dry hair & patchy alopecia	3	37.5
Enlarged liver	4	50.0
Tingling & numbness in hand & feet	7	87.5
Decreased touch & pain sensation	5	62.5
Tremor in hands	2	25.0
Swelling/edema around ankle	5	62.5
Tenderness & cramps in muscles	6	75.0
Decrease power of upper & lower limbs	4	50.0
Muscular atrophy	1	12.5
Wrist & foot drop	-	00.0

Table 2: Investigation Report of Family Members

Investigation		
Increased Sodium/ Potassium	-	00.0
Increased SGOT	1	12.5
Increased SGPT	3	37.5
Increased Serum bilirubin	3	37.5
Raised Serum creatinine	1	12.5
Raised Blood urea	-	00.0
Raised blood arsenic (> 100mg/L)	8	100
Urinary excretion of arsenic (>200mg/24hrs)	8	100

These indicates general and skin lesions are more frequent and appear early than neurological features especially motor functions muscular weakness and paralysis.

Discussion:

Chronic arsenic toxicity is one of the major health problems in certain parts of the country especially in the areas where arsenic is rich in ground strata. It also occurs in the areas

where water is regularly contaminated by industrial or agrochemical wastes. Eating food contaminated with arsenical pesticides or grown with arsenic-contaminated water or in arsenic-rich soil may also cause chronic poisoning. [9]

In some areas environment is heavily polluted with arsenicals and arsine and cause toxicity by breathing for months and years. Weak and mal-nourished people are easily affected by arsenic contaminated water, fume or dust. Higher the concentration of arsenic in water /air or higher the daily intake, the symptoms appear faster. [10]

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Fig. 1: Arsenical Pigmentation (Spotty Rain Drop Like) Affecting Both Palm



Fig. 2: Arsenical Pigmentation (Spotty Rain Drop Like) Affecting Both Sole



Fig. 4: Arsenical Aldrich Mees Line Over Both Foot Nail



Fig. 3: Hyperkeratosis and Excoriation of Skin Seen over Leg and Foot



Fig. 5: Arsenical Aldrich Mee's Line over Both Hand Nail



Case Report

Unusual fall from Height in an Elevator: A Case Report

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Abstract

Deaths due to fall from height are more commonly seen in urban area especially where high rise buildings are constructed. Invariably such falls from great height results in tragic death of the innocent victims mainly construction workers who are working without any safety measures. A fatal fall from height can result from accident, suicide or homicide. This paper reports an unusual incident where four construction worker suffered accidental fall due to snapping of the cable of a temporary elevator erected at the construction site. Out of the four victims, one died on the spot while the remaining three victims were hospitalized who subsequently died within few hours of admission due to the fatal injuries sustained during the fall. The medico-legal autopsy on each of the victims showed characteristic pattern of skeletal and internal injuries sustained on account of blunt trauma due to fall from height. The following case is reported due to its rarity and unusual form of accidental death due to fall from height.

Key Words: Fall from height, Elevator, Accident, Blunt trauma, Skeletal & Internal Injuries

Introduction:

"The higher you climb, the harder you fall."- Chinese idiom [1]

The incidence of deaths due to fall from height is increasing day by day as many work activities require working at a considerable height. This is more found to be true in workers who are engaged in employment activities like maintenance, construction, painting, decoration and window cleaning. Moreover such odd jobs are performed without proper training, planning and safety measures. Fall from height refers to fall from one higher level to another level involving ladder, stairs, roof, etc. [2]

The frequency, type and extensiveness of injuries in falls from height are determined by body weight and velocity, nature of the surface impacted, duration and intensity of the impact force, body orientation in the moment of impact, as well as the elasticity and viscosity of the tissue of the contact body region. [3-5] fall are a leading cause of injury in the United States, second only to motor vehicle crashes. [6]

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Fall from height is defined in many ways, the international classification of diseases (ICD9) states that a fall from height is an event where a person falls to a ground from upper level. Whereas the Frailty and Injuries Co-operative Studies of Intervention (FICSIT) define fall from height as unintentionally coming to rest on the ground, floor or other lower level. A more recent definition of fall from height is to descent from upright, sitting or horizontal position, the descent height being less than or equal to 1 meter. [7]

Case History:

The incident occurred in March 2005, where 4 dead bodies were brought for medico-legal autopsy to the mortuary of Department of Forensic Medicine, TNMC and BYL Nair Hospital, Mumbai. All the deceased victims were working at the construction site of the OPD building of the hospital. The construction company had erected a temporary elevator (lift) at the construction site for the inspection of construction work.

A group of 4 workers (comprised of 1 civil engineer, 1 supervisor and 2 construction worker) were coming down by this temporary lift from the eighth floor, when the cable of the lift snapped and the lift came crashing down on to the ground. It was a free fall from a height of about 60 feet. The incident happened around 21.00 hours. Out of the 4 worker, one worker died on the spot while the other three workers sustained injuries for which they were admitted in the surgical unit of the hospital. They

subsequently succumbed to their injuries within 3 hours of admission.

A complete and thorough medico-legal autopsy was conducted on the body of each victim on the next day. All the victims were male between the age group of 30 years to 40 years. On external examination it was found that all the victims were of moderate to average built. Rigor mortis was well developed. The post mortem lividity was faintly developed over back and dependant parts except over the areas of contact flattening.

The post-mortem lividity was fixed. There was oozing of blood from the nostril of one of the deceased victim. The victims had suffered external injuries in the form of multiple irregular impact abrasions with subjacent contusions, irregular grazed abrasions and irregular stretch lacerations. Out of the three admitted victim, one deceased victim showed presence of sutured surgically incised wounds of exploratory laparotomy and thoracotomy with intercostal drainage. The details of injuries of each victim is described as below

Case 1: Male, age 34 years

On External Examination:

- a. Swelling, visible deformity and compound fracture and dislocation of lower ends of both bones of the right leg, fracture of Talus and Cuboid bones of the right foot.
- b. Swelling and visible deformity of the left ankle joint and foot, with palpable fractures of lower ends of both bones of the left leg and fracture of Talus and Calcaneum bones of the left foot.

On Internal Examination:

- a. Subarachnoid haemorrhage about 20 ml at the base of the brain.
- b. Contusions of the intercostal muscles of the right side of the chest over the front from the clavicle down to the level of the 6th rib and over the outer aspect, along the 7th, 8th and 9th intercostal spaces of size maximum 18 cm X 16 cm and minimum 11.5 cm X 13.5 cm.
- c. Contusions of the intercostal muscle of the left side of the chest over the front extending downwards from 1st rib to the 6th rib size 19.5 cm X 16.5 cm and over the front and outer aspect of the 9th and 10th intercostal spaces, size 6 cm X 10 cm associated with undisplaced fracture of the 9th and 10th rib in anterior axillary line.
- d. Displaced fracture of the 7th rib on right side and 2nd, 3rd and 4th ribs on the left side at their costovertebral junction.

- e. Tearing of the pleura at sites subjacent to the displaced fractures of ribs.
- f. Avulsion of posterior attachments of the domes of the diaphragm on both sides.
- g. Contusion of both lungs at their hilae.
- h. Two irregular tears over the posterior aspect of the right lobe of the liver.
- i. Contusion of the right psoas muscle along its entire length.
- j. Compression fracture of the lower half of the body of 5th lumbar vertebra.
- k. Fracture of the body and alae of the sacrum with dislocations of the lumbosacral and both sacroiliac joints.
- l. Fracture dislocation of pubic symphysis.
- m. Fracture dislocation of atlanto occipital joint.
- n. 2600 ml of fluid blood was drained and 440 gm of clots was evacuated from the sub diaphragmatic space of both sides.

Case 2: Male, 37 years

On External Examination:

- a. Swelling, visible deformity and compound fractures and dislocation of lower ends of both Tibia and Fibula of both legs, Talus and Calcaneum of both the foot.

On Internal Examination:

- a. Fracture of the sternum at the junction of the Manubrium with the body.
- b. Contusion of anterior pericardium.
- c. Displaced fracture of ribs from 2nd to 7th rib of right side and 3rd and 4th ribs of left side of the chest anteriorly in midclavicular line with contusion of subjacent intercostal muscle.
- d. Displaced fractures of 1st, 2nd and 3rd ribs of right side at its posterior end with subjacent contusion.
- e. Bilateral haemothorax of about 1500 ml of fluid blood. Tearing of pleura at sites subjacent to the displaced fractures of ribs.
- f. Roughly triangular penetrating laceration 1cm X 1cm X 1cm deep on posterior aspect of upper lobe of right lung.
- g. Multiple contusions of size ranging from 3 cm X 2 cm to 1 cm X 1cm on both upper and lower lobes of both lungs.
- h. Haemo peritoneum of about 800 ml of blood.
- i. Contusion of anterior surface of right lobe of liver.
- j. Multiple contusions of size ranging from 3.2 cm X 2 cm to 1.8 cm X 1 cm on the coils of intestine and mesentery.
- k. Bilateral perirenal haematoma.
- l. Fracture dislocation of the lumbar spine at the level of 3rd and 4th lumbar vertebra.
- m. Fracture dislocation of the cervical spine of 2nd and 3rd cervical vertebra with contusion of underlying cervical spinal cord.

- n. Contusion of right psoas muscle. Fracture of the left pubic bone.
- o. Comminuted fracture of the body of the sacrum with fracture dislocation of the right sacroiliac joint.

Case 3: Male, 30 years

On External Examination:

- a. Swelling, visible deformity and compound fractures and dislocation of both ankle joints, Talus and Calcaneum of both sides.

On Internal Examination:

- a. Diffuse subdural and subarachnoid haemorrhages over both cerebral hemispheres with blood clots at the base of the brain.
- b. Contusions of diaphragm of varying sizes on both pleural and peritoneal surfaces.
- c. Displaced fracture of 7th, 8th and 9th rib in midaxillary line of left side of the chest with subjacent contusions.
- d. Displaced fracture of 3rd rib at costochondral junction of right side of the chest.
- e. Evidence of thoracotomy on left side.
- f. Both lungs collapsed and show contusions at the hila with penetrating laceration seen on lower lobe of left lung of size 2cm X 1 cm parenchyma deep.
- g. Hemoperitoneum with 1000 ml of blood drained and 200 gm of clot removed.
- h. Multiple contusions seen on the coils of intestine and mesentery.
- i. Multiple lacerations on anterior and posterior aspect of the right and left lobe of the liver ranging between 3.4 cm X 2.5 cm parenchyma deep to 2.5 cm X 1.2 cm parenchyma deep.
- j. Both kidneys showed presence of perirenal haematoma and right Kidney laceration.
- k. Complete fracture dislocation of cervical spine at 2nd and 3rd cervical vertebra level.
- l. Fracture dislocation of lumbar vertebrae at 4th and 5th level.

Case 4:

On External Examination:

- a. Swelling, visible deformity and compound fractures and dislocation of lower ends of both Tibia and Fibula of both legs, Talus and Calcaneum of both the foot.

On Internal Examination:

- a. Displaced fracture of ribs from 2nd to 7th rib of right side and 3rd and 4th ribs of left side of the chest anteriorly in midclavicular line with contusion of subjacent intercostal muscle.
- b. Bilateral haemothorax of about 1500 ml of fluid blood.
- c. Tearing of pleura at sites subjacent to the displaced fractures of ribs.

- d. Roughly triangular penetrating laceration 1cm X 1cm X 1cm deep on posterior aspect of upper lobe of right lung.
- e. Multiple contusions of size ranging from 3 cm X 2 cm to 1 cm X 1cm on both upper and lower lobes of both lungs.
- f. Multiple contusions of size ranging from 3.2 cm X 2 cm to 1.8 cm X 1 cm on the coils of intestine and mesentery.
- g. Bilateral perirenal haematoma.
- h. Complete fracture dislocation of the lumbar spine at the level of 3rd and 4th lumbar vertebra.
- i. Fracture dislocation of the cervical spine of 2nd and 3rd cervical vertebra with contusion of underlying cervical spinal cord.
- j. Comminuted fracture of the body of the sacrum with fracture dislocation of the right sacroiliac joint.

The cause of death was common in all the victims and was given as **“Death due to haemorrhage and shock as a result of multiple injuries to internal organs and multiple skeletal fractures due to blunt direct and transmitted trauma (Unnatural).”**

Discussion:

Falls from a height present a great challenge to trauma services. In children, they are most commonly due to accidents, while in adults; they are attributed to suicide, accident or crime. The nature and magnitude of the injuries occurring due to falls depend on the height of the fall, the nature of the contact surface, and body orientation on impact, body mass, the victim's ability to distribute the impact forces efficiently, and the victim's age. [8, 9]

The highest incidence of fall from height occurs at construction site followed by fall from public buildings. Fall from height is the most common cause of fatal injuries and single biggest cause of work place deaths. On an average majority of fall related deaths happens in construction industry with remaining spread across other industries. [10]

In majority of falls, vertical landing with feet first is common and next common being with the head first. [11]

In this case report, 4 victims died in a single incidence of a fall from height in a temporary made elevator at a construction site of a Hospital. All the victims were male between the age group of 30 to 40 years. The manner of death was accidental in nature.

The medico-legal autopsy findings revealed a common pattern of injuries in all the victims. All the victims showed open fractures of bones of lower extremities and feet. This can

be attributed due to the fact that the feet must have made the first contact with the hard ground. Since the fall occurred in an enclosed space of the elevator it restricted free fall and change in the position of the body which is usually seen in fall from height where the victim is air born. More or less similar pathognomic findings were noted on external examination in studies conducted by other researchers. [12-14]

The postmortem findings of the victims revealed multiple skeletal fractures which is common in falls from greater heights. The internal examination revealed abdominal and chest injuries along with fracture of the spine, ribs and pelvis. (Table 2 & 3) Chest and abdominal injuries were seen most commonly while cranio-cerebral injuries in the form of intracranial haemorrhages were noticed in only two cases out of four.

Yagmur et al [8] have mentioned that abdominal and chest injuries were relatively uncommon in falls from less than 4 m and the head was the most frequently injured region. Chest, abdominal, extremity and neck injuries occurred in decreasing order of frequency. As the height increases, the incidence of chest, abdominal and extremity injuries rises along with head injuries. Similar findings have been reported by Gupta et al, [14] who described 63 persons who fell from heights. It was demonstrated that lethal injuries involving multiple organs rose in number as the height increased. [15]

Fissure fracture of the skull and fracture of cervical spine was noticed when the fall occurred on to concrete from minimum height of 3 feet and on to hard soil from the height of 10 feet. Multiple rib fractures, fracture of clavicle and laceration of liver was noticed when the fall height was 7 feet on to concrete. Spleen and kidneys were damaged when height of fall was more than 20 feet on to hard surface.

Fracture of upper limbs were seen in falls occurred on to concrete from height of 6 feet where as the fracture of lower limb was found when the fall height was more than 15 feet on to hard surface. [10]

In the current case report, since the fall was from a greater height of about 60 feet the injuries were most commonly seen in the abdominal, thoracic and spinal regions involving multiple organs. There were extremity injuries in 100% cases, thoracic injuries 100%, abdominal injuries 75% and cranio-cerebral injuries in 50% of cases. A similar research on fall from height has revealed head injuries in 100%, extremity injuries in 16.6%, abdominal injuries in 16.6%, and thorax injuries in 16.6% of deaths. [16]

Conclusion:

The present case report revealed typical pattern of skeletal and internal injuries sustained due to fall from height in an enclosed elevator. The nature of injuries suggests that the victims must have landed on their feets first.

The blunt force sustained due to landing on the hard ground surface may have been transmitted axially through the long bones of the lower extremity to the spine. Later on the force must have been distributed to the ribs and the internal organs consequently causing fractures of the ribs and injuries to the internal organs.

Unfortunately detailed scientific study about the capacity of the lift to carry persons, dimensions of the lift, tensile strength of the cable, presence of shock absorber and analysis of the pulley could not be done.

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Table 1: External Skeletal Injuries

External injuries	Skeletal	Case 1	Case 2	Case 3	Case 4
Compound Fracture of Bones of Lower Extremity		Present	Present	Present	Present
Fracture Dislocation of Bones of Feet		Present	Present	Present	Present

Table 2: Internal Organ Injuries

Organ	Case 1	Case 2	Case 3	Case 4
Lungs	Contusion	Lacerations	Lacerations	Contusions and Lacerations
Heart	Nil	Contusion anterior pericardium	Nil	Nil
Liver	Nil	Contusion	Lacerations	Nil
Spleen	Nil	Nil	Nil	Nil
Kidney	Nil	Perirenal Hematoma	Perirenal Hematoma and Laceration	Perirenal Hematoma
Intestines and Mesentery	Nil	Contusions	Contusions	Contusions
Brain	Sub arachnoid Haemorrhage	Nil	Diffuse subdural and sub arachnoid Haemorrhage	Nil
Spinal Cord	Nil	Contusion of cervical spinal cord	Nil	Contusion of cervical spinal cord

Table 3: Internal Fractures

Fractures	Case 1	Case 2	Case 3	Case 4
Ribs	Present	Present	Present	Present
Spine	Present	Present	Present	Present
Pelvis	Present	Present	Nil	Present

Table 4: Distribution of Injuries

Injuries	Cases (%)
1. Head	
a. Fractures	0
b. Intracranial haemorrhages	2 (50)
c. Cerebral Injury	0
2. Thorax	
a. Haemothorax	1 (25)
b. Rib Fracture	4 (100)
c. Sternum Fracture	1 (25)
d. Diaphragm Injury	2 (50)
3. Abdomen	
a. Liver laceration	1 (25)
b. Spleenic laceration	0
c. Renal laceration	3 (75)
d. Intestine and Mesentery contusion	3 (75)
e. Haemo peritoneum	3 (75)
4. Upper Extremity	0
5. Lower Extremity	
a. Femur Fracture	0
b. Tibia Fracture	4 (100)
c. Fibula Fracture	4 (100)
d. Tarsal bone fracture	4 (100)
e. Metatarsal Fracture	0
6. Pelvis Fracture	3 (75)
7. Spinal	
a. Spinal cord contusion	2 (50)
b. Cervical spine	3 (75)
c. Thoracic Spine	0
d. Lumbar spine	4 (100)

*Your vision of a better tomorrow,
Steers us even today,
Your soul nurtures our hearts,
Your unseen presence still leads our way*



Dr. G R Bhaskar
(06-Oct-1926 to 17-Nov-2012)

A towering influence in the field of Forensic Medicine, an intellectual of international stature who chose to maintain a modest profile, Dr. G.R. Bhaskar was that glowing beacon of inspiration, which lights up many paths towards the goal of the highest achievements.

Case Report

Disseminated Intravascular Coagulation: A Medical Menace

*R.K.Punia

Abstract

Medical negligence suits are on the rise now-a-days. Doctors, who were considered messengers from the God and worshipped, are met with Civil and Criminal negligence cases, thereby leading them to practice defensive medicine. The expectations among patients for complete and dramatic cure, knowledge about recent advances in medicine and awareness of the general public regarding the legal provisions has increased the stress among medical practitioners. There are instances where even known complications of diseases and physiological conditions (after delivery) have been considered as malpractice outcome by patients and relatives. Disseminated intravascular coagulation (DIC), also known as disseminated intravascular coagulopathy or consumptive coagulopathy, is a pathological activation of coagulation (blood clotting) mechanisms that happens in response to a variety of diseases and physiological condition. The present case is one such case where a known complication turns out to be a Doctor's nightmare and the role of medical expert opinion in such cases.

Key Words: Negligence Disseminated Intravascular Coagulation (DIC), Coagulopathy, Malpractice

Introduction:

Medical negligence is defined as breach of duty owed by a doctor to his patient to exercise reasonable degree of skill and care. Once the doctor has obtained requisite qualification, he is expected to acquire skill to treat the patient and exercise good care. Degree of skill and care is not defined but it is assumed that he will exercise reasonable degree of skill care. He may not be the best in the community of doctors but is assumed that he is the average and his expertise should be at least average in his peer group. It is also understood that a doctor may not always knowing the latest is his field but it is expected that he must be aware of new techniques that are coming to his specialty.

For negligence the damage to the patient is essential caused by the Act of omission or Act of commission. In Act of omission there is Failure to exercise reasonable degree of care can cause damages to the patient. In Act of commission damages due to direct effect of treatment. Complications of treatment or any unforeseen accident which might occur during the management of a patient not amounting to negligence, as long as the standard of the treatment and care provided to the patient is reasonable.

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Case History:

The treatment records of a female victim admitted in a Private hospital in Jaipur was submitted to the Department of Forensic Medicine, SMS Medical College, Jaipur for perusal and opinion.

As per history the deceased victim was a 28year old married female, (G2P1L1) conceived for the second time. She had undergone a previous Caesarean section (LSCS), for indications unknown.

The present pregnancy was uneventful but for nausea and vomiting in the first trimester. She underwent routine antenatal checkups including vaccination. At the end of nine months amenorrhea, she got admitted to the private hospital for intervention. She was worked up with routine investigations including complete haemogram, renal function tests, clotting parameters and USG abdomen which showed a single live intra uterine gestation with adequate liquor and Grade IV Placenta Previa.

After written informed consent and proper preparation she was put under general anesthesia with adequate pre-anesthetic medications. She underwent a brief period of Cardiac arrest while under anesthesia from which she recovered with injection atropine and Cardiac massage. Lower section caesarean section was done as per protocols. A mature female child was delivered and handed over to the Pediatrician.

The victim shortly developed bleeding from the uterus and on examination, the

placenta was found adherent to the uterine walls (Placenta accreta). On trying to remove the adhesion, bleeding increased further. The procedure was stopped and an arrangement for blood transfusion was done. Informed consent from the relatives was taken for Emergency Hysterectomy to control the Post partum Haemorrhage (PPH). After obtaining consent, hysterectomy was done and after securing haemostasis, wound closure was done in layers.

Patient was revived from General anesthesia and shifted to ICU, wherein her general conditions worsened. Her pulse became feeble, and tachycardia set in with tachypnoea and dyspnoea. She was conscious to begin with but later became disoriented and drowsy. Her clotting parameters were altered with increased bleeding time, clotting time, Prothrombin time, Activated Partial Thromboplastin time (APTT) and INR. D- dimer was positive, with increased Fibrin Degradation Products (FDP).

She was given extensive blood (Fresh blood and packed cells) transfusion, with Fresh Frozen Plasma (FFP) and Cryo-precipitate after grouping and cross matching. In spite of the best of efforts, her condition deteriorated and she was shifted to a tertiary care institution the same day, wherein she was operated again to look for any bleeders and after debridement, wound closure was done with drainage tubes left in abdomen and pelvis. She was put under conservative management and observed in the ICU with monitoring of vital parameters. Her blood pressure did not improve in spite the inotropes and she succumbed to death with 24 hours of her Delivery.

The immediate cause of death was certified as 'Uncontrolled post LSCS bleeding' with underlying cause as Post LSCS/ Post hysterectomy DIC (Disseminated intravascular coagulation). This led to dissatisfaction among the relatives and huge public outcry. After demonstrations in front of the hospital and the police station, the relatives finally lodged in a complaint of criminal negligence under section 304 and 34 IPC.

The matter came under investigations and as per Hon'ble Supreme Court guidelines, the investigating officer came to our hospital to get the second opinion of a panel of Experts before proceeding with the case.

As per the instructions of competent authority of SMS Hospital a Medical Board including author was constituted on 18-1-11 and opinion was given on the basis of treatment documents given by the investigating authorities. After perusal of all the records, the Panel opined that death of patient was due to DIC and PPH,

as a result of complications of LSCS associate with placenta previa Grade IV and placenta accreta. The panel also opined that the treatment of the patient was proper and as per present guidelines; DIC and PPH could occur even when patient is treated with proper skill and care.

Discussion:

Disseminated intravascular coagulation (DIC), also known as disseminated intravascular coagulopathy or consumptive coagulopathy, is a pathological activation of coagulation (blood clotting) mechanisms that happens in response to a variety of diseases.

The subcommittee on DIC of the International Society on Thrombosis and Haemostasis has suggested the following definition for DIC: "An acquired syndrome characterized by the intravascular activation of coagulation with loss of localization arising from different causes. It can originate from and cause damage to the microvasculature, which if sufficiently severe, can produce organ dysfunction."

This is a clotting and bleeding disorder that results from the generation of tissue factor activity within the blood. This trigger of the coagulation cascade quickly leads to significant thrombin production which perpetuates its own formation. In very little time, the existing regulatory factors such as antithrombin III, protein C, and protein S are consumed. As a result, large amounts of thrombin are generated, leading to a hypercoagulable state. [1]

In the normal physiological state, plasmin is responsible for breaking fibrin into fibrin split products, thereby limiting the amount of fibrin clot being formed. In DIC, the quantity of plasmin is significantly increased, leading to the generation of significant quantities of fibrin degradation products. This often results in bleeding. DIC can occur acutely but also on a slower, chronic basis, depending on the underlying problem. It is common in the critically ill, and may participate in the development of multiple organ failure, which may lead to death.

The salient obstetric causes for DIC are abruptio-placentae, pre-eclampsia, hemolysis, elevated liver enzymes, low platelets (HELLP) syndrome/eclampsia and amniotic fluid embolism.

The affected person is often acutely ill and shocked with widespread haemorrhage (common bleeding sites are mouth, nose and venepuncture sites), extensive bruising, renal failure and gangrene. The onset of DIC can be fulminant, as in endotoxic shock or amniotic fluid

embolism, or it may be insidious and chronic. Decreased levels of antithrombin are correlated with elevated mortality in patients with sepsis. [2]

Diagnosis is usually suggested by following conditions: Severe cases with hemorrhage: The PT and APTT are usually very prolonged and the fibrinogen level markedly reduced. High levels of fibrin degradation products, including D-dimer, are found owing to the intense fibrinolytic activity stimulated by the presence of fibrin in the circulation. There is severe thrombocytopenia. The blood film may show fragmented red blood cells (schistocytes). Mild cases without bleeding: There is increased synthesis of coagulation factors and platelets. PT, APTT, and platelet counts are normal. Fibrin degradation products are raised. [3]

Definitive diagnosis depends on the result of:

- Thrombocytopenia
- Prolongation of Prothrombin time and activated partial Thromboplastin time
- A low fibrinogen concentration
- Increased levels of fibrin degradation products

The only effective treatment is the reversal of the underlying cause. Prognosis varies depending on the underlying disorder, and the extent of the intravascular thrombosis (clotting).

The prognosis for those with DIC, regardless of cause, is often grim. Disseminated intravascular coagulation (DIC) is a confusing syndrome, because many unrelated diseases can induce DIC, clinical manifestations can vary, there is confusion regarding appropriate laboratory diagnosis, and the guidelines for management with specific available therapeutic modalities are unclear. [4] The diagnostic difficulties result in delayed diagnosis and treatment of DIC cases which further worsen the prognosis. Prompt and adequate and appropriate treatment is necessary to save the life of the patient as well reputation of the practitioner.

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PHOTO

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