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(Registration No.349, 12th May, 1972, Panji, Goa)

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Journal of Indian Academy of Forensic Medicine (JIAFM)
The official publication of Indian Academy of Forensic Medicine

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Printed and published by Dr. Mukesh Yadav, Editor, JIAFM and Dr. A. D. Aggarwal, Joint Editor, JIAFM on behalf of Indian Academy of Forensic Medicine at name of the press [SHIVANI PRINTERS, NOIDA, U.P.]
Journal of Indian Academy of Forensic Medicine

Volume: 33 • Number: 1 • January-March 2011

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From Editor’s Desk

JIAFM
A Quarterly Publication
Volume 33, Number 1, January- March, 2011

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

Professor [Dr.] Mukesh Yadav
Editor, JIAFM

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The journal is indexed with IndMed and made available online by following website:
www.medind.nic.in  http://indmed.nic.in
www.jiafm.com  www.forensicindia.com
www.indianjournals.com
Editorial: Threat of Unnatural death of Forensic Medicine in India at the Hands of BOG/MCI

Forensic Medicine is facing a threat of unnatural death in India, that to at the hand of its protector i.e. the Medical Council of India itself. “Vision-2015” document prepared by the BOG/MCI has threatened Forensic Medicine to die an unnatural death by reducing it to non-existence. This plan to kill Forensic Medicine came at a time when India needs its services most to become a developed nation. This is a fact of common knowledge that economic growth and development goes hand in hand when law and order are under control and every one brought to justice by the court of law. There is no denial of the fact that Forensic Medicine knowledge adds to ‘the administration of justice’. The Indian Constitution itself in its preamble talked about justice and equality for common man.

Circumstantial evidence given by the Forensic Medicine knowledge and its experts along with cause of death in unnatural death cases (Custodial Deaths, Dowry Deaths, Murder, etc.) had brought justice in many recent cases, like Priadarshni Mattoo case, Nithari case, etc. on the other hand lack of application of Forensic Medicine knowledge and non-utilization of services of its expert in cases like Aarushi Murder case shaken the confidence of common man in administration of justice. Even modern medicine may loose its professional status by unnatural death of Forensic Medicine as Hon'ble Supreme Court has made clear that it's the Ethics, which differentiate a profession from the occupation. Medical Ethics as on today part of Forensic Medicine curriculum, knowledge of which is very essential for present as well as future medical fraternity in civilized, democratic country like India, again it was Hon'ble Supreme Court of India in many cases like Pt.Parmanand Katara (1989), Khet Mazdoor Sangh case (1996) reminded importance and application of Medical Ethics for common man’s as well as medical professionals interest.

As the apex court of India and several other constitutional court expressed their view regarding necessity of stringent punishment for deferent criminals. Some of the examples are given below.

In Mahesh v. State of M.P. (1987) 2 SCR 710, Supreme Court while refusing to reduce the death sentence observed thus: "It will be a mockery of justice to permit the accused to escape the extreme penalty of law when faced with such evidence and such cruel acts. To give the lesser punishment for the accused would be to render the justice system of the country suspect. The common man will lose faith in courts. In such cases, he understands and appreciates the language of deterrence more than the reformative jargon."

In Dhananjoy Chatterjee vs. State of west Bengal (1994 (2) SCC 220), Supreme Court has observed that shockingly large number of criminals go unpunished thereby increasing, encouraging the criminals and in the ultimate making justice suffers by weakening the system's credibility. The imposition of appropriate punishment is the manner in which the Court responds to the society's cry for justice against the criminal. Justice demands that courts should impose punishment befitting the crime so that the courts reflect public abhorrence of the crime. The Court must not only keep in view the right of the criminal but also the rights of the victim of the crime and the society at last while considering the imposition of appropriate punishment.

Similar view has also been expressed in Ravji @ Ram Chandra vs. State of Rajasthan (JT 1995 (B) SC 520). It has been held in the said case that it is the nature and gravity of the crime but not the criminal, which are germane for consideration of appropriate punishment in a criminal trial. The Court will be failing in its duty if appropriate punishment is not awarded for a crime which has been committed not only against the individual victim but also against the society to which the criminal and victim belong. The punishment to be awarded for a crime must not be irrelevant but it should conform to and be consistent with the atrocity and brutality with which the crime has been perpetrated, the enormity of the crime warranting public abhorrence and it should respond to the society's cry for justice against the criminal. If for extremely heinous crime of murder perpetrated in a very brutal manner without any provocation, most deterrent punishment is not given, the case of deterrent punishment will lose its relevance.
In the case of State of M. P. vs. Munna Choube and Anr. reported in (2005) 2 SCC 710 the Hon'ble Supreme Court observed: The law regulates social interests, arbitrates conflicting claims and demands. Security of persons and property of the people is an essential function of the state. It could be achieved through instrumentality of criminal law. Undoubtedly, there is a cross-cultural conflict where living law must find answer to the new challenges and the Courts are required to mould the sentence system to meet the challenges. The contagion of lawlessness would undermine social order and lay it in ruins. Protection of society and stamping out criminal proclivity must be the object of law which must be achieved by imposing appropriate sentence. Therefore law as a cornerstone of the edifice of "order" should meet the challenges confronting the society. Friedman in his "law in changing society" stated thus "State of criminal law continues to be as it should be a decisive reflection of social consciousness of the society." Therefore, in operating the sentencing system the law should adopt the corrective machinery or deterrence based on factual matrix. By deft modulation sentencing process be stern where it should be, and tempered with mercy where it warrants to be. The facts and given circumstances in each case, the nature of crime, the manner in which it was planned and committed, the motive for commission of the crime, the nature of the weapon used and all other attending circumstances are relevant facts which would enter into the area of consideration.

Similarly in Munna Choubey V. State of M.P, (2005)2 SCC 710 Supreme Court Said-"Imposition of sentence without considering its effect on the social order in many cases may be in reality a futile exercise. The social impact of the crime, e.g. where it relates to offences against women, dacoity, kidnapping, misappropriation of public money, treason and other offences involving moral turpitude or moral delinquency which have great impact on social order, and public interest, cannot be lost sight of and per se require exemplary treatment. Any liberal attitude by imposing meagre sentences or taking too sympathetic view merely on account of lapse of time in respect of such offences will be result-wise counterproductive in the long run and against societal interest which needs to be cared for and strengthened by string of deterrence inbuilt in the sentencing system."

Therefore, to fulfill the courts order as well as to encounter with the sophisticated nature of crime by the deterrent offenders the only solution is proper application Forensic Medicine & Forensic Science which can be done by recognising the subject as professional one as well as to increase employment opportunity for the said category of public.

The most essential need of a forensic professional is to have a crystal clear knowledge of Law. Essentially of knowledge of law for a forensic medicine expert can be referred from N.H.R.C. appointed core group on forensic science on their report under the name and style-"State of The Art Forensic Sciences: For Better criminal Justice" at page 42 clearly stated that-"...........The job of a Forensic Expert is only half done after the scientific tests have been completed and the written report is submitted. The other half is to present the results of the tests in a form that is admissible in the courts of law and in a manner that is understandable by the judiciary...", also the apex court judgement - State of Maharashtra V. M.H. George, AIR 1965 SC 722 clearly said that ignorance about law is not a matter of excuse. Since law is the basis of social development therefore clear knowledge of law makes a person with rational attitude, absence of such can be referred from Allahabad High Court Judgement of Smt. Kamlesh and Anr. vs State Of U.P. And Ors., cited in 2002 (3) AWC 1792, 2002 Cri LJ 3680 Division Bench of S Singh, R Dash JJ at para 13 said- "................., "It is safe as a general rule to assume that a professional expert witness is a partisan, willing and eager to serve the party who requests his service. Indeed all experts, whether professional or non-professional, are very apt to zealously espouse the cause of the party by whom they are called. There are to be sure exceptions to the general rule but they are not numerous enough to more than prove the rule. The witnesses now in worst repute are called expert witnesses that is, witnesses retained and paid to support by their evidence a certain view on a scientific or technical question. We have all heard the old jeer about the three kinds of liars--white liars, black liars and expert witnesses." (Woodroffe and Amir Alis Evidence Act 14th Edition, page 1293)."

Even absence of knowledge of law makes a person not to give proper respect to the summon issued by the courts of law, such example can be presented from the case of Lalchand Sk. and another
V. State of West Bengal, CRM 15399 of 2010 (which is an application for bail u/s 439 of Cr. P.C. filed on 10th Nov., 2010 in connection with Salar P.S. Case No. 68 of 2007 dated 1st Sept. u/s 302/376/120B/201 where the division bench of J.N. Patel C.J and Ashim Kumar Roy J. of Calcutta High Court, order dated 06/12/2010 said that “……………..We have received the report from the Additional Sessions Judge of the trial Court. As per the report, the Director of F.S.L., Medical Officer and the police officer were summoned but they had not turned up. Therefore, trial court was required to adjourn the trial on 22nd November, 2010. Thereafter, it has been fixed on 21st December, 2010 and 22nd December, 2010 for examination of the State witnesses.

In our view, the trial court is not helpless in this regard. If the prosecution witnesses fail to turn up after being served with summons, the trial court at the first instance should issue a bailable warrant of arrest for securing their presence and thereafter non-bailable warrant of arrest may be issued so that their presence can be secured by following the due process of law.

The crimes are increasing day by day. Conviction rate is not up to expectation. In most of the cases the court fails to deliver the justice due to deficiency in medico legal reports. To deliver a verdict the court takes the assistance of eye witnesses and scientific investigating reports. Globally the judiciary is depending more & more on scientific evidences in comparison to eye witnesses. Here in India the honorable apex court has also taken steps to modernize the judiciary investigating system & gradually consider the scientific evidences when delivering the judgments. Among the scientific reports the medico legal report (the reports prepared by a doctor) ranks the top in assisting the administration of justice. Time and again several courts have reprimanded and pulled down the doctors for their callous attitude and also suggested for increase importance to be given in training in FORENSIC MEDICINE. (Justice Paneerselvam Madras High court & Chief Justice of the Andhra Pradesh High Court, Bilal Nazki)

Salient Features of Draft for Approval- Restructured Medicolegal Curriculum for MBBS Course in India [December 2007] Drafted by “Expert Panel for Revision of Undergraduate Medicolegal Curriculum” and Chaired by Hon’ble Justice M. N. Venkatachaliah. Submitted to United Nations Development Country Office- SAJI project, Additional Secretary, Ministry of Law and Justice, Department of Justice, Government of India, Secretary, Ministry of Health and Family Welfare, Government of India, President & Secretary of Medical Council of India and all Executive members of medical Council of India who are Forensic Medicine Specialists are of immense importance in present scenario in India. Even Dental Council of India had realized the importance of Forensic Medicine and has introduced a new subject as “Forensic Odontology” in its curriculum for B.D.S. course recently.

Is there need for change in curriculum and teaching hours by the MCI in larger public interest?

Realizing the application of knowledge of Forensic Medicine and its impact, Allahabad High Court directions in a recent case of Smt. Savita Devi and Others vs. State of U.P. and Others, [2009 (65) ACC 869] Judgment dated May 8, 2009, are worth mentioning here. Court observed that “In the face of such incompetent expressions of medical opinions by the doctors, which are becoming increasingly prevalent, and which can seriously prejudice the fair conduct of investigations and trials in criminal cases, we would appreciate if the concerned Secretary Medical Health could develop a system for conducting refresher courses in Medical Jurisprudence for Government doctors who have to undertake Medical examinations or post mortem examination of the victims, deceased and others in medico-legal matters.” [Para 25]

Value of opinion of doctors in Criminal Cases and Violation of Fundamental Rights of both Accused and Victim:

Further the disturbing trend that doctors of late are becoming too careless and often willing tools ever ready to rubber stamp the opinions of investigating officers without application of their independent minds appears to have been again high- lighted before this Court in the instant case. An opinion erroneously, collusively or dishonestly given by the doctor, who examines a victim, can have far reaching consequences especially at the initial stage when a court considers a bail application of a prayer for staying arrest of an accused or for any other purpose. It is true that subsequently during trial the opinion of the doctor if considered only as an opinion evidence under section 45 of the Evidence Act, which is relevant, but not conclusive and the Court, is free to
judicially estimate the value of the doctor’s opinion evidence by examining how well it can explain and clarify the facts in issue. [Para 23]

Observations of the Sh. Sanjeev Aggarwal, Addl. Session Judge-V (Outer), Rohini Courts, Delhi are important in this respect. Court observed that “Further from the perusal of the Post Mortem report and the MLC prepared in the present case and in many other cases, which comes to the notice of this court daily, during routine court proceedings, where Medicolegal reports are prepared and the doctors attend the court for their depositions relating to postmortems and different types of MLC(s). In most of the cases, the said writing in the MLC(s)/Postmortem reports are not at all legible and lot of time is consumed in deciphering the said writing. In all those case, the doctors/Autopsy Surgeons have to first describe the contents written in the MLC(s) and postmortem reports, so that the same can be dictated and can be converted into legible words.”

Court further observed that “Some times the concerned doctors have either left the services of the hospital or are not traceable and other doctors are directed to appear in the court in their place, but due to illegible handwriting of the concerned doctors(s) including the signatures, put on the MLC(s) the doctor who is deputed in the place of such Doctor(s) are most of time are not able to decipher the handwriting of the concerned doctor and feel great inconvenience in communicating the exact facts mentioned in the reports and MLC(s) during their examination, which adversely effects the ends of justice and unnecessarily consumes lot of time of the court.”

Further lots of other deficiencies have been observed by this court regarding the manner of preparation of MLC(s) and the postmortem reports. Consequently, following suggestions be implemented for improvement of Medicolegal and postmortem reports for better administration of Criminal Justice:

1. The MLCs, especially the postmortem reports be prepared by computer typing, rather than handwriting to save the time of the court, defence lawyers and the accused and to give better clarity to the accused persons, as to what is against them.
2. The MLC(s) at present in the casualty of the hospital are being prepared by very junior or trainee doctors resulting in incomplete information being mentioned in the MLC(s), about the injury and the associated findings. Therefore, the MLC(S) should not be prepared by the doctors who are not properly trained in Forensic Medicine.
3. Any injury(s) found on the body of the injured including burn injuries(s), should be clearly illuminated on the sketch diagram(s) of the human body which are already on the back side of the MLC’s and along with that the colour changes, dimensions of injury(s), duration of injuries(s), depth of injury(s), location in respect to land marks of the body, be clearly mentioned, which medical facts are most essential for better appreciation of the injuries and for better appreciation of facts during the trial.
4. Further along with postmortem reports the injuries found on the body of deceased should also be illustrated on the sketch diagram of human body, including exit and entry wound of bullet injuries at least in burn and murder cases.
5. Histopathological report of organ(s) of the deceased be submitted at the earliest, rather it is observed, it is not being submitted/done at all in most of the cases.
6. The subsequent/final opinion regarding the cause of death, by the Autopsy Surgeon is opined very late in most of the cases, due to delayed, reporting/collection of FSL/Chemical Analysis report of viscera, and histopathological report, which results in grave injustice to the fundamental rights of the accused and the victim during the trial for speedy justice. Therefore, FSL report be given in a time bound manner, at least in serious cases.

The copy of this order was sent to Principal Secretary, Health, and Principal Secretary Home GOVT. of NCT of Delhi, for compliance and circulate amongst all the Medical Superintendent(s) of the Hospitals of Delhi Govt.

National Protest was organized by observing Black Day on 5th February 2011 by the Forensic Medicine Faculty throughout India. Protest in collaboration with IMA was also organized before MCI Office at Dwarka, New Delhi, in January 2011.
Presidential Address:

32nd Annual National Conference of Indian Academy of Forensic Medicine, Nellore, A.P.

It has been a long Journey since 1972, our Academy has now grown into a blossoming fraternity of dedicated medico-legalist and their mastery in the field can not be under-estimated. Starting from a mere 28 member team in the beginning, to its ever increasing brigade as it stands today, it is a marker of our ever increasing popularity with total number of Life members counting today to 843.

The improvements in the medical services in the country was long back realized by the Government of India which formed Bhore Committee, submitted its report in 1946 and Mudliar Committee submitted its report in 1962, but both the committees mainly concentrated on health survey in which medico-legal practices were not given any stress. Subsequently government of India appointed a committee on Medico-legal practices in India to assess the then existing conditions and quality of medico legal work. The report was published in the year 1964. The committee found that the medico-legal practice through out the length and breadth of the country have been in most deplorable conditions due to shortage of trained personnel, absence of even ordinary facilities like, transports, cold storage, mortuaries, instrument etc, absence of any incentive for medico legal practitioners to take interest in so called dirty work and want of literature, standards and research with an Indian bias.

It was also realized by the committee that the low standard of medico legal work is due to non existence of full time Forensic Medicine department in the Medical Colleges which was mostly taught by either the department of pathology, Superintendent of the Hospital or the Civil Surgeon. (Civil Surgeon word used in IPC, Cr.P.C. 174, 176, IEA)

Even the MCI did not prescribe a set of teachers in the department of Forensic Medicine. Since then gradually we succeeded to create post of Professor of Forensic Medicine and could separate this important discipline and started a separate identity and existence. Gradually the MCI also emphasised the increased need of medical teachers in the department of Forensic Medicine and prescribed various norms depending on the number of admission and the medico legal cases dealt in the department.

I am cherished to see that our work is being appreciated in all fields of society be it the administration or the judiciary or the medical fraternity. The change in the modern society are bound to put further responsibility on our shoulder to dispatch this challenging yet interesting divine cause of human existence. Standing on this platform I find it a rare opportunity to bow my head to all the pioneers of this field, whose untiring efforts have made this possibility in to reality, though I strongly feel that there remains a scope of further improvement in every field and it is the inevitable duty of ours to ensure that we flourish this dream of our primogenitors to nourish it in the best possible ways to make sure that we produce the genuine successors in future.

There is still scarcity of teachers with adequate qualifications. The reasons are many, but those apparent are lack of postgraduate seats in the subject, lack of the faculty and facilities in Forensic Medicine in medical colleges. Main reason being the lack of interest of students, who do not take up this branch and lack of proper incentives to bear the medico legal work. Above all they have to work under very difficult conditions. As we know medico legal expert has to bear a great moral and legal responsibility and work under a great social and political pressure and had to do so called dirty work of postmortem on decomposed bodies. Though, now a days, some state governments had given some incentives for postmortem allowances like Madhya Pradesh and Kerla but not by all states. Like wise it is expected from all other State Governments to give some postmortem allowance and health risk allowance to attract medical personals to acquire expertise in this branch.

The problem most imminent facing the subject of Forensic Medicine today is the recent development of the new draft “Vision 2015” document by the Board of Governors of Medical Council of India which has no any eminent person of Forensic Medicine. As we all know that Forensic Medicine can not be taught and learned in piece meal. The Board of Governors of MCI has fragmented it, into Rape and assault to be taught in Gynaecology and Obstetrics, Injuries to be taught in surgery and toxicology to be included in pharmacology and medico-legal issues to be learned from legal experts. Then why not the Medico-legal Services be out sourced to some agency of developed country for better investigation which is the need of the hour? The BOG had probably forgotten that it is the right of
every citizen to have free and fair justice and the promulgation of Vision 2015 document is an encroachment of basic human right? It is very disturbing and frustrating that while we are talking of holistic medical programme in the country, the apex body is uprooting the very basic faith of the society and humanity by diluting the importance of this vital link of Forensic Medicine between the society and the State. I wonder how the concept of ethical medicine and curtailed social faith will go hand in hand. The image of a Doctor will be at stake.

The Medical Council of India on one hand, furnishes the fact of acute shortage of medico-legalists in the country over burdened with medico legal cases where more than 3/4th of the work is being dispatched by ill trained and disinterested MBBS doctors and on the other hand is diluting the curriculum by not letting them become familiar with the basics of medico legal work. Further the prerequisites that a functional mortuary is not to be an integral part of teaching institutions is horrible. It is difficult to imagine, how these doctors will handle case of medicolegal intricacies, when we know that the present situation of such examinations is very poor in the country. Again reducing the curriculum to five years is proposed, it appears as if we are in haste to produce doctors without ensuring the quality. Such sort of recommendations is likely to hinder the concept of “Health for All”.

Crime, Society and Role of Forensic Medicine:

The reduction of faculty members of Forensic Medicine will have long term consequences in effecting both, the level of under graduate teaching and the future shortage of postgraduate students adversely affecting the entire work. It is highly regretted, that the norms for the increase of post graduate seat has also been relaxed, so how the standard of teaching and training of post graduate and the quality medico-legal work will be dispensed? And how can we have enough number of well trained personals given the present times of organized crime?

Now a day, the public is aware of science and law. So is the criminal. It is now difficult to prosecute and convict a criminal without scientific evidence, which is not possible without a competent person equipped with modern gadgets of forensic investigations. Thus the need to provide sufficient funds, space, and infrastructure along with necessary staff is justified. Unless things are established in accordance with scientific principles, expected desired result cannot be achieved. I would like to request the entire fraternity to pursue the matter in their state to fulfill the requirement at the earliest and to organize CME to update the knowledge of medical personals dealing with medico-legal work.

Ray of Hope from Forensic Science Services Bill, 2011:

Recently, a ray of hope has come from the Ministry of Home Affairs, Govt. of India regarding the Bill on Forensic Science Services which will also include Forensic Medicine to develop a redressal statutory mechanism to provide Forensic Pathology Services as a right of victim and dead persons and state obligation, as well as to ensure Quality, on time credible Forensic pathology services commensuration with crime and population statistics. In this context the Government of India has constituted an expert committee under the Chairmanship of Prof. Madhav Menon, Former Director of National Judicial Academy Bhopal, for the drafting of this Bill on Forensic Science Services in the country with objective of improving quality, timeliness and credibility of Forensic Services in Criminal Justice delivery system. This committee has to decide the ways and methods to improve Forensic Pathology.

Many eminent Forensic Medicine Experts of the country were invited to attend the meeting which was held on 22nd January 2011 in New Delhi. With reference to “Vision 2015”, I have suggested that immediate action should be taken by the Ministry of Home Affairs, GOI in co-ordination with the Ministry of Law and Justice, Ministry of Health & Family welfare departments of GOI who are the main consumer of our services, for the restoration of faculty members in the Forensic Medicine department and the proportionate increase in accordance with the medico legal work load in co-ordination.

Apart from this other suggestions include creation of separate cadre of Medico-legal officers at each district in all States, creation of necessary infrastructure for medico-legal Autopsies, incentives to forensic experts and the creation of state Medico-legal institute in each state, and developing one of the state Medico-legal Institute or one medical college as Zonal Medico-legal centre. It was also suggested that GOI should make necessary budgetary provisions for development of such centers for proper training and teaching as well as dispensing the quality Medico-legal work.

It shall be made mandatory to create a separate cadre of medico legal experts in each state to strengthen the quality of work at district level; one of the medical colleges in each state should be developed as Nodal Centre for Medico legal Consultation and training. Such a Nodal center should have facility for the Forensic pathology, Toxicology, Osteology, Anthropology, Entomology, Serology, Dentistry, Diatom labs along with facilities for Photography and Videography. The government of India, the Ministry of Home affairs should make a separate budgetary provision for the development of
infrastructure for medico legal set-up. It has also been suggested to form a Uniform Medico-legal Code in the country and that Medico- legal services be made more lucrative by ways of providing honorarium, incentives, free accommodation, telephone, transportation facilities along with other amenities to attract medical graduates to take up this specialty of Forensic Medicine. It was also suggested to consider the applicability of Right to Information Act to medico legal records which is in fact not the property of forensic medicine department but they are only the temporary custodian of such records.

Consumer Protection Act has imposed new challenges to the Medico-legal expert who has to give opinion in case of medical negligence, especially when the case is referred by the police. Though recently Supreme Court ruled that no case of negligence should be registered against any medical officer unless prima facie negligence is evident in the opinion of specialist of that filed of which the case belongs, these guide lines are awaited to be published. I hope that such steps taken by the Supreme Court give some promising relief to medical fraternity.

In my view it is the high time that we all should join hands together to make sure that our discipline prospers in the greater interests of the society and be well updated to the most recent advancements and that our pledge to ensure free and fair justice be strongly upheld.

I am happy to say that it is probably for the first time ever that every member of this fraternity has reacted very promptly, and not only with respect to “Vision 2015” but also about the existence and survival of this subject. The overwhelming response of the fraternity members from all over the country has made it possible for me to convene an emergency meeting of the Executive Committee of IAFM to form a core committee to formulate a draft representation to the Board of Governors of MCI on 4th December 2010 and also met them in person on 28th December 2010. The BOG has agreed about our demands in principle but the actual action is still awaited. The IMA has also joined hands with us in persuading this matter with MCI.

It will be the continuous collective effort, by all the members that will certainly improve the situation and we will keep pace with the global scientific developments and will prove useful to the society for the administration of Criminal Justice Delivery System.

Dr. D.S. Badkur
President, Indian Academy of Forensic Medicine,
Director, Medico-legal Institute,
Government of Madhya Pradesh,
Bhopal,
INDIA
Original Research Paper

Comparison of Lambdoid Suture Closure by X-Ray and CT scan in Two States of India


Abstract
In the present study, comparison is done for closure of squamous suture of skull of living individuals from Punjab and Rajasthan. The cases studied in Punjab are 100 individuals between the age group of 45 years to 70 years with age interval of five years and twenty cases from each age group were studied who were CT scanned for closure of squamous suture at Rajindra Hospital Patiala (Punjab). In Rajasthan (SMS Hospital Jaipur), X-ray examination of 100 individuals was done having age group 40 years to 70 years with age interval of ten years in male and female separately for squamous suture closure and accordingly the squamous suture is divided into 2 parts-(1) Upper half (%), (2) Lower half (%).

In both studies, squamous suture is studied ectocranially. It is seen that endocranially suture closure will not give reliable results and sometimes endocranially sutures remain unfused for whole life. No differences in right or left side of squamous suture have been reported by Todd and Lyon. Occasionally there is considerable sclerosis and condensation along the various sutures, particularly sagittal, squamous and coronal suture.

Key Words: Squamous suture closure, X-ray, Computer tomography scan, Age estimation

Introduction:
The estimation of age of a person starts from conception to death; broadly it can be grouped as intrauterine age & extrauterine age. During the course of development from zygote to fully develop adult human being & thereafter, the body undergoes certain sequential changes which can be observed scientifically & these data help in fixing age of individual or a part of body with certain degree of scientific accuracy. Various studies had been performed to study closure of skull suture in dead bodies and the findings on the skull deduced but few numbers of studies done in the living persons. In the present comparative study, both X-ray and CT scan findings are compared for closure of coronal suture. studies in past had been done for age estimation on basis of x-ray examination, due to its cost effectiveness but only one study reported in India by CT-Scan examination in living persons.

Material and Methods:
In Punjab study hundred cases taken, were mixed (Male & Female both) between 45-70 yrs age group who were CT scanned with age interval of five years & twenty cases from each age group were studied who were CT scanned for closure of suture of skull ectocranially for squamous suture.

In Rajasthan Study, The persons selected for study were in the age group 30-35 yr, 36-40 yr, 41-45 yr, 46-50 yr, 51-55 yr, 56-60 yr, 61-65 yr, 66-70 yr, 71-75 yr, 76 onwards. After taking proper history in relation to determination of age, availability of certificates indicating date of birth, horoscope or any other

Table 1

<table>
<thead>
<tr>
<th>Stage</th>
<th>Closure of suture</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>No closure</td>
<td>A</td>
</tr>
<tr>
<td>II</td>
<td>Less than half closure of suture</td>
<td>+</td>
</tr>
<tr>
<td>III</td>
<td>Half closure of suture</td>
<td>++</td>
</tr>
<tr>
<td>IV</td>
<td>More than half closure of suture</td>
<td>+++</td>
</tr>
<tr>
<td>V</td>
<td>Complete closure of suture</td>
<td>++++</td>
</tr>
</tbody>
</table>

In Rajasthan Study, The persons selected for study were in the age group 30-35 yr, 36-40 yr, 41-45 yr, 46-50 yr, 51-55 yr, 56-60 yr, 61-65 yr, 66-70 yr, 71-75 yr, 76 onwards. After taking proper history in relation to determination of age, availability of certificates indicating date of birth, horoscope or any other
such document, physical examination, skiagramy were carried out after obtaining their informed consent and the cases were classified into two broad groups.

**GROUP I:** Subject with confirm age as per birth certificate/horoscope and service record etc.

**GROUP II:** Subjects without any age proof, whose age was labelled from their statement with correctness within 6 months to 2 yrs. Radiological (X-Rays) examination of squamous suture –

| Table 2 |
|------------------|------------------|
| **Closure of suture** | **Grade** |
| Upper ½ | Not Commenced | In Process | Fused |
| Lower ½ | Not Commenced | In Process | Fused |

**Observations:**

It has been observed from table-3 that in Punjab study, CT Scan had been adopted as a method for age estimation and in Rajasthan study x-ray examination was done for determining age.

**Discussion and Comparison:**

In Rajasthan study, from table-5, by X-ray examination in the age group of 30-70 yrs for male and female, suture closure has not commenced. In age group 71-75 yrs, out of 7 cases studied 04 show no commencement in male and 02 cases in male show suture closure is in process while in female 01 case show no commencement and 01 case show fusion. In age group from 76 yrs onwards, out of 05 cases 03 cases in male show no commencement, 01 case show suture closure in process and 02 show fusion in male. In female 01 case each is in process of fusion and fused.

In Punjab study Age group from 46-70 yrs 20 cases from each group with 5 yrs interval studied show, from 46-50 yrs 7 cases show complete union, in Age group 51-55 yrs 9 cases show complete union, in age group 56-60 yrs 14 cases show complete union, in age group 61-65 yrs 17 cases show complete union and in age group 66-70 yrs 18 cases show complete union. In Punjab study suture closure occurred at 55-65 yrs & in Rajasthan study suture closure in male occurred at 80 yrs but in female 81 yrs is the age at which suture closure occurred. (Table-8)

**Conclusion:**

From the Punjab Study, It is concluded that the closure of squamous suture occur at the age of 55 to 65 years in both male and females.

From the Rajasthan Study, It is concluded that the closure of squamous suture occurred-

A. In Females, the closure occur at 81 years
B. In Males, the closure occurs at 80 years.

If we compare both studies, the difference in closure of squamous in Punjab and Rajasthan studies was noted due to different region, climatic condition hereditary, dietary and life style etc.

**Suggestions for Further Study:**
1. As we did not study the persons between the age group of 25-45 years, this age group should also be included for the study of closure of sutures of skull as we should know when there is earliest closure of sutures.
2. To know closure of suture from CT Scan more views i.e. coronal, should be taken to know their closure.

| Table 4: Fusion process of Squamous Suture in X-ray examination (Males) |
|------------------|------------------|------------------|
| **Age (yrs)** | **Cases** | **In X-ray examination** |
| Male | | |
| Not Commenced | In Process | Fused |
| | | | |
| 30-35 | 11 | 9 | 100 |
| 36-40 | 7 | 3 | 100 |
| 41-45 | 16 | 11 | 100 |
| 46-50 | 9 | 7 | 100 |
| 51-55 | 17 | 11 | 100 |
| 56-60 | 11 | 6 | 100 |
| 61-65 | 15 | 9 | 100 |
| 66-70 | 2 | 2 | 100 |
| 71-75 | 7 | 4 | 100 |
| 76-on | 5 | 3 | 100 |
| **%** | | | |
| | | 66.6 | 33.3 |

| Table 5: Fusion process of Squamous Suture in x-ray examination (Females) |
|------------------|------------------|------------------|
| **Age (Yrs)** | **Cases** | **In X-ray examination** |
| Female | | |
| Not Commenced | In Process | Fused |
| | | |
| 30-35 | 11 | 2 | 100 |
| 36-40 | 7 | 4 | 100 |
| 41-45 | 16 | 5 | 100 |
| 46-50 | 9 | 2 | 100 |
| 51-55 | 17 | 6 | 100 |
| 56-60 | 11 | 5 | 100 |
| 61-65 | 15 | 6 | 100 |
| 66-70 | 2 | - | - |
| 71-75 | 7 | 1 | 100 |
| 76-on | 5 | 0 | 0 |
| **%** | | |
| | | 66.6 |

<p>| Table 6: Comparison of Fusion process of Squamous Suture in CT Scan Examination |
|------------------|------------------|------------------|
| <strong>Age in yrs</strong> | <strong>In CT Scan Male &amp; Female (Combined)</strong> | |</p>
<table>
<thead>
<tr>
<th><strong>Cases exam</strong></th>
<th><strong>Complete union</strong></th>
<th><strong>%</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>30-35</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>36-40</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>41-45</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>46-50</td>
<td>20</td>
<td>07</td>
</tr>
<tr>
<td>51-55</td>
<td>20</td>
<td>09</td>
</tr>
<tr>
<td>56-60</td>
<td>20</td>
<td>14</td>
</tr>
<tr>
<td>61-65</td>
<td>20</td>
<td>17</td>
</tr>
<tr>
<td>66-70</td>
<td>20</td>
<td>18</td>
</tr>
</tbody>
</table>
References:

Table 3: Results as shown in Punjab and Rajasthan studies

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Race</th>
<th>Method (Exam)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pardeep Singh</td>
<td>2001</td>
<td>Punjab</td>
<td>CT Scan</td>
</tr>
<tr>
<td>Rajesh Verma</td>
<td>2002</td>
<td>Rajasthan</td>
<td>X-ray</td>
</tr>
</tbody>
</table>

Table 7: Comparison between X-ray and CT scan examination as a method of choice for age estimation

<table>
<thead>
<tr>
<th>S. No</th>
<th>CT scan exam</th>
<th>X-ray exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>CT scan is a costly affair</td>
<td>X-ray examination is cheap</td>
</tr>
<tr>
<td>2.</td>
<td>It is time consuming modality</td>
<td>Less time consuming</td>
</tr>
<tr>
<td>3.</td>
<td>In one section a small part of a particular suture can be studied</td>
<td>Almost whole of the suture is visible</td>
</tr>
<tr>
<td>4.</td>
<td>At a time only one suture can be studied</td>
<td>Almost all the sutures can be studied at a time</td>
</tr>
<tr>
<td>5.</td>
<td>Results given after examining the whole suture are more reliable</td>
<td>Result as compare to CT scan is less reliable</td>
</tr>
<tr>
<td>6.</td>
<td>Inner and outer table of skull can be visualized</td>
<td>Only outer table of skull can be visualized</td>
</tr>
<tr>
<td>7.</td>
<td>A doctor specialise in Radio-diagnosis and imaging can performed CT scan</td>
<td>Not a difficult task to performed x-ray examination</td>
</tr>
<tr>
<td>8.</td>
<td>Results can only be interpreted by specialist only</td>
<td>Results can be interpreted by an MBBS Doctor</td>
</tr>
<tr>
<td>9.</td>
<td>Various sections of single suture are required for complete examination</td>
<td>Only one x-ray / two are sufficient to view whole suture</td>
</tr>
</tbody>
</table>

Table 8: Comparison of time of closure of Squamous suture (in years) shown by both authors.

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Race</th>
<th>Sex</th>
<th>Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pardeep Singh</td>
<td>2001</td>
<td>Punjab (India)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Rajesh Verma</td>
<td>2002</td>
<td>Rajasthan (India)</td>
<td>80 Years</td>
<td>81 Years</td>
</tr>
</tbody>
</table>
Original Research Paper

Clinico-Pathological Profile in Deaths Due To Burns

*Rahul Chawla, **Ashok Chanana, **Hukumat Rai, ***A.D.Aggarwal, ****Harnam Singh, *****Gaurav Sharma.

Abstract

Burn injuries occur universally and have plagued mankind since antiquity till the present day. Burns represent an extremely stressful experience for both the burn victims as well as their families. An extensive burn profoundly affects the patient's physique, psyche, financial situation and family. Patients with extensive burns frequently die, and for those with lesser injury, physical recovery is slow and painful. In addition to their dramatic physical effects, burn injuries frequently cause deleterious psychological complications. In all societies including developed or developing countries, burns constitute, a medical and psychological problem, but also have severe economic and social consequences not only to them, but also to their family and society in general. 24% cases were not hospitalized. 40% cases died within 24 hours of sustaining burns. 38% cases were unconscious before death. 66% cases had given dying declaration. Mechanical injuries were present in 10% cases. 84% cases of total cases were alleged cases of accident. The major cause of death was Septicemic shock in 56% cases.

Key Words: Burns, Fire, Clinical, Pathology, Death.

Introduction:

A severe burn injury is the most devastating injury a person can sustain and yet hope to survive. Sushurta, the great Indian surgeon, was the first in describing the clinical features of a burned victim, almost 2,500 years ago. The history of fluid replacement therapy for burns also begins with Sushurta, who first described fever and thirst as the characteristic features. [1,2]

Burns are injuries produced by application of dry heat such as flame, radiant heat or some heated solid substance like metal or glass to the body. Local injury to the body by heat may result from dry heat, application of hot bodies, licking by flames resulting in simple burns, moist heat leading to scalds, corrosive poisons resulting in corrosive burns. Electric spark, discharges, flashes and lightening leads to electric burns. [3]

Swan (1823) was the first to make the observation of acute peptic ulceration following cutaneous burns. Curling (1842) was the first to give a detailed description of the lesion and its pathogenesis [4]. Underhill (1921) demonstrated on 20 burn patients that burn shock was primarily due to fluid loss, secondary to fluid and electrolyte shifts and thus provided the basis of regimes. Evans (1952) was the first to device a formula based on the surface area burnt and the weight of the patient to compute the replacement required. [5]

Every year more than 2 million people sustained burns in India, most of which around 500,000 people were treated as outdoor patients. About 2, 00,000 were admitted in hospitals and 5,000 died. [6] Davies (1990) reported in his study that there might be over 2 million major burn injuries in India per year.[7] The fire death rate in the USA (57.1 deaths per million in 1988) was the second highest in the world and the highest of all industrialized countries. [8]

Material and Methods:

The study consisted of 50 cases alleged to have died of burns and brought to mortuary attached to the Department of Forensic Medicine and Toxicology, Government Medical College, Amritsar from May 2004 to July 2005.

All the 50 cases were first thoroughly examined for noting demographic details and the information was collected from accompanying relatives, hospital records, and police papers to
ascertain the incidence, manner and circumstances of burns.

**Observations:**

76% cases were hospitalized cases and 24% cases were not hospitalized. (As shown in table no. 1) 40% cases died within few minutes to 24 hours of sustaining burns. 24% cases died within a week and 20% cases died within 2 weeks. 12% cases died within 3 weeks and beyond. 4% cases belonged to the category of deaths prior to burns due to other causes (post mortem burns). (As shown in table no. 2 and figure I).

58% cases were conscious before death and 38% cases were unconscious before death. 66% cases had given dying declaration and 30% cases had not given dying declaration. 8% cases after giving dying declaration had become unconscious terminally. (As shown in table no. 3) Mechanical injuries were present in 10% cases and absent in 90% cases. (As shown in table no. 4) Curling ulcers were present in 4% cases and absent in 96% cases (As shown in table no. 5).

84% cases of total cases that were studied were alleged cases of accident, 8% cases were of homicide, 4% cases were of suicide, and 4% cases were of post mortem burns where bodies were burnt after killing to conceal the crime. One of the cases was that of a newlywed bride whose body was burnt after she died of some poison given to her by in-laws. Second case was that of strangulation whose body was burnt after strangulating with a ligature. An intact ligature was present around the neck at the time of autopsy. (As shown in table no. 6 and figures II, III)

The major cause of death was Septicemic shock in 56% cases, followed by primary shock in 22% cases. Oligemic shock was responsible for 10% deaths each. Injuries were responsible in 12% cases including 2 cases of post mortem burns. (As shown in table no. 7 and figure IV)

**Table 1: Incidence of Hospitalization in Burn Cases.**

<table>
<thead>
<tr>
<th>Hospitalization</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>38</td>
<td>76%</td>
</tr>
<tr>
<td>No</td>
<td>12</td>
<td>24%</td>
</tr>
</tbody>
</table>

**Table 2: Incidence of Duration of Survival in Burn Cases.**

<table>
<thead>
<tr>
<th>Duration of survival</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Few minutes to 24 hours</td>
<td>20</td>
<td>40%</td>
</tr>
<tr>
<td>Within a week</td>
<td>12</td>
<td>24%</td>
</tr>
<tr>
<td>Within 2 weeks</td>
<td>10</td>
<td>20%</td>
</tr>
<tr>
<td>Within 3 weeks</td>
<td>6</td>
<td>12%</td>
</tr>
<tr>
<td>Deaths prior to burns due to other causes (post mortem burns)</td>
<td>2</td>
<td>4%</td>
</tr>
</tbody>
</table>

**Table 3a: Incidence of State Of Sensorium before Death in Burn Cases.**

<table>
<thead>
<tr>
<th>State of sensorium</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conscious</td>
<td>29</td>
<td>58%</td>
</tr>
<tr>
<td>Unconscious</td>
<td>19</td>
<td>38%</td>
</tr>
<tr>
<td>Post mortem burns</td>
<td>2</td>
<td>4%</td>
</tr>
</tbody>
</table>

**Table 3b: Incidence of Dying Declaration in Burn Cases.**

<table>
<thead>
<tr>
<th>Dying declaration</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>33</td>
<td>66%</td>
</tr>
<tr>
<td>No</td>
<td>15</td>
<td>30%</td>
</tr>
<tr>
<td>Post mortem burns</td>
<td>2</td>
<td>4%</td>
</tr>
</tbody>
</table>

**Table 4: Incidence of Mechanical Injuries in Burn Cases.**

<table>
<thead>
<tr>
<th>Causes</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present</td>
<td>5</td>
<td>10%</td>
</tr>
<tr>
<td>Absent</td>
<td>45</td>
<td>90%</td>
</tr>
</tbody>
</table>

**Table 5: Incidence and Distribution of Curling Ulcers in Stomach.**

<table>
<thead>
<tr>
<th>Changes</th>
<th>Present</th>
<th>Absent</th>
<th>No.</th>
<th>%</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curling ulcers</td>
<td>2</td>
<td>4%</td>
<td>48</td>
<td>96%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 6: Incidence and Distribution of Manner of Death in Burn Cases.**

<table>
<thead>
<tr>
<th>Burns</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antemortem – Accident</td>
<td>42</td>
<td>84%</td>
</tr>
<tr>
<td>Antemortem – Suicide</td>
<td>2</td>
<td>4%</td>
</tr>
<tr>
<td>Antemortem – Homicide</td>
<td>4</td>
<td>8%</td>
</tr>
<tr>
<td>Post Mortem Burns</td>
<td>2</td>
<td>4%</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Figure II: Incidence and Distribution of Manner of Death in Burn Cases.**

**Figure III: Incidence and Distribution of Manner of Death in Burn Cases.**

<table>
<thead>
<tr>
<th>Cause Of Death</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary shock</td>
<td>11</td>
<td>22%</td>
</tr>
<tr>
<td>Oligemic shock</td>
<td>5</td>
<td>10%</td>
</tr>
<tr>
<td>Septicemic shock</td>
<td>28</td>
<td>56%</td>
</tr>
<tr>
<td>Injuries</td>
<td>6</td>
<td>12%</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100%</td>
</tr>
</tbody>
</table>
Figure IV: Incidence and Distribution of Cause of Death in Burn Cases

Discussion:

Hospitalization

In the present study, 76% cases were hospitalized and 24% cases were not hospitalized. (Table 1) Aggarwal and Chandra [9] noted in their study that 85% cases were hospitalized and 15% cases were not hospitalized. Ganguly [10] observed that 85% cases were hospitalized and 15% cases were not hospitalized in his study. The study of Haralkar and Rayate [11] studied 343 patients in the reproductive age group from September 2000 to August 2001 comprising 76.22% of total number of patients admitted. Naralwar and Meshram [12] analysed 368 burn cases at IGMC Nagpur during one calendar year (2002). Levine and Radford [13] observed that 25% of all victims of fires during a 14 month period required hospitalization. As the current study was done on autopsy cases, hospital record was available in 76% cases, though in remaining cases some sort of treatment was given but no hospital record was provided. Similar observations were seen by Aggarwal and Chandra (1971) as well as by Ganguly (1976). Whereas study of Levine and Radford (1977) was on the burn cases reported in emergency in which only 25% cases required hospitalization, it is different kind of study than the current study.

Duration of survival

In the current study, 40% cases died within a few minutes to 24 hours, 24% cases within a week and 20% cases within two weeks. 12% cases died within three weeks and beyond. 4% cases had died to other causes. (Postmortem burns) (Table 2 and Figure I). All these patients had died due to different forms of shocks i.e. neurogenic, oligaemic (hypovolemic), and septicemic shock. The findings were consistent with Aggarwal and Chandra [9] who had observed out of 100 study cases that 18 cases and 7 cases died within 6 hours and 6 to 12 hours respectively. 4 cases died within 12 to 24 hours. 27 cases died within 1 to 3 days, 23 cases between 3-5 days, 14 cases in between 5 to 7 days and only 7 cases died after 7 days from time of injury. The highest period of survival was observed in 6% cases belonging to category of within 3 weeks. Aggarwal and Chandra (1971) had highest period of survival of about 3 weeks in 2 cases out of total 100 study cases. Stefan [14] observed the survival periods of 20.1 days in the age group 15-64 years with burns of 57.3% of body surface area of 2nd and 3rd degrees in comparison with 16 days in patients with burns of 48.4% of body surface area in 1976-1979. In patients over 65 years with burns of 33.9% of body surface area, the survival period had been extended to 16.8 days in comparison with 13.2 days in cases with total burn skin area of 24.8%. This effect could not be confirmed in this study as it was autopsy study.

State of sensorium before death and dying declaration

In the present study, 58% cases were conscious and 38% were unconscious before death. 66% cases had given dying declaration and 30% cases had not given dying declaration. 8% cases after giving dying declaration became unconscious terminally (Table 3). Warmick [15] observed that often consciousness was lost only as a preterminal event. No study has been done regarding dying declaration recording in the past. Literature on shock clearly mentions that sensorium remains clear in all forms of shock till the terminal stage. So dying declaration or statement by dying person regarding the events can be recorded in almost every case. In the present study, 4% cases were of postmortem burns, 22% cases died on spot due to cylinder blast, factory fire etc and in remaining cases, statement could not be recorded because of medication or quick death or other reason. The study is in concurrence with observation of Warmick.

Mechanical injuries

In the present study, 10% cases showed presence of mechanical injuries and 90% did not. (Table 4) In the 10% cases, burns were not responsible as cause of death but the mechanical injuries itself were fatal. It is not uncommon in India, that after causing death of person, evidences are destroyed by lighting fire to dead bodies. In the current series, 4% cases were deaths due to antemortem injuries and not burns. No study is available to compare the finding.
Curling ulcers in stomach

Curling ulcers were seen in 4% cases. (Table 5) Czaja et al [16] observed Curling ulcers in 27 patients out of 37 burned patients. As the study was on hospitalized living cases and the current study is an autopsy study so there is a difference in the observations.

Manner of death

In the present study, 96% cases were of ante-mortem burns and 4% cases were of post-mortem burns. In ante-mortem burns, 84% of accident, 4% cases of suicide, 8% cases of homicide were observed. 4% cases were of post-mortem burns. (Table 6 and Figure II, III) Aggarwal and Chandra [9] observed 88% cases of accidental burns, 11% cases of suicidal burns and 1% case of homicidal burns were noted. The incidence of accidental burns was 8 times than that of suicide. Ganguli[10] observed in his study that accidental burns were responsible for 87.66% of the cases and 4.34% cases committed suicide by burning. Suarez-Penaranda [17] studied two cases of homicidal ligature strangulation with extensive burning of the bodies. Naralwar and Meshram [12] observed majority of victims sustaining burn accidentally. The current study also shows that burn injuries are mainly due to accident which is similar to the observations of above authors.

Cause of death

The mortality due to burns is still on the higher side due to lack of barrier nursing and its availability at selected centers, cost of treatment. In the present study, 22% cases died due to primary shock, 10% cases due to oligemic shock, 56% cases due to septicemic shock. (Table 7 and Fig IV) Aggarwal and Chandra [9] noted that 52% cases died due to toxemia. The next factor responsible for causing death was shock which was observed in 35% cases. Stefan [14] observed the cause of death as burn shock in 25.8% of cases, sepsis in 30.3%, pneumonia in 54.4% cases. Septic shock was the main cause of death who survived for more than 24 hours the finding is in consonance with the observations of the mentioned authors.

Conclusions:

Dying declaration can be recorded in all the hospital reported cases of burns even if the patient is in shock as sensorium is clear till the preterminal stage of death. Septic shock was the commonest cause of death due to burns in majority of the cases, followed by primary shock and oligemic shock.

References:

Original Research Paper

Pattern of Unnatural Deaths - A Cross Sectional Study of Autopsies at Mortuary of KLES'S Hospital and MRC, Belgaum

*Santhosh. C. S, **Vishwanathan. K. G, ***Satish Babu B S.

Abstract

Unnatural deaths claim a substantial number of lives in developing countries like India. Among the various types of deaths RTAs account for majority of deaths followed by burns, poisoning, fall from height, animal bite and hanging. Accidental deaths accounted for 87.5% cases followed by suicidal (10%) and homicidal (2.5%) deaths. Males (80.83%) were more commonly involved as compared to females (19.17%). The types of unnatural deaths encountered in our study were RTAs (61.67%), burns (15%), FFH (7.5%), poisoning (6.67%), assault (2.5%), snakebite (1.67%), scorpion bite (0.83%), death due to blast injury (1.67%), death due to bull gore injury (0.83%), hanging (0.83%) and accidental fall of stone on head (0.83%). Poisoning 7 (58.33%) was the most common method of self-destruction followed by burns 2 (16.67%), FFH 2 (16.67%) and hanging 1 (8.33%). In homicidal deaths, stabs 2 (66.67%) were the most common type of death followed by 1 (33.33%) case of combination of stab and blunt force impact. Preventive measures should be adopted where ever possible and prompt steps should be taken to decrease the incidence of road traffic accidents which take a lion’s share among the unnatural deaths.

Key Words: Unnatural Deaths; Accident; Road Traffic; Suicide; Autopsy; Urban-Rural Population.

Introduction:

The unnatural causes of death are many with accidents being the most common amongst others. Over the decades there has been a steady increase in the transportation deaths and injuries, on road, rail and in the air. Accidental burns, poisoning, drowning, electrocution and fall from height are also on the rise. Suicidal and homicidal fatalities are common among both the urban and rural population.

Materials and Method:

This study is a cross-sectional study undertaken at the Mortuary of KLES’s Hospital & MRC, Belgaum, during the period from Oct. 2004 to Oct. 2005. All the cases of unnatural deaths, which died during the course of treatment at KLES’s Hospital & MRC, Belgaum and were subjected to medico-legal autopsy at the mortuary during the study period, were included in the study. The unnatural deaths were broadly classified as accidental, suicidal and homicidal depending upon the manner of death.

Results:

1) Profile of unnatural deaths:

The present study included 120 cases of unnatural deaths during a period of 1 year, out of which 105 (87.5%) cases were due to accident, 12 (10%) cases were suicide and 03 (2.5%) cases were homicide. (Table 1)

2) Sex profile of unnatural deaths:

Among 120 cases of unnatural deaths, 97 (80.83%) cases were males and 23 (19.17%) cases were of female sex. (Table 2)

3) Types of unnatural deaths:

During the study period, out of 120 cases, depending upon the modes of deaths encountered during the study period, there were RTAs 74 (61.67%), burns 18 (15%), fall from height 9 (7.5%), poisoning 8 (6.67%), assault 3 (2.5%), snake bite 2 (1.67%), scorpion bite 1 (0.83%), death due to blast injury 2 (1.67%), death due to bull gore injury, hanging and fall of stone on head 1 (0.83%) each. (Table 3)

4) Age and sex wise distribution of the presenting type of unnatural deaths:

Maximum numbers of cases of RTA 20 (27.02%) involving 20 males were seen in the...
age group of 21-30 years followed by 18 (24.32%) cases, 16 males and 2 females in the age group of 31-40 years and 14 (18.92%) cases, 14 males in the age group of 41-50 years. In the age groups of 21-30 years and 41-50 years there were no females. In case of burns there were 7 (38.89%) cases, 0 male and 7 females in the age group of 21-30 years and there were 7 (38.89%) cases, 2 males and 5 females in the age group of 31-40 years. Maximum numbers of FFH 6 (66.67%) cases were in the age group of 21-30 years and among them 5 were males and 1 female. The maximum number of deaths due to poisoning 3 (37.5%) were in the age group of 31-40 years and all the 3 were males. (Table 4)

5) **Type of accidental, suicidal, and homicidal deaths with sex wise distribution:**

The pattern of accidental deaths were, RTA 74 (70.48%), burns 16 (15.24%), FFH 7 (6.67%), poisoning 1 (0.95%), snake bite 2 (1.90%), bull gore injury 1 (0.95%) and fall of stone on head 1 (0.95%). (Table5). Out of 105 cases of accidental deaths, 84 were males and 21 were females. Among them RTAs top the list where out of 74 cases an overwhelming 68 (80.95%) cases were males and 6 (28.57%) were females. There were 12 (57.14%) cases of females and 4 (4.76%) cases of males among the accidental burns. In FFH 6 (7.14%) were males and 1 (4.76%) was female. In poisoning, 1(1.19%) case of accidental poisoning was a male. (Table5). Poisoning 7 (58.33%) was the most common method of self-destruction followed by burns 2 (16.67%), FFH 2 (16.67%) and hanging 1 (8.33%). (Table 5)

Out of 12 cases of suicidal deaths, 10 were males and 2 were females. Among the 7 (58.33%) cases of poisoning all the 7 were males. Among the 2 (16.67%) cases of burns, both were females. Among the 2 (16.67%) cases of FFH, both were males. There was 1 (8.33%) case of hanging and it was a male. In homicidal deaths, stabs 2 (66.67%) were the most common type of death followed by 1 (33.33%) case of combination of stab and blunt force impact. All the 3 (100%) cases were males with no female case of homicidal death. (Table 5)

**Discussion:**

In our study, unnatural deaths due to accidents were 67.5%, suicide 10% and homicide 2.5%. Our findings are similar to the study conducted at PGIMER, Chandigarh, where 79.3% of deaths were due to accidents, 13.9% due to suicide and 6% of deaths were due to homicide [1]. Our findings differ from to the results of the study conducted at Government Medical College and Hospital, Chandigarh where deaths due to accidents were 49.56%, deaths due to suicide were 38.55% and homicide were 4.44%. [2] Sex profile of unnatural deaths showed 80.83% of the cases were males & 19.17% cases were females. Our findings are similar to study conducted at PGIMER, Chandigarh where 73.42% were males and 26.58% were females.[1] Our findings were similar to the study at Dhaka Medical College, Dhaka, Bangladesh where 73.32% were males and 26.68% of the cases were females.[3]

The Types of unnatural deaths in our study was 61.67% were RTAs, 15% cases were burns, 7.5% cases were FFH, and 6.67% were death due to poisoning. These deaths were attributed to be the leading causes of death in our study. In the study at Government Medical College and Hospital, Chandigarh, RTA accounted for 36.26% which was less when compared to our study. A similarity in the results was seen in case of burns which included 18.30% of cases. But a contrast in the result was seen in case of poisoning (21%) and FFH (0.99%) [2].

Maximum numbers of RTAs in our study is due to the close proximity of Belgaum city to the Golden Quadrilateral highway traversing the city which accounts for many highway accidents. Apart from this, congested and overcrowded roads and increase in the number of vehicles have resulted in more number of accidents even within the city.

The numbers of deaths due to poisoning, burns, FFH are influenced by number of factors like the geographic area of study, cultural and traditional background of the people. Age and sex wise distribution of the presenting type of unnatural deaths in our study showed that 70.10% were males and 26.08% were females among deaths due to RTA. The maximum number of cases of RTA 27.02% was seen in the age group of 21-30 years followed by 24.32% in the age group of 31-40 years. Our findings are similar to the study of the victims of vehicular accidents in Delhi where 66% were males and 34% were females and the maximum number of victims.4

Our findings differ from the study conducted at Kasturba Medical College, Manipal where 75% were females and 25% were males. The age group of 19-25 years involved 26.7% followed by the age groups 26-32 years which involved 21.7% which also differed from our study[5]. Our results also differ from the study at M.R. Medical College, Gulbarga where 75.68% were females and 24.32% were male victims of
burns. Here also the maximum number of deaths involved the age group 21-30 years.[6] In our study 8.25% cases of poisoning were males and no female case of poisoning was involved. The maximum number of deaths 37.5% was in the age group of 31-40 years. These findings are similar in males (9.8% cases) and they differ in females (12.4% cases) when compared to the study conducted at PIGMER, Chandigarh. The age group of 16-25 years were involved maximally i.e. 48.31% which also differs from our study.[1]

The types of accidental deaths in our study were RTAs 70.48%, burns 15.24%, FFH 6.67% and poisoning 0.95%. Our findings are similar with respect to RTAs (65.72%) and burns (14.09%) in the study conducted at Government Medical College and Hospital, Chandigarh during 1994-2001. But they differ from our results in case of poisoning (9.87%).[7] Our findings are similar to the study conducted at the same centre (Government Medical College and Hospital, Chandigarh) by another author during 1994-2003 with respect to RTAs (73.17%) and FFH (5.34%). But the findings differ in case of burns (5.27%) and poisoning (4.20%).[2] In our study among all the accidental deaths RTAs were maximally involved. This may be explained due to close proximity of the National Highway No.4 and increase in the number of vehicles within the city which has resulted in many accidents. Likewise accidental burns, poisoning and FFH included a small percentage of cases in our study.

In the types of suicidal deaths the maximum number of suicidal deaths occurred as a result of self-administration of poisons (58.33%), followed by burns (16.67%), FFH (16.67%) and hanging (8.33%). Our findings are consistent in case of suicidal deaths due to poisoning (48.49%) and hangs (9.88%) at the study conducted at Government Medical College and Hospital, Chandigarh. But the results differ in case of suicidal deaths due to burns (39.79%).[2] Our findings differ from the study at Ireland,[8] Epirus in North West Greece,[9] Manipur[10] and Behrampur11 where hanging was the most common method of self destruction followed by either poisoning or drowning in water and burns.

In the present study, death due to multiple stabs (66.67%) and combination of sharp and blunt object impact (33.33%) were the types of homicidal deaths encountered. Our findings are on a higher side when compared to the study conducted at GTB Hospital and Mortuary, Shadharra, Delhi where death due to stab was the most common cause (41.04%). The combination of stab and blunt object

Conclusion:

Unnatural deaths are known to claim a substantial number of lives especially in developing country like India. Analysis of unnatural deaths in society not only gives an idea of the manner of death but also it reflects the socio-economic status of the society. The increase in the pace of mechanization, rise in the number of fast moving vehicles, semi skilled drivers, drunken drivers, inadequate, congested and ill-maintained roads in our country has led to the increase in the number of RTAs. Self destruction by poisoning is commonly adopted by farmers as insecticides and agrochemicals are easily available in every rural house. By improving the literacy rate and providing employment to the youth, crime rate and more so the number of homicidal deaths can be brought down. Preventive measures should be adopted promptly wherever possible to avoid all unnatural deaths. If not preventable, prompt and immediate care should be provided in order to save the life of the victim.

References:

Original Research Paper

Pattern of Non-Fatal Head Injury in Adult Cases Reported at
J.N.M.C. Hospital, A.M U, Aligarh

*Mohd Kaleem Khan, **Shaukat Arif Hanif, ***Munawwar Husain, ****M. Fakhrul Huda, *****Imran Sabri

Abstract

Head injury is one of the major public health problems and has already attained epidemic proportions in India. The incidence of head injuries is growing with greater mechanization in industry and an increase in high velocity mode of transport. The injuries could be caused by a penetrating or blunt force either by direct violence or indirectly. The present study was conducted in cases admitted to Emergency section of J.N. Medical College Hospital, A.M.U. Aligarh. All the cases (2850) of head injury reported from 01/01/2008 to 31/12/2009 for treatment were included in the study.

Most of the cases of head injury belong to younger age group (15-34yrs) comprising of 56.61% with male preponderance of 85.68% with majority of the cases belonging to road traffic accident (55.02%). Scalp injury in 2365 cases whereas 969 were cases of skull fractures and extradural hemorrhage (17.36%) was most common intracranial injury followed by subdural hemorrhage (7.6%).

Key Words: Head injury, Road traffic accident, Transport Injuries

Introduction:

The city of Aligarh in U.P. is growing up in every conceivable way; in educational establishments, roads, buildings, business, energy infrastructure and, of course, population. It has a huge international residential Central University housing 28,000 students within its sprawling campus. 1/4th are female students. The city indwellers population stood at 8.2 lacs (census 2000) not counting another 1800,000 liberally spread in adjoining rural areas. Head injury is a major public health problem and has already attained epidemic proportions in India.

Traumatic injury, in which severe head injury plays a major role in over 50% of cases, remains the leading cause of death in person below 45 years of age and overall the third leading cause of death responsible for 8% of all deaths, followed by cardio cerebral vascular disease and cancer and it is the chief cause of death among persons aged 15 - 24 years. Assault leading to scalp injuries is mostly homicidal in nature, & is generally produced by blunt weapons, like lathi, stone, wooden pestle (musal) and occasionally by a cutting instrument such as gandasa, khurpi, axe or sword.

The injuries are mostly contusion and laceration, as well as incised and punctured wounds. Small scalp wounds are difficult to detect as they may be hidden beneath the hair—particularly in women. The swelling and inflammation is not significant as the scalp is a dense tissue. It has been observed that an oblique blow generally causes a large wound and a direct blow, a small one. These wounds may be simple or may be complicated with fractures of the skull.

Aim and Objectives:

1) To determine the pattern of non-fatal head injury.
2) To study the mechanism of head injury.
3) To study the incidence of head injury in relation to age, sex and etiology.
4) To correlate the injury with lesions produced in the head.
5) To know the different types of intracranial lesions, their frequency and relation with the mode of injury.

The study was done and completed in the Department of Forensic Medicine in conjunction with Neurosurgery Unit, Department of Surgery Jawaharlal Nehru Medical College Hospital (JNMCH), Aligarh Muslim University, Aligarh along with the Department of Emergency at Jawaharlal Nehru Medical College Hospital (JNMCH), Aligarh Muslim University, Aligarh, involving subjects admitted in two years in the Emergency of the hospital. The present
observations are based on systematic study of these cases.

**Material and Method:**

For the purpose of study all the cases of head injury reported to the casualty Jawaharlal Nehru Medical College Hospital (JNMCH), Aligarh Muslim University, Aligarh for treatment were included in the study. Out of these cases serious patients were admitted and the rest were sent back after giving treatment.

A total of 2850 cases with documented antecedent head trauma were selected for the study. Gender and age differentiation was not of paramount importance. Patients reporting to the Casualty Section of J.N. Medical College Hospital, A.M. U., Aligarh, it was not taken into consideration whether they had received treatment elsewhere before reporting to this hospital. The clinical presentation of the traumatized patient & diagnostic CT scan formed the basis of the study. The CT scan was read and commented upon by qualified radiologist in conjunction with neurosurgeon, both of the rank of Reader.

**Criteria for Selection of Cases:**

1. All cases which have a definite history of head injury are taken for the study.
2. All the cases who have registered themselves in casualty register and medico legal case sheets were prepared are taken for study.
3. Age of patients selected varied between 15-80 yrs.

**Results and Discussion:**

With exploding population, increasing registration of automobiles every month, rampant encroachment of roads, nasty tendency of violating traffic rules and chaotic traffic systems have greatly contributed rapid strides in head injury due road traffic accident.

Head injury is also quite common in assault and gunshot injuries and vulnerability of the head is the reason that the fatal injuries are inflicted with intention to kill a person. This results in double loss to the country. Firstly expenditure is incurred in the treatment of these victims and secondly being in the most productive age group, it results in huge productive man-days loss. An increased incidence of head injury has direct repercussion on increased fatalities.

The present study was carried out in the JNMCH, AMU, Aligarh to assess the prevalence and epidemiological factors involved in head injury. Total of 2850 cases of head injury came to the casualty of the J.N Medical College Hospital, Aligarh for treatment between the periods from 1/1/2008 to 31/12/2009.

Age of the victims varied from 15 - 80 years. The peak incidence was observed in the age group 15 - 24 years comprising 34.46% of the cases. It was also observed that 22.15% belonged to the age group 25 - 34 years. Thus 56.61% of cases comprised of age group of 15 - 34 years in the study. Individuals in the age group 65 years and above were the least affected i.e. 4.21 % of total cases. Out of 2850 cases 2442 (85.68%) were males while 408 (14.31%) were females. Thus a male: female ratio of 6:1 was observed. This is in accordance with studies done by Mohanty S et al (2005)[3] and Verma et al (2004)[4]. However ratio observed by Kremer C et al [5] was 4:1, Malhotra et al (2005)[6] was 3.4:1 and by Jha et al (2004)[7] it was 3:1. Individuals in the seventh decade were the least affected in present study and the lowest age was 15 years and highest age was 80 years. Majority of victims are of road traffic accident 1568 (55.02%) cases followed by assault 646 (22.67%) cases. Fall from height 361 (12.67%) and gunshot were 245 (8.59%) cases, whereas occupational comprised of 30 (1.05%) cases.

This in accordance with the study done by Equbal et al (2005)[8].This is not in accordance with the study done by Chen CL et al(1995)[9] which showed 70 % road traffic accident, 15.3 % fall from height and assault 8.7%. There were a total 2850 cases out of which 2365 individuals were with injuries to scalp and 485 cases with no scalp injury at all. The commonest type of injury was laceration and heamatoma. Study conducted in Delhi by Tyagi et al (1986)[10] reported scalp injuries to be present in 76%, while Gupta et al (2007[11])reported 89% of scalp laceration. These findings are consistent with our study. Skull fracture was seen in 969 (34.00%) individuals out of total 2850 cases. This figure is not consistent with the findings of Tyagi et al (1986)[10] and Fimate et al (1992)[12] who reported the incidence to be 83.3% and 82.3% respectively. There were victims with one or other form of intracranial injury. Among the intracranial injuries, extradural haemorrhage was the commonest, present in 495 (17.36%) cases. Next common was subdural haemorrhage in 217 (7.6%) cases, followed by subarachnoid haemorrhage in 102 (3.50%) cases. Contusions of the brain parenchyma were present in 325 cases. These findings are not consistent with Tyagi et al (1986) [10], Chandra et al (1979)[13] Fimate et al (1992[11]),
Summary and Conclusion:

The study was aimed at analyzing the epidemiology, pattern and causes of death in non fatal and traumatic head injury. Various factors like age, sex, characteristics of victims and offenders in accidents, injuries to the head and other parts of the body were studied. The observation obtained was plotted in the form of tables, illustrative graphs. The following conclusions were drawn:

A total of 2850 cases of head injury came to the casualty of the J.N Medical College Hospital, Aligarh for treatment between 1/1/2008 to 31/12/2009.

The age of the victims varied from 15-80 years. The peak incidence was observed in the age group 15-24 years comprising 34.46% of the cases and male: female ratio of 6:1 was observed in non fatal head injury cases.

Majority of victims were of road traffic accident 1568 cases (55.02%) followed by assault 664 cases (22.67%) in non fatal head injury cases. Scalp laceration and haematoma was the most common injury afflicted to the victims followed by skull fractures. Extradural haemorrhage was the commonest intracranial bleed present in 495 cases. Next was subdural haemorrhage in 217 cases, present in 325 cases.

References:

2. The Government of India, Ministry of Home Affairs, National Crime Record Bureau, Accidental deaths and suicides in India 1999

Table 1: Distribution of Age and Sex in Non Fatal Head Injury cases

<table>
<thead>
<tr>
<th>Sr.</th>
<th>Age (yrs)</th>
<th>Sex</th>
<th>Victims</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>No.</td>
</tr>
<tr>
<td>1</td>
<td>Age 15-24</td>
<td>852</td>
<td>130</td>
</tr>
<tr>
<td>2</td>
<td>Age 25-34</td>
<td>951</td>
<td>116</td>
</tr>
<tr>
<td>3</td>
<td>Age 35-44</td>
<td>447</td>
<td>77</td>
</tr>
<tr>
<td>4</td>
<td>Age 45-54</td>
<td>366</td>
<td>50</td>
</tr>
<tr>
<td>5</td>
<td>Age 55-64</td>
<td>156</td>
<td>19</td>
</tr>
<tr>
<td>6</td>
<td>Age 65 &amp;&gt;</td>
<td>106</td>
<td>16</td>
</tr>
<tr>
<td>Total</td>
<td>2442</td>
<td>408</td>
<td>2850</td>
</tr>
</tbody>
</table>

Table 2: Mode of Injury in Non Fatal Head Injury cases

<table>
<thead>
<tr>
<th>Sr.</th>
<th>Mode of Injury</th>
<th>No. of cases</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Road Traffic Accident</td>
<td>1568</td>
<td>55.02</td>
</tr>
<tr>
<td>2</td>
<td>Assaults (Hit)</td>
<td>646</td>
<td>22.67</td>
</tr>
<tr>
<td>3</td>
<td>Fall From Height</td>
<td>361</td>
<td>12.07</td>
</tr>
<tr>
<td>4</td>
<td>Gunshots</td>
<td>246</td>
<td>8.59</td>
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<tr>
<td>5</td>
<td>Occupational</td>
<td>30</td>
<td>1.05</td>
</tr>
<tr>
<td>Total</td>
<td>2850</td>
<td>100</td>
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</tr>
</tbody>
</table>

Table 3: Cranial-Intracranial Lesions in Non Fatal Head Injury

<table>
<thead>
<tr>
<th>Lesion</th>
<th>No. of Cases</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skull Fracture</td>
<td>969</td>
<td>655</td>
</tr>
<tr>
<td>Linear</td>
<td>187</td>
<td>105</td>
</tr>
<tr>
<td>Depressed</td>
<td>105</td>
<td>74</td>
</tr>
</tbody>
</table>

Table 4: Intracranial Haemorrhage in Non Fatal Head Injury Cases

<table>
<thead>
<tr>
<th>Type of Hemorrhage</th>
<th>No. of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extradural</td>
<td>496</td>
</tr>
<tr>
<td>Subdural</td>
<td>217</td>
</tr>
<tr>
<td>Subarachnoid</td>
<td>102</td>
</tr>
<tr>
<td>Brain Contusion</td>
<td>325</td>
</tr>
</tbody>
</table>
Original Research Paper

Estimation of Age from Epiphyseal Fusion in Iliac Crest

*Pardeep Singh, **R.K.Gorea, ***S.S.Oberoi, ****A.K.Kapila

Abstract

Scientific estimation of age of an individual whether living, recently dead person, disintegrated and decomposed dead bodies, skeletal remains or incomplete skeleton or fragmentary remains is a vexing problem for medical jurist, in both civil and criminal cases and is an important part of examination in medico-legal practices. A large number of researchers have studied this process, hoping to understand its origin, evolution and consequences as well as to try to combat it.

In the present study 100 individuals are studied between the age group of 16 to 25 years in male and female separately i.e. 50 males and 50 females, whose X-ray examination is done at Rajindra Hospital; Patiala, Punjab. The study is undertaken to know the time of fusion of epiphyses of iliac crest. In this study, every individual’s X-ray pelvis AP view is taken to know fusion of iliac crest epiphyses.

Key words: Epiphyseal fusion, Iliac crest, X-ray, Criminal, Civil.

Introduction:

Scientific estimation of age of an individual whether living, recently dead person, disintegrated and decomposed dead bodies, skeletal remains or incomplete skeleton or fragmentary remains is a vexing problem for medical jurist, in both civil and criminal cases and is an important part of examination in medico-legal practices. A large number of researchers have studied this process, hoping to understand its origin, evolution and consequences as well as to try to combat it. As iliac crest fuse around 18-21 years that help in various situations like age of marriage for girls and boys, attainment of majority, voting right, contesting elections, judicial punishment, kidnapping (section 361 IPC) & consent for participating in dangerous sport (under section 87 IPC) & for identification of a person in India. Present study is undertaken to know epiphyseal fusion of iliac crest so that an age interval should be given at which these epiphyses fuse at specific age.

Material and Methods:

In present study, 100 cases were studied. The cases studied are between age group of 16-25 years that are exposed to x-ray at Rajindra Hospital Patiala.

Male and Female individuals are studied with age interval of two years and ten cases from each age interval were taken. The cases are studied with the help of X-ray pelvis antero-posterior view for iliac crest for epiphysis fusion.

Status of epiphyseal union was divided into following four stages:

<table>
<thead>
<tr>
<th>Stage</th>
<th>Appearance and fusion</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Centre not appeared</td>
<td>A</td>
</tr>
<tr>
<td>II</td>
<td>Centre appeared but no union</td>
<td>+</td>
</tr>
<tr>
<td>III</td>
<td>Union started but incomplete</td>
<td>++</td>
</tr>
<tr>
<td>IV</td>
<td>Complete union</td>
<td>+++</td>
</tr>
</tbody>
</table>

Age of each individual studied is confirmed from birth certificate, driving license, passport, ration card or voter's card etc.

Method for X-Ray examination:

Study has been carried out by Roentgenographic technique. The technique included standardization of:
1. Time of exposure
2. Positioning of the part
3. Distance of film from X-Ray tube and
4. Processing and time of developing the films.
5. Positioning of the epiphyses during X-Ray: Clark's radiographic technique has been followed in this investigation.

AP View for Pelvis: Positioning of patient and Film- Patient lying supine with the median sagittal plane adjusted to coincide with the central longitudinal axis of the couch. Anterior superior iliac spines should be equidistant from the couch top. This distance may be assessed by placing a thumb on each iliac spine and the fingers in contact with the couch necessary using non-opaque pads. The knees should be flexed over foam pads for comfort. The heels should be separated and the
limbs rotated medially so that the long axis of the feet is approximately 5-10 degrees to the vertical. The limbs are maintained in position using sandbags. The film is centred at a level midway between anterior superior iliac spines and superior border of the symphysis pubis.

Direction and Centring of the X-ray Beam - Centre in the midline midway between the level of the anterior superior iliac spines and the superior border of the symphysis pubis with the central ray perpendicular to the film.

Observations:
The incidence and extent of fusion of the iliac crest in different age groups studied in the present investigation was as follows:
The table 1 shows in age group 16—17 years, in one case (10%) centre not appeared & in 9 cases (90%) centre appeared but no union occurred. In age group 18—19 years, in three cases (30%) centre appeared but no union, in six cases (60%) union started but incomplete & in one case (10%) complete union occurred. In age group 20—21 years, in four cases (40%) union started but incomplete & in six cases (60%) complete union occurred. In age group 22—23 years, in ten cases (100%) complete union occurred. In age group 24—25 years, in all ten cases (100%) complete union occurred. In present study, males show epiphyseal fusion of iliac crest in 20—21 yrs in both sexes. Earliest union occurs at 19 yrs in males & 17 yrs in females.

Table No.4: No. of cases with complete union of iliac crest epiphyses

<table>
<thead>
<tr>
<th>Age (Yrs)</th>
<th>No. of cases Examined</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>16-17</td>
<td>20</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>18-19</td>
<td>20</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>20-21</td>
<td>20</td>
<td>6</td>
<td>60</td>
</tr>
<tr>
<td>22-23</td>
<td>20</td>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>24-25</td>
<td>20</td>
<td>9</td>
<td>90</td>
</tr>
</tbody>
</table>

Table 2 shows in age group 16—17 years, in four cases (40%) centre appeared but no union, & in 2 cases (20%), in five cases (50%) union started but incomplete & in one case (10%) complete union occurred. In age group 18—19 years, in seven cases (70%) union started but incomplete & in three cases (30%) complete union occurred. In age group 20—21 years, in one case (10%) union started but incomplete & in nine cases (90%) complete union occurred. In age group 22—23 years, in one case (10%) centre appeared but no union occurred, in one case (10%) union started but incomplete & in eight cases (80%) complete union occurred. In age group 24-25 years, in all ten cases (100%) complete union occurred.

Discussion:
In present study, males show epiphyseal union at 20-21 years age group and earliest union occurred at 19 years. Females show epiphyseal union at 20-21 years age group and earliest union occurred at 17 years.
The present study findings are close to Galstaun, Parikh, Krishan Vij and Inderbir Singh in India. Table 4 shows for males in 18-19 year age group, one case (10%) show complete union, in 20-21 year age group, six cases (60%) show complete union, in 22-23 years age group ten cases (100%) show complete union and in 24-25 year age group nine cases (90%) show complete union. For females in 16-17 year age group, one case (10%) show complete union, in 18-19 year age group, three cases (30%) show complete union, in 20-21 years age group nine cases (90%) show complete union, in 22-23 year age group eight cases (80%) show complete union and in 24-25 year age group ten cases (100%) show complete union. In present study, for Epiphyseal Fusion of Iliac Crest, majority of cases show complete union at 20-21 years for male and female both. These findings are in tandem with study carried out by Galstaun, Parikh, Krishan Vij and Inderbir Singh because all studies are done in India.

From the present study it is concluded that Epiphyseal of iliac crest fused in most of cases at 20-21 yrs in both sexes. Earliest union occurs at 19 yrs in males & 17 yrs in females.

References:
Table No.1: incidence and extent of fusion of the iliac crest in different age groups in Males

<table>
<thead>
<tr>
<th>Extent of fusion</th>
<th>16-17 years</th>
<th>18-19 years</th>
<th>20-21 years</th>
<th>22-23 years</th>
<th>24-25 years</th>
<th>Cases</th>
<th>%</th>
<th>Cases</th>
<th>%</th>
<th>Cases</th>
<th>%</th>
<th>Cases</th>
<th>%</th>
<th>Cases</th>
<th>%</th>
<th>Cases</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centre not appeared</td>
<td>1</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Centre appeared but no union</td>
<td>9</td>
<td>90</td>
<td>3</td>
<td>30</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Union started but incomplete</td>
<td>9</td>
<td>0</td>
<td>6</td>
<td>60</td>
<td>4</td>
<td>40</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complete union</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>10</td>
<td>6</td>
<td>60</td>
<td>10</td>
<td>100</td>
<td>100</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table No.2: incidence and extent of fusion of the iliac crest in different age groups in Females

<table>
<thead>
<tr>
<th>Extent of fusion</th>
<th>16-17 years</th>
<th>18-19 years</th>
<th>20-21 years</th>
<th>22-23 years</th>
<th>24-25 years</th>
<th>Cases</th>
<th>%</th>
<th>Cases</th>
<th>%</th>
<th>Cases</th>
<th>%</th>
<th>Cases</th>
<th>%</th>
<th>Cases</th>
<th>%</th>
<th>Cases</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centre not appeared</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Centre appeared but no union</td>
<td>4</td>
<td>40</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Union started but incomplete</td>
<td>5</td>
<td>50</td>
<td>7</td>
<td>70</td>
<td>1</td>
<td>10</td>
<td>1</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complete union</td>
<td>1</td>
<td>10</td>
<td>3</td>
<td>30</td>
<td>9</td>
<td>90</td>
<td>8</td>
<td>80</td>
<td>10</td>
<td>10</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table No.3: Comparison of time of fusion of iliac crest (in years) with that shown by other authors

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Race</th>
<th>Sex</th>
<th>Earliest Union (years)</th>
<th>Male</th>
<th>Female</th>
<th>Mixed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stevenson's</td>
<td>1924</td>
<td>White &amp; Negroes</td>
<td>-</td>
<td>22-24</td>
<td>18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Davies &amp; Parsons</td>
<td>1927</td>
<td>English</td>
<td>-</td>
<td>23</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flecker</td>
<td>1932</td>
<td>Australians</td>
<td>18</td>
<td>15-16</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pillay</td>
<td>1936</td>
<td>Madrasses (Indian)</td>
<td>-</td>
<td>14-18</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Galstaun</td>
<td>1937</td>
<td>Bengalis (Indian)</td>
<td>19-20</td>
<td>17-19</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Krogman</td>
<td>1962</td>
<td>U.S.A.</td>
<td>-</td>
<td>18-19</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stewart</td>
<td>1973</td>
<td>U.S.A.</td>
<td>20 or more</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chaursania</td>
<td>1980</td>
<td>Indian</td>
<td>-</td>
<td>16-17</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parikh</td>
<td>1990</td>
<td>Indian</td>
<td>-</td>
<td>18-20</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indorbr</td>
<td>1993</td>
<td>Indian</td>
<td>-</td>
<td>20-25</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Krishan Vij</td>
<td>2001</td>
<td>Indian</td>
<td>-</td>
<td>18-20</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present</td>
<td>2001</td>
<td>Punjab (Indian)</td>
<td>20-21</td>
<td>20-21</td>
<td>M =19, F=17</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Original Research Paper

Radiological Age Estimation from Xiphi-Sternal Joint in Living Person

*Garg A, **Goyal N, ***Gorea RK,

Abstract

Age determination is very important. The perfect way to store the age related data is still lacking in developing countries. For age determination, different parts of the skeleton are more useful at different age ranges. The different age ranges include fetal, children, teen age, young adult, and older adult. Age determination is required in both civil as well as criminal cases. So for these cases, forensic experts are entrusted duty to determine the age. Forensic experts rely on radiographs of various bones and joints to determine age. Most of the age determination data available in middle and old adult is from autopsies and not from living population radiographs. Due to lack of this living person radiograph database, Xiphisternal joint is studied to determine the age in middle and old people. Lateral view radiograph of this joint was done in people whose exact date of birth was known and who had a valid proof of date of birth.

Key Words: Age determination, Xiphi-sternal Joint, Xiphoid Process, Sternum, Corpses, Mesosternum

Introduction:

In India, there is no perfect way to record age in past. So, forensic expert are frequently consulted about the exact age determination in the middle as well as old age people in civil as well as criminal cases. Whatever data is available for age determination is based on the western population and that too from only dead bodies. There is little data available from Indian population. So when ever forensic experts are consulted for age determination, they usually opt for dental, skull as well as sternum radiographs in middle as well as old population.

We observe that lateral view radiograph examination of sternum was difficult to compare with autopsy procured sternum. So that data available from corpses is difficult to apply on living people for age determination & comparison. This study was designed to get X-ray lateral view sternum from living person whose exact age is available from birth certificates etc. the fusion of Xiphi-sternal joint was noted. Secondly different authors are giving different opinion on the basis of fusion of Xiphi-sternal joint which is as follows: Parikh [1] mentioned that the xiphoid unites with the body of the sternum at about 40 yrs.

Mathihran & Patnaik [2] opined that xiphoid unites with body around 40 years. Das[3] studied ossification from sternum obtained from the cadavers during autopsy & concluded that if fusion at manubrio-corporal junction age is above 28 years, fusion at corporo-xiphisternal junction age may be above 32 years & fusion at both the sites means age above 36 years. Therefore, sternal data “xiphisternum fuses with the body at 40 years and manubrium fuses to the body by 60 years,” is not reliable and erratic.

Glaister [4] mentioned that the xiphoid process usually fuses with the body of the sternum about the age of forty. Jit and Bakshi [5, 6] studied about time of fusion of the human mesosternum with manubrium & xiphoid process in sterna obtained from 772 male and 208 female subjects from Punjab, Haryana and Chandigarh (India) varying in age from 5 to 85 years. The xiphoid process did not fuse with the body of the sternum in males below 18 years and female below 21 years. Non-fusion of the xiphoid process was seen in 11.4 % of males above 66 years and 37.5 % female above 40 years.

After the age of 18 – 20 years, the ossification of the sternum did not help in establishing the age of an individual.Reddy [7] mentioned that at about 40 years, the xiphoid unites with the body and Krogmann [8] mentioned that the Xiphoid process fuses with the Body of the Sternum after 40th year. Gatzoulis et al in Gray’s Anatomy [9] edited that the Xiphi-sternal joint is also a symphysis. This
joint usually transformed to a synostosis by the fortieth year, it sometime remain unchanged even in old age. Gautam [10] stated that the fusion of Manubrium with the body of sternum begins after the age of 40 and completed after the age 50 years. The main objective of the study is to determine the earliest, latest as well as mean age of fusion of Xiphi-sternal joint.

**Material and Methods:**

The present study comprised of 192 subjects from both sexes (males and females) between the age group of 35-65 years. The cases were selected from the easily available general population to us: patients admitted in wards, their relatives and police personnel visiting the hospital, Patiala. Only those cases were selected where proof of exact date of birth was available. The cases showing any disease or damage in respect to anterior chest wall were not considered. Cases with poor quality of X-ray films due to over shadowing of the breast tissue or any other factor were discarded. The cases were radiologically examined for the lateral view of sternum after obtaining their written consent.

Then status of fusion of Xiphoid process with the body of sternum was studied showing complete fusion and others (having no fusion, partial fusion and doubtful fusion). After exposure and reporting, statistically tables were prepared for both age and sex wise. Present study was compared with the previous study.

**Results:**

The total of 192 cases was studied. 30 cases were discarded because of lack of good x-ray exposure or breast overshadowing. The studies cases were divided into age: 35-40, 41-45, 46-50, 51-55, 56-60, 61-65 years. While studying x-ray exposure for xiphi-sternal joint 10 cases showed equivocal result, so that cases were kept in different equivocal class.

**Discussion:**

The present study is compared with the study conducted by Jit et al [5] as shown in table 3 & Gautam et al [10]. Study shows 28.57 percent of complete fusion respectively in males and females in 46-60 age groups where as the complete fusion in males is 20 % and in females is 100 % as per Gautam et al. In present study in 51-55 age groups, in males complete fusion is seen in 79.17 % cases while in Gautam et al study it was 80% while both studies in female shows 100 % complete fusion in this age group.

In 56-60 age group in males complete fusion is seen in 89.47 % cases while in Gautam et al study it was 100 % while in female group, complete fusion was seen in 83.3 % cases as compared to 100% complete fusion in Gautam et al study. In our study in 61-65 age group both males and females show 100% complete fusion while in Gautam et al study it was 40 % in male group & 100 % complete fusion in female group.

**Conclusion:**

The earliest age of fusion of xiphoid process with body of the sternum or mesosternum as per present study was 36 &35 yrs males & females respectively (Since our first group was 35 to 40 years). The latest age of fusion of xiphoid process with body of the sternum as per present study was 59 & 56 yrs in males & females respectively. The average age of fusion of the xiphisternum with the body of the sternum is 50.04 yrs in males & 46.42 yrs in females. It is concluded that at the age group of 40-50 years, only 50% of population is showing fusion at Xiphi-sternal Joint by lateral view radiography. In rest of 50% of population, still the fusion is incomplete. So, Forensic Experts should be cautious while labelling the age of patient above 40 years on the basis of fusion of xiphisternal Joint and vice versa.

**References:**

**Table 1: Distribution of Cases According to Sex and Age**

<table>
<thead>
<tr>
<th>Age group (in yrs)</th>
<th>Cases for study</th>
<th>Equivocal</th>
<th>Total cases</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
</tr>
<tr>
<td>35 - 40</td>
<td>24</td>
<td>02</td>
<td>02</td>
</tr>
<tr>
<td>41 - 45</td>
<td>21</td>
<td>04</td>
<td>01</td>
</tr>
<tr>
<td>46 - 50</td>
<td>23</td>
<td>02</td>
<td>00</td>
</tr>
<tr>
<td>51 - 55</td>
<td>24</td>
<td>01</td>
<td>01</td>
</tr>
<tr>
<td>56 - 60</td>
<td>19</td>
<td>06</td>
<td>02</td>
</tr>
<tr>
<td>61 - 65</td>
<td>18</td>
<td>08</td>
<td>00</td>
</tr>
<tr>
<td>Total</td>
<td>129</td>
<td>23</td>
<td>06</td>
</tr>
</tbody>
</table>

**Table 2: Relation between Fusions of Xiphoid with Body of Sternum according to Age & Sex**

<table>
<thead>
<tr>
<th>Age Group (Years)</th>
<th>Complete Fusion</th>
<th>Others</th>
<th>Complete Fusion</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>35 - 40</td>
<td>6(28.57)</td>
<td>18(71.43)</td>
<td>1(50)</td>
<td>1(50)</td>
</tr>
<tr>
<td>41 - 45</td>
<td>10(47.62)</td>
<td>11(52.38)</td>
<td>2(50)</td>
<td>2(50)</td>
</tr>
<tr>
<td>46 - 50</td>
<td>15(65.28)</td>
<td>8(34.78)</td>
<td>2(100)</td>
<td>0(0)</td>
</tr>
<tr>
<td>51 - 55</td>
<td>19(79.17)</td>
<td>5(20.83)</td>
<td>1(100)</td>
<td>0(0)</td>
</tr>
<tr>
<td>56 - 60</td>
<td>17(89.47)</td>
<td>2(10.53)</td>
<td>5(83.33)</td>
<td>1(16.67)</td>
</tr>
<tr>
<td>61 - 65</td>
<td>18(100)</td>
<td>0(0)</td>
<td>8(100)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Total</td>
<td>85+44=129 cases (100%)</td>
<td>19+4=23 cases (100%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 3: Comparison of Complete Fusion of Xiphoid Process with Body of Sternum (Mesosternum)**

<table>
<thead>
<tr>
<th>Age Group (Years)</th>
<th>Complete Fusion Male (Jit et al)</th>
<th>Complete Fusion Female (Jit et al)</th>
<th>Total Cases Male (Jit et al)</th>
<th>Total Cases Female (Jit et al)</th>
<th>Complete Fusion Male (Present Study)</th>
<th>Complete Fusion Female (Present Study)</th>
<th>Total Cases Male (Present Study)</th>
<th>Total Cases Female (Present Study)</th>
</tr>
</thead>
<tbody>
<tr>
<td>35 - 40</td>
<td>21*(30.9)</td>
<td>6(28.57)</td>
<td>68(100)</td>
<td>12(100)</td>
<td>3(25)</td>
<td>1(50)</td>
<td>24(100)</td>
<td>2(100)</td>
</tr>
<tr>
<td>41 - 45</td>
<td>22(28.9)</td>
<td>10(47.62)</td>
<td>76(100)</td>
<td>32(100)</td>
<td>11*(34.4)</td>
<td>2(50)</td>
<td>21(100)</td>
<td>4(100)</td>
</tr>
<tr>
<td>46 - 50</td>
<td>34(51.5)</td>
<td>15(65.28)</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>51 - 55</td>
<td>30(73.2)</td>
<td>19(79.17)</td>
<td>41(100)</td>
<td>---</td>
<td>---</td>
<td>1(100)</td>
<td>24(100)</td>
<td>---</td>
</tr>
<tr>
<td>56 - 60</td>
<td>23(65.7)</td>
<td>17(89.47)</td>
<td>35(100)</td>
<td>---</td>
<td>---</td>
<td>5(83.3)</td>
<td>19(100)</td>
<td>---</td>
</tr>
<tr>
<td>61 - 65</td>
<td>14(80.9)</td>
<td>18(100)</td>
<td>23(100)</td>
<td>---</td>
<td>---</td>
<td>8(100)</td>
<td>18(100)</td>
<td>---</td>
</tr>
<tr>
<td>Total</td>
<td>144</td>
<td>85</td>
<td>14</td>
<td>19</td>
<td>309</td>
<td>135</td>
<td>44</td>
<td>27</td>
</tr>
</tbody>
</table>

* Indicates that Jit et al[5] made 36 to 40 for both male and females and > 41 age group for females.

# Indicates that Jit et al[5] made > 41 age group for females. Note: Percentage is calculated Sex-wise per group.
Original Research Paper
An Approach to Sudden Natural Deaths in Medicolegal Autopsies at Karamsad, Gujarat

*Sanjay Gupta, **Ravi Panchal, ***Divyesh Sondarva

Abstract
The Forensic autopsy is a medical procedure. Unfortunately, it is too often thought of only in reference to violent or unnatural deaths. The present prospective study was aimed to know the effectiveness of post-mortem examination to find out cause of death and its correlation with histopathological examination. It was also intended to deduce various epidemiological parameters and their logical relevance. Total 825 autopsy cases were performed during January 2007 to December 2009 (3 years), out of which 63 (7.64%) were of sudden natural deaths. Most of cases were found in 31-50 years age group and male preponderance was seen in all age groups. A majority of deceased were married. Cardiovascular diseases were the most important cause contributing 58.73% in sudden natural deaths. These cardiac cases were mainly due to coronary artery disease, coronary thrombosis and acute myocardial infarction. The 90.49% cases were brought dead to the hospital. In majority of cases (95.24%) postmortem was performed within 24 hours of death.

KeyWords: Sudden Natural Deaths; Autopsy; Cardiovascular; Coronary Artery Disease

Introduction:
The Forensic autopsy is a medical procedure. Unfortunately, it is too often thought of only in reference to violent or unnatural deaths. The natural deaths cases presenting to the forensic investigator and pathologist need not be intimidating. Among the natural death, sudden deaths cases always carry potential risk of autopsy being negative or obscure one. According to WHO, sudden death are sudden and unexpected death of a person is usually seen within 24 hours of onset of symptoms. Most of time these deaths are resulted within one hour of onset and most of patients when brought to the hospital are dead. Many instances were reported where a healthy person without any significant past history of any illness was found dead at home or at work place, of course such cases always raise a suspicion of foul play.

Important causes of death, contributing to sudden death are; coronary artery disease [1], MI [2], congestive cardiac failure [3], heart failure due to pheochromocytoma [4], mesenteric vein thrombosis [5], epilepsy [6], sports related activities [7], congenital anomaly like Situs Inversus [8], spontaneous subdural [9] & aneurysmal subarachnoid haemorrhages [10].

Objectives:
The present study was carried out-
1. To know the effectiveness of post-mortem examination to find out cause of death and its correlation with histopathological examination.
2. To deduce various epidemiological parameters and their logical relevance.

Materials and Methods:
The study sample comprised all medico legal autopsies conducted in the Department of Forensic Medicine, P. S. Medical College and S. K. Hospital, Karamsad, India, during 1st January 2007 to 31st December 2009, covering a span of three years. Sudden deaths due to natural causes were identified and analyzed for the age, sex, marital status, and causes of the death of each victim. This includes all the sudden deaths where causes of death were not known, whether person died in the house or in the hospital.

All such deaths where cause of death was unknown were reported to the Forensic Medicine experts and they in turn performed autopsy. In all these cases organs were preserved for histopathological examination.
(HPE) and final opinion drawn after the receipt of HPE report. Cases having unnatural manner of death were excluded from the study.

Results and Discussion:
A total 825 medicolegal autopsies were conducted in the Department of Forensic Medicine of P. S. Medical College and S. K. Hospital, Karamsad, Gujarat, India, from 1st January 2007 to 31st December 2009. In majority of cases, indication for performing autopsies was unnatural deaths, but in 7.64% cases autopsies were conducted in natural deaths [Table-1]. Almost similar incidences of natural deaths were reported by Zanjad et al [8.92%] in their study at Maharashtra [1]. Higher incidences of natural deaths were reported by Kumar et al [11] (18. 8%) and Iver Nordrum et al[12] (27.8%) in overseas studies. This inconsistency may be due the fact that different autopsy centre are having different type of case load.

In the present study maximum 44.45% cases were reported in 4th and 5th decade of life [Table-2]. Similar findings were observed by Zanjad et al [1] (52.6%) & Kumar et al[11] (53.2%). The possible explanation to the fact may be westernization, sedentary life style, increase consumption of alcohol and smoking. Majority of cases (82.54%) were observed in males (M/F ratio was 4.7:1) [Table-3]. Similar findings were observed by Zanjad et al[1], Kumar et al[11], Sarkioja et al[13] & Thomus et al[14], of course ratio was variable. Two third (63.49%) of total natural death were seen in married [Table-4]. The reason may be married people are more cautious and worried about their financial and other social issues.

In the present study, cardiac deaths comprised more than half of the cases (58.73%) [Table- 5]. This is consistent with the findings of Cohle et al [15], Sarkioja et a [13], Zanjad et al[1], Kumar et al[11] and Morentin et al[16] in their respective studies. These cardiac cases were mainly due to coronary artery disease, coronary thrombosis and acute myocardial infarction. Other cardiovascular diseases such as ischemic heart disease, left ventricular and congestive cardiac failure were also found in the present study but number was very less [Table-6].The age ranged 1 to 88 were reported in the study. In males, among all age groups (excluding 1-20 years), leading killer was cardiac. In females, natural deaths due to cardiac origin were not observed in age group 1-30, 51-60 and 71 onwards. Maximum (3 cases) death cases due to cardiac origin were reported in age group 41-50 years [Table-6].

The next most common category of cause of death was milliary tuberculosis, which accounted for 14.29% (9) of all natural deaths. The third common cause was multiple organ failure (involvement of more than two organs, contributing into cause of death), which comprised 12.70% (8) of the all natural deaths and followed cases of respiratory origin, which comprised 9.53% (6) of all natural deaths. Other causes like spontaneous intracerebral haemorrhage, liver disease, combination of cardiac and renal disease, combination of lung and renal disease and malignancy (one case of squamous cell carcinoma of lung) were less in number. Lower socioeconomic status and treatment defaulter may be the reason for higher incidence of milliary tuberculosis [Table-5].

The majority of cases (90.49%) were brought dead to the hospital. In 6 cases hospital admission took place and duration was ranging from 2 hour to 20 days [Table-7]. In admitted cases, cause of death was not explained medically even after thorough investigations. In majority of cases (95.24%) postmortem was performed within 24 hours of death. In 2 cases, postmortem was performed within 48 hours of death and only in 1 case time since death was 3-5 days [Table-8]. In all cases cause of death was concluded on basis of autopsy and histopathological findings.

Conclusion:
The study reveals that married males in the fourth & fifth decade are at increased risk of sudden natural deaths mostly due to cardiovascular diseases. Meticulous postmortem and histopathological examination are need of hour to minimize risk of autopsy being negative or obscure one.

References:


Table-1: Cases with Manner of death

<table>
<thead>
<tr>
<th>Manner of death</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unnatural</td>
<td>245</td>
<td>233</td>
<td>284</td>
<td>762 (92.36)</td>
</tr>
<tr>
<td>Natural</td>
<td>8</td>
<td>16</td>
<td>39</td>
<td>63 (7.64)</td>
</tr>
<tr>
<td>Cardiac</td>
<td>5</td>
<td>10</td>
<td>22</td>
<td>37 (58.73)</td>
</tr>
<tr>
<td>Non-cardiac</td>
<td>3</td>
<td>5</td>
<td>13</td>
<td>21 (33.33)</td>
</tr>
<tr>
<td>Cardiac + Non-cardiac</td>
<td>0</td>
<td>1</td>
<td>4</td>
<td>5 (7.94)</td>
</tr>
<tr>
<td>Total</td>
<td>253</td>
<td>249</td>
<td>323</td>
<td>825 (100)</td>
</tr>
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</table>

Table-2: Age Wise Distribution of Cases

<table>
<thead>
<tr>
<th>Age</th>
<th>Male</th>
<th>Female</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10</td>
<td>1</td>
<td>0</td>
<td>1 (1.59)</td>
</tr>
<tr>
<td>11-20</td>
<td>0</td>
<td>0</td>
<td>0 (00.00)</td>
</tr>
<tr>
<td>21-30</td>
<td>6</td>
<td>1</td>
<td>7 (11.11)</td>
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<tr>
<td>31-40</td>
<td>11</td>
<td>1</td>
<td>12 (19.05)</td>
</tr>
<tr>
<td>41-50</td>
<td>12</td>
<td>4</td>
<td>16 (25.40)</td>
</tr>
<tr>
<td>51-60</td>
<td>10</td>
<td>0</td>
<td>10 (15.87)</td>
</tr>
<tr>
<td>61-70</td>
<td>9</td>
<td>3</td>
<td>12 (19.05)</td>
</tr>
<tr>
<td>&gt; 70</td>
<td>3</td>
<td>2</td>
<td>5 (7.93)</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
<td>11</td>
<td>63 (100)</td>
</tr>
</tbody>
</table>

Table-3: Gender Wise Distribution of Natural Death Cases

<table>
<thead>
<tr>
<th>Year</th>
<th>Male</th>
<th>Female</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>7</td>
<td>1</td>
<td>8 (12.70)</td>
</tr>
<tr>
<td>2008</td>
<td>13</td>
<td>3</td>
<td>16 (25.40)</td>
</tr>
<tr>
<td>2009</td>
<td>32</td>
<td>7</td>
<td>39 (61.90)</td>
</tr>
<tr>
<td>Total</td>
<td>52 (82.54)</td>
<td>11 (17.46)</td>
<td>63 (100)</td>
</tr>
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</table>

Table-4: Marital Status Wise Distribution of Cases

<table>
<thead>
<tr>
<th>Marital status</th>
<th>Male</th>
<th>Female</th>
<th>Total (%)</th>
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</thead>
<tbody>
<tr>
<td>Married</td>
<td>33</td>
<td>7</td>
<td>40 (63.49)</td>
</tr>
<tr>
<td>Unmarried</td>
<td>8</td>
<td>0</td>
<td>8 (12.70)</td>
</tr>
<tr>
<td>Widow</td>
<td>0</td>
<td>1</td>
<td>1 (1.59)</td>
</tr>
<tr>
<td>Not known</td>
<td>11</td>
<td>3</td>
<td>14 (22.22)</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
<td>11</td>
<td>63 (100)</td>
</tr>
</tbody>
</table>

Table-5: Leading Causes of Death

<table>
<thead>
<tr>
<th>System / organ</th>
<th>Entity</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac 37 (58.73%)</td>
<td>CAD</td>
<td>11</td>
<td>2</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>IHD</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>MI</td>
<td>7</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>CT</td>
<td>9</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>CCF</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>LVF</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Respiratory 6 (9.53%)</td>
<td>Pneumonia</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Bronchial asthma</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Liver 2 (3.17%)</td>
<td>Liver disease</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Cerebral 2 (3.17%)</td>
<td>Spontaneous ICH</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Combinations 2 (3.17%)</td>
<td>Cardiac + renal disease</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Lung + Renal disease</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Multiple organs failure 8 (12.70%)</td>
<td>MOF (&gt; 2 organs)</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Milliary TB</td>
<td>7</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Malignancy 1 (1.59%)</td>
<td>Malignancy</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
<td>11</td>
<td>63 (100%)</td>
<td></td>
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Original Research Paper

A Profile of Abortion Cases in a Tertiary Care Hospital

*B.C. Shivakumar, **D. Vishvanath, *** P.C. Srivastava

Abstract:

The present study was conducted in the Department of Obstetrics and Gynaecology in collaboration with Department of Forensic Medicine at Rohilkhand Medical College and Hospital, Bareilly, U.P. between October 2009 and September 2010. A total of 150 married women presented for termination of pregnancy were being studied. 38% of women were in the age group of 26-30 years followed by 34.7% in 18-25 years. Majority (78%) were Hindus; major chunk (74%) belonged to lower class, 57.3% were illiterates, and 74% were from rural background. 84.7% of the patients presented between 5-12 weeks of gestation for termination. Majority (63.3%) were having 1-3 deliveries. 67.3% patients had no history of prior abortion. 54.7% unsuccessfully attempted to terminate the present pregnancy by using various methods. In 30.7% of patient’s unplanned pregnancy was main reason for terminating pregnancy, followed by contraceptive failure (29.3%) and inadequate income (26.7%).

Keywords: Abortion, Induced abortion, Contraceptive failure.

Introduction:

Despite a liberal abortion law (Medical Termination of Pregnancy Act, 1972), every year an estimated 5.7 million abortions (ten times the legal ones) are conducted illegally in India [1]. Data on abortion are scarce and inevitably unreliable because of legal, ethical, and moral constraints that hinder data collection. Underreporting and misreporting are common because women may be reluctant to admit an induced abortion.

With decreasing age of menarche and early onset of sexual activity; changing values of life, greater permissiveness, sexual inquisitiveness and promiscuity, ineffective use of contraceptives our young people are exposed early to unplanned and unprotected sexual intercourse leading to unwanted pregnancy and subsequently abortions. PNDT Act had failed to curb for sex determination and consequent sex-selective abortion in the country [2] which has prevalence of strong “son” preference.

Aims and Objectives:

The aim of the present study was planned to evaluate cases of abortions reporting to tertiary care hospital over a period of one year in relation to the magnitude of the problem and also to study the socio-demographic profile of women seeking such a procedure like age, religion, socioeconomic status, educational status, place of residence, gravida, parity, duration of pregnancy, reasons for opting abortion, and history of attempt to terminate present pregnancy before reporting to our hospital.

Material and Methods:

The study was conducted in department of Obstetrics and Gynaecology in collaboration with Department of Forensic Medicine at Rohilkhand Medical College and Hospital, Bareilly, U.P. between October 2009 and September 2010. A total of 150 married women presented for termination of pregnancy were eligible for inclusion. An informed consent was taken. Structured questionnaires were administered to these patients. Questions asked included the age of the women, religion, socioeconomic status, level of education, rural or urban background, duration of pregnancy, number of deliveries, previous abortion, any attempt to induce abortion before coming to hospital and reasons for the abortion were recorded.
These women were grouped into low, middle and high socio-economic status measured by standard of living index (SLI) based on ownership of the selected household assets - Low SLI (considered as coming from poor households), Medium SLI (considered as coming from middle class households) and High SLI (considered as coming from rich households).

The exclusion criterion was period of gestation more than 20 weeks confirmed by LMP, clinical examination and/or ultrasoundography; and those who did not give their consent to be included the study. Detailed clinical examination of the patient was done including per vaginal examination to assess the gestational age which was later confirmed by ultrasoundography. After the pregnancy was terminated these patients were followed up for two weeks for any abortion related complications.

**Observations and Results:**

Table-1 depicts distribution of age, religion, socioeconomic, educational and residential status among women. All 150 women studied, were married. The peak incidence of abortion (n=57, 38%) was noted in the age group of 26-30 years, followed by 52 women (34.7%) in the age group of 18-25 years. 31-35 years age group included 29 cases (19.3%) and only 09 cases (6%) belonged to 36-40 years age group. A miniscule of 3 cases (2%) was reported in the age group of 41-45 years. None of the case was below 18 years and above 43 years. Majority of the women were Hindus (n=117, 78%), followed by Muslims (n=31, 20.7%) and Sikhs (n=2, 1.3%). We found no respondents among Christians. Major chunk of the women belonged to lower class (n=111 cases, 74%) followed by 39 cases (26%) from middle class. None were from upper class. Out of 150 cases, 86 (57.3%) women were illiterates, 36 (24%) women studied less than high school and 28 (18.7%) studied beyond the level of high school. There was a preponderance of women (n=111, 74%) from rural background. Only 39 cases (26%) belonged to urban areas.

Table-2 depicts distribution of duration of pregnancy, number of deliveries and number of previous abortion among women. Majority of the women (n=127, 84.7%) presented between 5-12 weeks of gestation. Only 23 women (15.3%) reported between 13-20 weeks of duration and their further subdivision was 14 were of incomplete abortion, 5 cases of oral contraceptive failure and 4 cases were of missed abortion. Majority (n=95, 63.3%) reported 1-3 deliveries. In 34 cases (22.7%) 4-7 deliveries were reported. Only 21 women (14%) had no history of previous delivery. Majority (n=101, 67.3%) had not experienced prior abortion. 33 women (22%) had 1 abortions, 12 women (8%) had 2 abortions, 3 women (2%) had 3 abortions and only 1 woman (0.7%) had history of 4 previous abortions.

Table-3 depicts distribution of attempt to induce abortion and reasons for abortion among women. We noted that 82 (54.7%) patients unsuccessfully attempted to terminate the present pregnancy by using various methods and 68 (45.3%) patients directly consulted to terminate pregnancy in our hospital. Among various reasons given by patients for undergoing abortion, 46 women (30.7%) reported unplanned pregnancy, 44 (29.3%) were due to contraceptive failure, 40 (26.7%) due to inadequate income, and 20 (13.3%) cases were due to completion of family. None of them reported female foetus as a reason for undergoing abortion.

**Discussion:**

Incidence of induced abortion is extremely difficult to measure. Data quality is an important consideration in studying abortion. Abortions performed legally or illegally are subject to substantial under reporting. Although abortion has been greatly liberalized, the annual number of legal abortions performed in India is 0.5 million of the annual estimated 6 million abortions [3]. The gap between estimated abortion and reported MTP cases is enormous, reflecting a fact that less than 10% of the abortions which take place in India, are carried out in government's recognized institutions. Among the remaining cases, perhaps a small proportion is conducted by trained and qualified doctors, who do not report the cases to the government, while the remaining majority of women go to unauthorized and untrained abortionists. Women of all reproductive age groups seek abortion in India.

The incidence of abortion as noted in the different age group in the present study was almost at same pattern with those of Agarwal & Salhan [4] with maximum cases in 26-30 years and minimal abortion incidence in the age groups of 36-45 years. Bahadur et al [5] also observed maximum cases (58.5%) among 26-30 years age group supporting ours observation. But in contrast to our findings, they noted the second highest incidence (23.7%) in 31-35 years age group. Bhattacharya et al [6] also observed that majority of women (70.45%) were in their thirties. Moreover, Rehan et al [7] observed that...
majority of women (36.6%) were aged more than 35 years contradicting our findings. In the present study, ages between 19-30 years which involved a period of intense sexual activity opted for undergoing abortion either because of complete family or financial constrains due to which they were not be prepared for continuing pregnancy. Besides their use of temporary contraceptive methods was low and they relied more on abortion.

There was not even a single case of unmarried women in our study who turned up for abortion; this could be because of the fact that they preferred services from more confidential private practitioners, as our hospital is a public hospital.

Majority of the patients were Hindus (78%) followed by Muslims (20.7%). A similar observation was noted by Bahadur et al [5], Agarwal & Salhan [4]. Increased prevalence of abortion in Hindus may be because of their greater population. Moreover, Hindus are more liberal and easily opt for family planning measures including abortion. Induced abortion is a universal need, cutting across religious communities, class, and even cultural backgrounds. Muslim women have both less access to and less demand for induced abortion owing to religious norms. Muslim women in India have both higher fertility [8], and their religious beliefs often preclude the use of abortion [9]. Interestingly, we could not find any Christians in our study may be because of moral, religious belief around the sanctity of life. Even though they are aware that abortions are legal but they did not necessarily consider it as right choice.

Women of lower socioeconomic status constituted 74% followed by middle class 26%. Interestingly, no upper class women were admitted for abortion at our centre. Bahadur et al [5] also observed higher incidence (53.4%) of women belonging to the lower middle class and lower class according to the modified Kuppuswamy Socio-economic Status Scale. Roychowdhury et al [10] also recorded highest incidence (48.89%) in low income group, the number of abortion cases gradually declining with increasing income. Lowest incidence of MTP (11.11%) was recorded in the higher income group (Rs.1000-1500 per capita monthly income).

Most women belonging to the lower socio-economic strata of society for whom abortion is a method of fertility regulation. Poor women use of either traditional contraceptive methods or less-reliable methods such as rhythm/safe period and withdrawal methods which are found to have higher failure rate. Economic constraints may compel many women, particularly those who are poor and dependent on others, to seek services from unqualified providers. It is more likely that those women who are rich have better health, are more watchful and aware about sexual activities. Moreover, higher income groups have a preference for private nursing homes or clinics.

Majority of the patients (57.3%) were uneducated followed by equal number of cases i.e., 21.3% each educated under high school and above high school. Agarwal & Salhan [4] observed that majority of women (70.7%) were illiterate supporting our study. In contrast, Bahadur et al [5] noted lesser number of uneducated patients (34.8%) as compared to educated patients although they also noted higher number of patients in this category. Among educated, patients who studied less than high school were only 33.8%, while more than high schools were 31.4% patients. Although, there is inverse relationship between education and early marriage [11], the perception of small family norm is gradually increasing with women’s education and employment. Family planning methods increases with advancement in educational status of the women. Working women will be more likely to have abortions than non-working women because of conflicts between their roles as employees and their role as mother, along with their desire for smaller family size. Educated women also tend to take advantage of the MTP facility. Despite this, observation of the present study was quite contradicting since more uneducated women turned up for abortion at our centre.

Rural women predominated (74%) over urban (26%). Roychowdhury et al [10] noted that the majority (53.33%) of cases from rural and semi urban region and 46.67% from an urban background. Agarwal & Salhan [4] also noted 32% patients from rural background, 24% from urban and 44% from urban slum area as the study was conducted in Delhi. Approved facilities for abortion are concentrated in urban areas, resulting in limited access from a vast majority of women in rural areas.

Majority of women (84.7%) presented during 5-12 weeks of pregnancy followed by 13-20 weeks (15.3%). Roychowdhury et al [10] noted most of the abortions (53.33%) were done within first 6 weeks while 42.22% were aborted between 7-12 weeks thus supporting our findings. Bhattacharya et al [6] noted majority of the abortion cases (56%) in first trimester and 32.6% of cases in second trimester. Agarwal & Salhan [4] also noted majority of abortion cases (89.4%) within 12 weeks of gestation and
beyond 12 weeks only 10.6% cases. Kalyanwala et al [12] observed that 75% women underwent abortion during first trimester period followed by 25% in second trimester abortion.

A larger percentage of women presenting during 5-12 weeks suggests a better awareness towards the family planning programme which has now gained popularity even amongst the rural population. The delay in seeking abortion may be due to problems in suspecting pregnancy symptoms, irregular periods, poor recall and recording of menses would have prompted woman to confirm pregnancy late and indeed, the initial response to a missed menstrual period may be an attempt to "bring on" the delayed period with medicine from a local chemist. Obtaining their family's permission from husband and mother-in-law, accumulating resources to pay for the abortion and choosing a provider may be another reason for delaying abortion.

The delay beyond 12 weeks was mainly firstly because of administration of abortifacients leading to failure/incomplete abortions and secondly this may probably be due to desire to know the sex of the foetus. Ultrasonography can detect foetal sex only at the beginning of the second trimester. Some women may wait until second trimester thereby delaying abortion. Misconceptions that husband's consent is needed for seeking abortion and non-awareness of the existence of registered facilities where these services can be accessed is other plausible reasons for delay.

In our study, majority patients (63.3%) were having 1-3 deliveries followed by 22.7% women with 4-7 deliveries and only 14% cases came for termination of pregnancy without having any single delivery. Akinola et al [13] also noted higher incidence of 47.7% with 1-3 deliveries similar to our findings but in contrast, 43% patients did not had any delivery while only 9.36% cases had 4-6 deliveries. In another study Rehan et al [7] observed that 61% Pakistani women seeking abortion had given birth to ≥5 children. Raj et al [14] noted that among today's 20-24-year-olds, marrying as a minor (as opposed to as an adult) has been shown to be significantly associated with higher odds of having at least three children, of having poorly spaced births and of relying on sterilization as a means of contraception.

Married nulliparous women underwent abortion as they were unwilling to expand their family and they relied more on abortion rather than on temporary contraceptive methods. Proportion of deliveries that occurs in hospital is still lower and therefore, access to post natal contraceptive advice is quiet poor. Many married multiparous women having poorly spaced births and are relying on sterilization as a means of contraception. Deficiency in health care systems resulting in tubal ligation is the first and only method they ever used. It also exposes a violation of government guidelines stipulating that a woman must be at least 22 years old to be sterilized.

In our study major chunk of women (67.3%) had never underwent abortion earlier. 22% patients had experienced single abortion and only 0.7% cases had experienced 4 times abortions earlier. Roychowdhury et al [10] reported that 68.89% had their first abortion whereas 15.56% had a previous history of abortion which is in line with our findings. In contrast to our findings, Akinola et al [13] observed that only 6.3% of the patients had not experienced prior abortion and 75.5% patients reported only 1 abortion. In their study they noted the least incidence of patients (2.3%) who had experienced 3 previous abortions. Pre and post abortion services have often been given a low priority. Women are not often informed of the range of contraceptive choices available to prevent repeat abortions. Despite the Government initiatives, the social climate still encourages young couples to produce their first child soon after marriage. Also pressure on young women to prove their fertility as soon as possible after marriage, suggests that lesser number of married women would seek to terminate their first pregnancy.

More than half (54.7%) of the patients made previous unsuccessful attempt to terminate the pregnancy majority by oral/vaginal abortifacients with the help of local chemists, dais, quacks, or self. A survey conducted by Kalyanwala et al [12] among 549 unmarried women aged 15-24 years who had obtained an abortion in the Bihar and Jharkhand Sate observed that prior to having an abortion, a third of participants had made an unsuccessful attempt to terminate their pregnancy. Abortions can be self-induced like excessive physical activity and blows to abdominal wall, abortifacients can be used orally and vaginally, inserting herbs, sharp objects like knitting needles into the cervix and uterus, oral and vaginal use of mifepristone/misoprostol obtained from a chemist is also practiced and when pregnancy gets advanced complications and cost for termination may become high.

Coercive contraception following an abortion is not uncommon therefore many women reportedly refuse to go to a primary health care centre for an abortion because they
do not want to get sterilized [15]. Limited access, poor quality and cost of services for medical termination of pregnancy may encourage the women to go for self-induction.

Access to safe abortion services are limited, in fact, some of the clauses in the MTP Act have contributed to restricting the availability and access to abortion services for example, only gynaecologists or physician who have received training in MTP are allowed to perform an abortion and so even after training many providers do not feel competent and MTP is done only in government hospitals, or institutions approved by the government and approval of two doctors is required to abort pregnancies between 12 and 20 weeks gestation and women may incur hidden costs in the form of cost of medicine and illegal fees for staff.

Contraceptive failure and risk to mother’s health are the main reasons for women seeking abortion in general. The situations that lead to contraceptive failure are diverse, like forgotten pill, condom breakage, partner withdrawing late, etc. In the present study, unplanned pregnancy constituted 30.7% followed by contraceptive failure 29.3%, inadequate income 26.7% and family size (13.3%) as reasons for opting abortion. Interestingly, none of the women opted for abortion on gender ground which is a major national concern nowadays for amounting illegal abortion under the MTP Act.

Bahadur et al [5] cited the reasons for termination of pregnancy as unplanned pregnancy in 32.8% women, inadequate income in 24.6%, contraceptive failure in 22.3% and family complete in 20.3% women. Bhattacharya et al [6] observed birth spacing as the main reason (59.6%) followed by incomplete/missed abortion (22%) for seeking abortion. Female foetus was also reason for termination in 6.8% cases. Social cause was the commonest (75.57%). 4 girls were victim of rape and sought abortion on humanitarian ground (4.44%) in a study conducted at Kolkata on 90 adolescent girls aged between 15-18 years who had undergone MTP reported by Roychowdhury et al [10].

The reason why women with high gravidity opted for termination of the pregnancy was probably to limit family size or future expenses. Interestingly, female foetus (sex selective abortions) resulting in imbalance in sex ratio was not found as indication, may be primarily due to PNDT Act as ultrasound facilities for sex determination of foetus is strictly prohibited and secondarily, may be due to National scheme like Balika Samriddhi Yojana which helps balance the sex ratio, it pays couples on producing a female child.

The common refrain “better to invest 500 rupees now than 50,000 later” refers to the economic advantage of paying for a sex-selective abortion now, rather than paying the far higher future costs incurred by having a daughter [11].

**Conclusions:**

Abortion despite legalisation is a great neglected health care problem of women in their reproductive age-group who faces a complex set of problems like low literacy, low socio-economic status, early marriage and pregnancy, lesser use of contraception, sex-selective abortions, limited access for majority of women in rural areas to abortion services, poor practices related to ante-natal, natal and post natal care. Women in general need to be educated and better informed about the legality of abortion and should be encouraged to seek early safe procedures in certified medical care facilities to limit mortality and morbidity arising from unsafe abortion.

**Reference:**


Table-2: Duration of pregnancy, Number of deliveries and number of previous abortion

<table>
<thead>
<tr>
<th>Duration of pregnancy</th>
<th>No. (%)</th>
<th>No. of Previous abortion</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>05-12 weeks</td>
<td>127 (84.7)</td>
<td>0</td>
<td>101 (67.3)</td>
</tr>
<tr>
<td>13-20 weeks</td>
<td>23 (15.3)</td>
<td>1</td>
<td>33 (22)</td>
</tr>
<tr>
<td>Number of deliveries</td>
<td>No. (%)</td>
<td>2</td>
<td>12 (8)</td>
</tr>
<tr>
<td>0</td>
<td>21 (14)</td>
<td>3</td>
<td>03 (2)</td>
</tr>
<tr>
<td>1-3</td>
<td>95 (63.3)</td>
<td>4</td>
<td>01 (0.7)</td>
</tr>
<tr>
<td>4-7</td>
<td>34 (22.7)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table-1: Distribution of Age, Religion, Socioeconomic, Educational and Residential status in Abortion cases

<table>
<thead>
<tr>
<th>Age group</th>
<th>No. (%)</th>
<th>Socio-economic status</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-25</td>
<td>52 (34.7)</td>
<td>Lower class</td>
<td>111 (74)</td>
</tr>
<tr>
<td>26-30</td>
<td>57 (38)</td>
<td>Middle class</td>
<td>39 (26)</td>
</tr>
<tr>
<td>31-35</td>
<td>29 (19.3)</td>
<td>Upper Class</td>
<td>0 (0)</td>
</tr>
<tr>
<td>36-40</td>
<td>09 (6)</td>
<td>Educational status</td>
<td>No. (%)</td>
</tr>
<tr>
<td>41-45</td>
<td>03 (2)</td>
<td>Uneducated</td>
<td>86 (57.3)</td>
</tr>
<tr>
<td>Religion</td>
<td>No. (%)</td>
<td>&lt; High school</td>
<td>36 (24)</td>
</tr>
<tr>
<td>Hindus</td>
<td>117 (76)</td>
<td>&gt; High school</td>
<td>28 (18.7)</td>
</tr>
<tr>
<td>Muslims</td>
<td>31 (20.7)</td>
<td>Residence</td>
<td>No. (%)</td>
</tr>
<tr>
<td>Sikhs</td>
<td>2 (1.3)</td>
<td>Rural</td>
<td>111 (74)</td>
</tr>
<tr>
<td>Christians</td>
<td>NIL</td>
<td>Urban</td>
<td>39 (26)</td>
</tr>
</tbody>
</table>

Table-3: Distribution of Attempt to induce abortion and Reasons for abortion

<table>
<thead>
<tr>
<th>Attempt to induce abortion</th>
<th>No (%</th>
<th>Reasons for abortion</th>
<th>No (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attempted</td>
<td>82 (54.7)</td>
<td>Unplanned pregnancy</td>
<td>46 (30.7)</td>
</tr>
<tr>
<td>Did not attempt</td>
<td>68 (45.3)</td>
<td>Contraceptive failure</td>
<td>44 (29.3)</td>
</tr>
<tr>
<td>Inadequate income</td>
<td>40 (26.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family complete</td>
<td>20 (13.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female foetus</td>
<td>NIL</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Original Research Paper

Coronary Atherosclerosis and Myocardial Infarction
An Autopsy Study

*Monika Garg, **Akash Deep Aggarwal, ***Sant Prakash Kataria

Abstract
The incidence of coronary heart disease has markedly increased in India over the past few years. Ischemic heart disease, the largest cause of morbidity and mortality in the developed and developing countries today is overwhelmingly contributed by atherosclerosis. The study highlights the impact of atherosclerotic lesions in the population of Haryana. We studied atherosclerotic lesions in coronaries in cases subjected to autopsy, to grade and to evaluate the atheromatous plaques; and to assess the cases of myocardial infarction amongst them. The study comprises dissected specimens of heart in 115 cases subjected to autopsy. The vessels were examined for the presence of atherosclerotic lesions which were graded according to American Heart Association and examined for evidence of myocardial infarction. The study comprises the cases in age group of 15 to 85 years. 46.4% showed significant atheroma. Commonest type of atherosclerosis seen was grade-3. Triple vessel involvement was seen in 44.4% cases. Left Anterior Descending was most commonly involved artery. Myocardial infarction was the cause of death in 3 cases (3%) while 23 showed changes of chronic ischemic heart disease. The data obtained may form a baseline for the forthcoming studies.

Key Words: Atherosclerosis, Coronary, Plaque, Autopsy, Infarction.

Introduction:
Coronary artery disease due to atherosclerosis is an epidemic in India. The incidence of coronary artery disease has doubled during past three to four decades. It will soon emerge as the single largest disease accounting for nearly one-third of all deaths in India. A total of nearly 6.4 crore cases of coronary vascular disease are likely in the year 2015, nearly 96% would be coronary heart disease cases. Deaths from this group of diseases are likely to amount to a staggering 34 lakh.

An estimated 1.3 million Indians died from this in 2000. The projected death from coronary artery disease by 2015 is 2.95 million, of which 14% will be <30 years, 31% will be <40 years. Major advances in medical, interventional and surgical therapy, together with effective secondary prevention, has resulted in extended life expectancy and an improvement in the quality of life of most patients with clinical coronary artery disease.

Despite these achievements, the prevalence of coronary artery disease seems to remain high. However, the exact data on the prevalence of coronary atherosclerosis or clinical coronary artery disease are extremely diverse.

In order to assess the magnitude of the problem, a prospective study of autopsied patients for the presence of atherosclerotic lesions of the coronaries artery and myocardial infarction (MI) was undertaken for one month in the Post Graduate Institute of Medical Sciences and Research, Rohtak. An autopsy study gives a good measure of the prevalence, grading and distribution pattern of atherosclerotic lesions.

Material and Methods:
In the present study, heart specimens of 115 consecutive post-mortem cases, received in the forensic pathology section of the Post Graduate Institute of Medical Sciences and Research, Rohtak were examined grossly and microscopically for the presence and extent of atherosclerosis and evidence of MI.

The medical history & clinical diagnosis before death were, in few of the cases, unavailable. Few specimens underwent autolysis before examination. The heart were fixed in 10% formalin, weighed and then investigated for the presence of scars of MI Measurements of right ventricular
wall, left ventricular wall, inter-ventricular septa and stump of aorta were taken. Circumferences of mitral, tricuspid, pulmonary and aortic valve were noted. The three main coronary arteries were dissected out. Each coronary artery was then sectioned by multiple closely spaced cuts with a scalpel. The exposed artery was carefully examined for any thickening, yellow streaks, frank plaque or calcification. Then ventricles were sectioned transversely at 10 mm intervals commencing from apex.

After routine processing & paraffin embedding 4 micro-meter sections were taken. All the histological sections were examined microscopically for the presence of atheroma, ischemic heart disease, & MI. American Heart Association typing of atherosclerotic plaque was done. Special stains were performed according to need & nature of lesion.

American Heart Association criteria for grading atherosclerotic lesions [3,4]
- Grade 1 - isolated intimal foamy cells (minimal change)
- Grade 2 - numerous intimal foamy cells often in layers (fatty streaks)
- Grade 3 - pools of extra cellular lipid without a well-defined core (intermediate lesion or pre-atheroma)
- Grade 4 - well defined lipid core with luminal surface covered by normal intima (atheroma or fibro plaque)
- Grade 5 - lipid core with a fibrous cap with or without calcification (fibro-atheroma)
- Grade 6 - fibro-atheroma with cap defect such as haemorrhage and thrombosis
- Grade 7 - calcification prominent
- Grade 8 - fibrous tissue change prominent

Results:
Of the 115 heart studied, 80.9% were males. The weight of the heart was determined to be 289±71 grams for males and 269±77 grams for females. Out of these 18 specimens were autolysed. All the cases were divided into the age group according to the age at death as per Table-1.

The degree of atherosclerosis encountered in different age groups and in the two sexes is shown in Table-2. Atheroma have been seen above the age of 15 years, but significant atheroma appeared after third decade onwards and thereafter there is a gradual increase in both its frequency and severity from second to sixth decade. Maximum incidence was in the seventh decade of life. Commonest type of atherosclerosis was grade 3. Amongst the atherosclerotic coronaries, on an average 3.09% showed calcification and 14.4% had capillary defect. 46.4% of the cases showed significant atheroma i.e. grade 4 to grade 7. Out of these cases 13.3% had single vessel involvement whereas two vessels and three vessels were involved in 42.2% and 44.4% cases respectively. The incidence of atherosclerotic plaque and number of artery involved become higher as the age increases.

Of 45 cases with significant atheroma, Left Anterior Descending was most commonly involved in 38.1% and Right Coronary Artery was involved in 35.1% and Left Circumflex Artery was involved in 34% cases. (Table-3) Evidence of myocardial infarction at necropsy was found in 26.8% cases; of which 3 had acute MI & 23 had changes of chronic ischaemic heart disease. Two had scars of MI. The age of MI patients ranged between 29 and 80 years with an average of 52±14 years. 88.5% cases out of 26 cases of MI had one or more coronaries showing atherosclerosis.
Discussion:

There is an alarming increase in the number of deaths due to coronary atherosclerosis in India and this number is expected to escalate rapidly in the next decade. Atherosclerosis is a common phenomenon which is seen with different prevalence in different races. It begins in childhood and progresses through young adulthood to form the lesions that causes coronary heart disease.

In the present study it was observed that 93 cases (80.9%) were males and 22 (19.1%) were females which are more or less similar to most of the studies done in past. Murthy et al [5] studied 150 cases out of which 123 (82%) were males and 27(18%) were females. Singh et al [6] studied 200 cases with 170 (85%) males and 30 (15%) females. Padmavati [7] and Tandon [8] found 66.5% males and 33.5% females. Similarly Bhargava et al [9] studied 74.8% males and 24.2% females in their study. The reason being that as males are bread earners and females usually doing house hold work, which makes the males more vulnerable to accidents, violence and stress. Also males more indulge themselves in smoking; alcoholism etc. Mean heart weight in our study was 286±72 grams which was low as compare to the 327 grams by Bertomeu et al [3].

American Heart Association characterized & classified atherosclerotic lesions from type 1 to type 7. It was proposed that these lesions progressed from one type to the next. Now plaque rupture is established to be the most significant determinant of thrombus – mediated acute coronary syndrome. The preatheroma type was the most common type in our study (30.9%), next in frequency was atheroma (27.3%) however Sudha et al [10] who showed Left Anterior Descending as the most common site for plaque (47%) and Yazdi et al [14] who showed Left Anterior Descending as the most commonly involved artery (60%) , followed by Right Coronary Artery (50%) and Left Circumflex Artery (42.5%). Single vessel involvement was seen in 13.3% while two vessels and three vessel involvements was seen in 42.2% and 44.4% cases. Three vessels involvement was the most common in our study. It was correlated with the study given by Yazdi et al [14] but Virmani et al [11] showed single vessel disease was greater than others (44%).

Acute MI was seen in 3 cases (3%) comparable with the data given by Maru (6.5%) [17].The contribution of hypertension, serum cholesterol and cigarette smoking could not be assessed.

Conclusion:

The study showed unexpectedly high prevalence of atherosclerosis in India. Though the incidence of atherosclerosis is more in males as compare to females, but in both sexes it is alarming. This study highlights the importance of cardiovascular risk factors screening from early ages of third decades. Our study aids valuable data to the literature regarding the morphology of atherosclerotic lesions. The study of human atherosclerotic lesion is an extremely difficult task in a living subject and autopsy study is the best possible way to work on it. Though our study involved only a small number of cases, most of our observation correlated with the many similar studies.

References:

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8. Tandon OP, Aggarwal VC, Katiyar BC. Coronary and aortic atherosclerosis. Indian Heart J 1969;5:10


Table-1: Sex and age distribution of 115 autopsied cases

<table>
<thead>
<tr>
<th>Age group</th>
<th>Males</th>
<th>Females</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;21</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>3.5%</td>
</tr>
<tr>
<td>21-30</td>
<td>19</td>
<td>9</td>
<td>28</td>
<td>24.3%</td>
</tr>
<tr>
<td>31-40</td>
<td>25</td>
<td>6</td>
<td>31</td>
<td>27.0%</td>
</tr>
<tr>
<td>41-50</td>
<td>19</td>
<td>0</td>
<td>19</td>
<td>16.5%</td>
</tr>
<tr>
<td>51-60</td>
<td>15</td>
<td>6</td>
<td>21</td>
<td>18.3%</td>
</tr>
<tr>
<td>61-70</td>
<td>9</td>
<td>0</td>
<td>9</td>
<td>7.6%</td>
</tr>
<tr>
<td>&gt;70</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>2.6%</td>
</tr>
<tr>
<td>Total</td>
<td>93</td>
<td>22</td>
<td>115</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table-2: Degree of atheromas correlated with age and sex. (M Male, F Female, = Total, n No.)

<table>
<thead>
<tr>
<th>Age Gps</th>
<th>Grade 1 M</th>
<th>Grade 1 F</th>
<th>Grade 2 M</th>
<th>Grade 2 F</th>
<th>Grade 4 M</th>
<th>Grade 4 F</th>
<th>Grade 5 M</th>
<th>Grade 5 F</th>
<th>Grade 6 M</th>
<th>Grade 6 F</th>
<th>Grade 7 M</th>
<th>Grade 7 F</th>
<th>A</th>
<th>Total</th>
<th>Significant Atheroma</th>
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</thead>
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<td>2</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>0</td>
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<tr>
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<td>4</td>
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<td>2</td>
<td>5</td>
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<td>4</td>
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<td>15</td>
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</tr>
<tr>
<td>61-70</td>
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<td>2</td>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>9</td>
<td>0</td>
<td>3</td>
<td>9</td>
<td>18</td>
</tr>
<tr>
<td>&gt;70</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>14</td>
<td>1</td>
<td>3</td>
<td>115</td>
<td>45</td>
</tr>
</tbody>
</table>

Figure 1: Prevalence of coronary atherosclerotic lesions in different age groups

- Grade 7
- Grade 6
- Grade 5
- Grade 4
- Grade 3
- Grade 2
- Grade 1

Table-3: Frequency distribution of atheroma in three major coronaries

<table>
<thead>
<tr>
<th>Grade</th>
<th>RCA</th>
<th>LCA</th>
<th>LAD</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>13</td>
<td>13.4%</td>
<td>18</td>
<td>16.8%</td>
<td>17</td>
</tr>
<tr>
<td>2</td>
<td>11</td>
<td>11.3%</td>
<td>14</td>
<td>14.4%</td>
<td>13</td>
</tr>
<tr>
<td>3</td>
<td>39</td>
<td>40.2%</td>
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<td>33.0%</td>
<td>30</td>
</tr>
<tr>
<td>4</td>
<td>19</td>
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<td>25</td>
<td>25.6%</td>
<td>26</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>2.1%</td>
<td>1</td>
<td>1.0%</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>10</td>
<td>10.3%</td>
<td>7</td>
<td>7.2%</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>3</td>
<td>3.1%</td>
<td>0</td>
<td>0.0%</td>
<td>2</td>
</tr>
<tr>
<td>4-7</td>
<td>34</td>
<td>35.1%</td>
<td>33</td>
<td>34.0%</td>
<td>37</td>
</tr>
<tr>
<td>Total</td>
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<td>97</td>
<td>97</td>
<td>97</td>
</tr>
</tbody>
</table>


Original Research Paper

Krait bite poisoning in Manipal region of Southern India

* Francis N P Monteiro, **Tanuj Kanchan, ***Prashantha Bhagavath, ****G Pradeep Kumar

Abstract

Krait commonly inhabits the South Asian countries and is regarded as the most dangerous species of venomous snake in the Indian subcontinent. This prospective research included the consecutive cases of Krait bite cases admitted to Kasturba Hospital, Manipal during August 2003 and November 2005. All the victims of Krait bite were females aged between 17 and 35 years. Victims were from a rural background and most of them were bitten indoors and during the night time. Most of the bites involved the lower limbs. Signs of envenomation (neurological symptoms) were observed in 50% of the cases. In the only case of fatal outcome in our study, there was a delay in diagnosis of Krait bite owing to the absence of bite marks. The case emphasizes on the fact that the possibility of snake bite should be considered in an otherwise healthy person who presents with sudden onset of neuroparalytic features.

Key Words: Snakebite; Krait; Neurotoxin; Manipal, Southern India.

Introduction:

From a lead role as Eve’s tempters in the Bible to a regular appearance in the Harry Potter books and movies, snakes have slithered their way into world mythology and popular culture with tales born of fear as well as respect. The evolution of snakes dates back to 70 million years in the Cretaceous period. Only the presently living species of snakes, mainly the burrowing snakes are the available clues to explain the ancestry of snakes from the lizard like reptiles [1]. Snakes belong to the class Reptilia under the order Ophidia. Of the 3000 species of snakes, only about 300 are considered to be sufficiently poisonous to be of a danger to man. In India there are 236 species of which about 50 are poisonous.

The four common venomous land snakes found in this region that pose a problem to the people, both to the victim as well as to the medical man include the Common krait (Bungarus caeruleus), the common cobra (Naja naja), the saw scaled viper (Echis carinatus) and the Russell's viper (Vipera russelli) [2-7].

Results:

In the present case series of snake bite poisoning; all the four cases were females, age ranging from 17-35 years. Their case details are presented in Table 1. Details of each case, circumstances of bite and treatment are further described in detail:

Case One:

A 25 year old female was bitten by a common Krait at her residence while sleeping in the afternoon in the month of April. She was...
admitted to the hospital within 1 hour after the bite. The site of bite was dorsal aspect of right great toe. Two puncture marks 1.5 cm apart were present at the site of the bite. Clinical features included pain, drowsiness, dysarthria, dysphagia, convulsions, blurring of vision, ptosis, muscle weakness and drowsiness. There was no significant alteration in the blood parameters. She was administered with 24 vials of polyvalent anti-snake venom after sensitivity testing. She completely recovered and was discharged after 8 days of hospital stay.

Case Two:

A 17 year old student, in the month of July in early morning hours (at around 3am) of a rainy night while sleeping experienced severe pain in the lower trunk region. On getting up she noticed redness over the right inguinal region. She was taken to a local practitioner within half an hour of the onset of symptoms, who presumed it to be a case of insect bite and gave antihistaminic and steroid injection. On returning home she gradually developed breathlessness, vomiting, dysphagia, drooping of eyelids and ophthalmoplegia over a period of 10 hours. Later, while folding the bed sheet family members found a live Common Krait, which prompted them to take the patient to the nearest referral teaching hospital. There was redness over the right inguinal region; fang marks however, could not be appreciated. A total of 20, polyvalent anti-snake venom were administered after sensitivity testing. In spite of all life saving measures, the victim succumbed after 36 hours of hospital admission due to the complications of ensuing aspiration pneumonia and sepsis. Her blood parameters showed increased TLC, and neutrophilia (91%).

Case Three:

A 19 year old student was bitten by a common Krait at her residence while sleeping at night in the month of October. She was admitted to the hospital within 1 hr after the bite. The bite site was dorsal aspect of right great toe. There was a single puncture mark at the site of the bite. A tourniquet was tied by the patient himself above the site of the bite. She had only pain at the site of bite. There was no significant alteration in the blood parameters. No neurological features were present and she was discharged after 3 days of observation. No anti-snake venom was administered during the hospital stay.

Discussion:

In our study, all the victims were females from rural background and most of them were bitten indoors and during the night time. In one of the cases, the Krait was found in bed itself. Most of the earlier studies have however, shown a male predominance in cases of Krait bites. The common krait is a nocturnally active terrestrial snake which lives close to human dwellings, but it is not vicious by nature. The common krait normally prefers to feed on small snakes. However, the krait is attracted by mice, rats and lizards that are abundant in houses. While asleep, humans may be bitten either due to accidental handling or rolling over the snake, or exposed parts of the human body might be misidentified as prey [8]. Common victims of Krait in Kandy region of Sri Lanka are reported to be farmers who live in open wattle and daub houses and farmers sleeping in watch huts in agricultural fields [10].

Site of the bite was lower limbs in all the cases, except in the case where the Krait had moved into the bed of the victim and local redness was present in the lower trunk region. The bite marks varied in appearance from clearly noticeable single and double puncture wounds to scratches and non-appreciable marks in the fatal case of Krait bite where localized redness only could be appreciated. Bites by krait produce very fine punctures similar to that made by injection needle, without any local swelling. The bites are made even more complicated by very fine puncture of the size produced by a fine injection needle without any local swelling [11]. The fang marks may be missed unless looked for very carefully.

Table 1- Case details of Krait bite poisoning

<table>
<thead>
<tr>
<th>S</th>
<th>Sex</th>
<th>Age</th>
<th>Occupation</th>
<th>Month</th>
<th>Time</th>
<th>Place</th>
<th>Site</th>
<th>Bite mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>F/25</td>
<td>Farmer</td>
<td>Indoor</td>
<td>LL</td>
<td>One</td>
<td>Not visible</td>
<td>Not</td>
<td>Scratc h</td>
</tr>
<tr>
<td>2</td>
<td>F/17</td>
<td>Student</td>
<td>Indoor</td>
<td>LT</td>
<td>One</td>
<td>Not visible</td>
<td>Not</td>
<td>Scratc h</td>
</tr>
<tr>
<td>3</td>
<td>F/19</td>
<td>Student</td>
<td>Indoor</td>
<td>LL</td>
<td>One</td>
<td>Not visible</td>
<td>Not</td>
<td>Scratc h</td>
</tr>
<tr>
<td>4</td>
<td>F/35</td>
<td>Beedi worker</td>
<td>Indoor</td>
<td>LT</td>
<td>One</td>
<td>Not visible</td>
<td>Not</td>
<td>Scratc h</td>
</tr>
</tbody>
</table>

LL=Lower Limb, LT= Lower Trunk
Neurological symptoms of envenomation were present in two of the four cases of Krait bite. The Most elapid venoms are principally neurotoxic, producing a selective neuromuscular block affecting mainly the muscles of the eyes, tongue, throat and chest leading to respiratory paralysis. Victims of Krait bite often present with a preparalytic syndrome, which includes vomiting, blurred vision, drowsiness, heaviness of eyes and tingling sensation around the mouth. Paralysis is first detectable as bilateral ptosis and external ophthalmoplegia, as ocular muscles are more sensitive to neuromuscular blockade. Later the facial muscles, palate, jaws, tongue, vocal cords, neck muscles and muscles of deglutition may become paralysed.

The intercostal muscles are paralysed before the limbs, diaphragm and superficial muscles of the digits. At any time during respiratory paralysis, obstruction by inhaled vomitus or secretion can result in sudden death. Otherwise deepening coma, non-reactive dilated pupils, twitching and convulsions precede death. In krait bites pre paralytic stage is more marked than the paralytic stage. The victim usually succumbs to death due to respiratory failure. Convulsions are usually intense in krait bites. On an average death ensues within six to twenty four hours [12-16]. Patients of snake bite are to be carefully monitored for features of systemic envenomation for a period of at least not less than twenty-four hours. Antivenom is the only effective and specific treatment available for the envenomation.

In India monovalent, bivalent and polyvalent antivenoms are commercially available, but polyvalent venoms are widely used. Antivenom therapy is most effective if given immediately after the onset of signs of systemic envenomation but studies have shown that it would never be too late to administer antivenin. In both the cases where signs of envenomation were present, 24 and 20 polyvalent ASV vials were administered. Other two cases were kept in observation and were discharged later. In the only case of fatal outcome in our study, there was a delay in diagnosis of Krait bite and the victim succumbed after thirty-six hours of hospitalization due to the complications of ensuing aspiration pneumonia and sepsis.

Apart from the symptoms of envenomation, diagnosis of snake bite is based on the history of snakebite, identification of the snake and laboratory investigations. If the offending snake is caught or killed and brought with the patient the diagnosis is made by identification of the snake. If the snake is not identified, diagnosis is made by the history and local examination of the fang marks. In case of krait bites, more often than not, there is lack of history and bite marks are unappreciable [15, 16]. Fatality was reported in one case where the diagnosis was delayed as the victim was managed symptomatically by the family physician for an insect bite. The case emphasizes on the fact that the possibility of snake bite should be considered in an otherwise healthy person who presents with sudden onset of neuroparalytic features.

References:

Original Research Paper

Pattern of Injuries in Homicidal Cases in Greater Mumbai
A Three Year Study

*Dhiraj Buchade, **Shailesh Mohite

Abstract
The present study was carried out in the City of Greater Mumbai’s all post mortem centres during the calendar year of 2004 to 2006 with aims and objective to determine the pattern of injuries in cases of homicides during this period with special reference to injuries sustained during these homicidal incidences. Total 371 cases of homicidal deaths were collected from post mortem reports, panchrama, police requisition and statements of relatives. The injuries present on the particular body area were noted with due consideration of kind of weapon used, internal organs injured and cause of death. Male victim’s preponderance was noted over female victims with male age group of 21-30 years being most commonly affected. The head face and neck region of the body was most often targeted. Internal organs most commonly affected were neck structures followed by brain while least involved organ was heart. Hard and blunt weapons were most commonly used followed by sharp edged and pointed weapons. Infanticide was most common in female infants. The most common cause of death in male victims was shock and haemorrhages and in female victims was mechanical asphyxia.

Key Words: Homicide, Pattern of Injuries, Weapon, Cause of Death, Panchrama.

Introduction:
“Homicide” is defined as willful killing of one human being by another human being. Homicide is a heinous crime against society and as old as our civilization. The present study is carried out in the City of Greater Mumbai with an aims and objectives as follows:

Aims and objectives of study:
1. To study the pattern of injuries in the incidences of homicidal deaths.
2. To study which particular body area is affected in these homicidal cases.
3. To study the involvement of internal body organs in these homicidal cases.
4. To study which kind of weapon used in these homicidal cases.
5. To study the cause of death in these homicidal cases.

Material and Methods:
A retrospective study of 3 years during the calendar years 2004 to 2006 (1st Jan 2004 to 31st Dec 2006) was carried out from data obtained from all postmortem centers in Mumbai City.

Observations and Results:
The present study demonstrated preponderance of male victims 256 (69.01%) over female 115 (30.99%) and that the age group of 21-30 years 140 (37.7%) was the most commonly affected. The mean age of victim was 32.23 years with the youngest victim being newborn infant and oldest victim of 80 years. Female children were most common victims of infanticide.

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Abrasions 286 (77.1%) was most common type of injury observed in this study followed by contusion 241 (64.9%) while chop 7 (1.8%) injuries were least commonly found. The head and neck region 233 (62.8%) of the body was most often targeted followed by abdomen 155 (41.7%). Internal organs most commonly affected in this study were neck structures 136 (36.6%) followed by brain 105 (28.3%) while least involved organ was heart 32 (8.6%).

Hard and blunt 138 (37.2%) instrument/objects were the weapons of choice, followed by sharp edged & pointed 122 (32.8%) weapons. The commonest cause of death was shock and haemorrhage 171 (46.1%), followed by head injury 102 (27.4%) and mechanical asphyxiation 98 (26.4%). The most common cause of death in male victims was shock and haemorrhage and mechanical asphyxia in female victims. Most common victims of homicidal thermal burns were females while that of firearm injuries were males. Homicidal drowning was most common in children and homicidal poisoning was not reported.

**Discussion:**

The observations and results of the present study were compared and contrasted with the work of preceding researchers as follows:

There was a preponderance of male victims 256 (69.01%) over female victims 115 (30.99%), giving a male: female ratio of 2.2 : 1 which was consistent with observations of Ghangale, Dhawane, and Mukherjee [3]; Aggarwal and Bansal [1]; Scott[12]; Hilal, Cekin, Mete and Gulmen et al [4]; Mohanty, Mohanty and Acharya [8]; Houg, Rogde and Poulsen [5]; Perry and France[10] and Sinha U S, Kapoor A K and Surendra Kumar Pandey [14]. Most of the victims were in the age group of 21 to 30 years 140 (37.7%) followed by age group 31 to 40 yrs 87 (23.4%) which was consistent with the studies of Ghangale, Dhawane, and Mukherjee [3]; Rouse [11]; Hilal, Cekin, Mete and Gulmen et al [4] and Sinha U S, Kapoor A K and Surendra Kumar Pandey [14]. The youngest victim of the present study was a newborn infant and the oldest victim was 80 year female which was consistent with study of Ghangale, Dhawane, and Mukherjee [3] and Hilal, Cekin, Mete and Gulmen et al [4].

Most of the victims have injuries caused by hard and blunt weapons followed by sharp edged & pointed weapons. These observations contradicts the findings of Ghangale, Dhawane, and Mukherjee [3]; Aggarwal and Bansal [1] and Rouse [11] where injuries by sharp edged weapons was most common followed by hard and blunt weapons. Injuries caused by hard and blunt weapons most common in this study was also contradicted by Sinha U S, Kapoor A K and Surendra Kumar Pandey [14] and Bamidele Adeagbo, Colin Clark and Kim Collins [2] where firearm injuries were most common. The firearm weapons was least commonly used in the present study which contradicts findings of Sinha U S, Kapoor A K and Surendra Kumar Pandey [14] and Bamidele Adeagbo, Colin Clark and Kim Collins [2] were firearm was most commonly used weapons. Reason for above contradictions is that patterns of injuries in homicidal cases are based on kind weapon used and availability of weapon. In Mumbai City firearm related laws are strict and firearm weapons are not easily available. While hard and blunt objects and sharp edged weapons are easily available.

The head, face and neck region of body was most often targeted which was consistent with study of Mohanty, Mohanty and Panigrahi et al[9]; Sinha U S, Kapoor A K and Surendra Kumar Pandey [14]; Kohli and Aggarwal[6] and Sheikh and Subrahmanyam[13]. The neck structures was most commonly affected organ in this study followed by brain this contradicts findings of Sinha U S, Kapoor A K and Surendra Kumar Pandey [14] where brain was most commonly affected organ followed by neck structures. Reason is most of the victims of asphyxial deaths in this study are females and childrens and they will offer less resistance in act of throttling or strangulation or smothering as compared to male victims. Further in male victims incised and stab wounds are more common on neck region due to this over all neck structures are most commonly affected organs in this study.

The most common cause of death in this study was shock and haemorrhage followed by head injury which was consistent with the study of Aggarwal and Bansal [1] but contradicts study of Sinha U S, Kapoor A K and Surendra Kumar Pandey [14] and Bamidele Adeagbo, Colin Clark and Kim Collins [2] [where head injury was most common. A homicidal thermal burn was most common in females which were also reported by Ghangale, Dhawane, and Mukherjee [3] and Aggarwal and Bansal [1]. Homicidal drowning is most common in children and victims of homicidal firearm injuries were males these findings were also reported by Aggarwal and Bansal [1].
References:


Table No. 4: according to Region of Body on which Injury was inflicted

<table>
<thead>
<tr>
<th>Region of body (Including genitals)</th>
<th>Year 2004</th>
<th>Year 2005</th>
<th>Year 2006</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head, Face &amp; Neck</td>
<td>N 79</td>
<td>72</td>
<td>82</td>
<td>233</td>
</tr>
<tr>
<td>% within Year</td>
<td>58.1</td>
<td>63.2</td>
<td>67.8</td>
<td>62.8</td>
</tr>
<tr>
<td>Thorax</td>
<td>N 52</td>
<td>32</td>
<td>116</td>
<td></td>
</tr>
<tr>
<td>% within Year</td>
<td>38.2</td>
<td>28.1</td>
<td>26.4</td>
<td>31.3</td>
</tr>
<tr>
<td>Abdomen</td>
<td>N 60</td>
<td>44</td>
<td>51</td>
<td>155</td>
</tr>
<tr>
<td>% within Year</td>
<td>44.1</td>
<td>38.6</td>
<td>42.1</td>
<td>41.7</td>
</tr>
<tr>
<td>Limbs</td>
<td>N 23</td>
<td>23</td>
<td>19</td>
<td>65</td>
</tr>
<tr>
<td>% within Year</td>
<td>16.9</td>
<td>20.2</td>
<td>15.7</td>
<td>17.5</td>
</tr>
<tr>
<td>Total</td>
<td>N 136</td>
<td>114</td>
<td>121</td>
<td>371</td>
</tr>
<tr>
<td>% within Year</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
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Table No. 6: Distribution of Cases according to Weapon

<table>
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<tr>
<th>Weapon</th>
<th>Year 2004</th>
<th>Year 2005</th>
<th>Year 2006</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>Hard and blunt</td>
<td>N 50</td>
<td>39</td>
<td>49</td>
<td>138</td>
</tr>
<tr>
<td>% within Year</td>
<td>36.8</td>
<td>34.2</td>
<td>40.5</td>
<td>37.2</td>
</tr>
<tr>
<td>Sharp &amp; pointed</td>
<td>N 44</td>
<td>44</td>
<td>34</td>
<td>122</td>
</tr>
<tr>
<td>% within Year</td>
<td>32.3</td>
<td>36.6</td>
<td>28.1</td>
<td>32.8</td>
</tr>
<tr>
<td>Firearms</td>
<td>N 8</td>
<td>8</td>
<td>6</td>
<td>22</td>
</tr>
<tr>
<td>% within Year</td>
<td>5.9</td>
<td>7.0</td>
<td>5.0</td>
<td>5.9</td>
</tr>
<tr>
<td>Ligature materials</td>
<td>N 40</td>
<td>30</td>
<td>37</td>
<td>107</td>
</tr>
<tr>
<td>% within Year</td>
<td>29.4</td>
<td>26.3</td>
<td>30.6</td>
<td>28.8</td>
</tr>
<tr>
<td>Total</td>
<td>N 136</td>
<td>114</td>
<td>121</td>
<td>371</td>
</tr>
<tr>
<td>% within Year</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
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</tbody>
</table>
### Table No. 3: Distribution of Cases according to Nature of Injury

<table>
<thead>
<tr>
<th>Nature of Injury</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abrasion</td>
<td>107</td>
<td>89</td>
<td>90</td>
<td>286</td>
</tr>
<tr>
<td>% within Year</td>
<td>78.7</td>
<td>78.1</td>
<td>74.4</td>
<td>77.1</td>
</tr>
<tr>
<td>Contusion</td>
<td>94</td>
<td>70</td>
<td>77</td>
<td>241</td>
</tr>
<tr>
<td>% within Year</td>
<td>69.1</td>
<td>61.4</td>
<td>63.6</td>
<td>64.9</td>
</tr>
<tr>
<td>Laceration</td>
<td>60</td>
<td>53</td>
<td>60</td>
<td>173</td>
</tr>
<tr>
<td>% within Year</td>
<td>44.1</td>
<td>46.5</td>
<td>49.6</td>
<td>46.6</td>
</tr>
<tr>
<td>Incised</td>
<td>33</td>
<td>33</td>
<td>18</td>
<td>84</td>
</tr>
<tr>
<td>% within Year</td>
<td>24.3</td>
<td>28.9</td>
<td>14.9</td>
<td>22.6</td>
</tr>
<tr>
<td>Stab</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>% within Year</td>
<td>0.7</td>
<td>0.9</td>
<td>4.1</td>
<td>1.8</td>
</tr>
<tr>
<td>Chop</td>
<td>8</td>
<td>2</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>% within Year</td>
<td>5.9</td>
<td>1.8</td>
<td>4.1</td>
<td>4.0</td>
</tr>
<tr>
<td>Thermal burns</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>% within Year</td>
<td>0.7</td>
<td>0.9</td>
<td>4.1</td>
<td>1.8</td>
</tr>
<tr>
<td>Firearms</td>
<td>8</td>
<td>8</td>
<td>6</td>
<td>22</td>
</tr>
<tr>
<td>% within Year</td>
<td>5.9</td>
<td>7.0</td>
<td>5.0</td>
<td>4.9</td>
</tr>
<tr>
<td>Total</td>
<td>136</td>
<td>114</td>
<td>121</td>
<td>371</td>
</tr>
<tr>
<td>% within Year</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

### Table No. 7: Distribution of Cases according to Cause of Death

<table>
<thead>
<tr>
<th>Cause of Death</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>Total</th>
</tr>
</thead>
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<tr>
<td>Head injury</td>
<td>37</td>
<td>27</td>
<td>38</td>
<td>102</td>
</tr>
<tr>
<td>% within Year</td>
<td>27.2</td>
<td>23.7</td>
<td>31.4</td>
<td>27.4</td>
</tr>
<tr>
<td>Shock &amp; haemorrhage</td>
<td>62</td>
<td>61</td>
<td>48</td>
<td>171</td>
</tr>
<tr>
<td>% within Year</td>
<td>45.6</td>
<td>53.5</td>
<td>39.7</td>
<td>46.1</td>
</tr>
<tr>
<td>Mechanical asphyxia</td>
<td>33</td>
<td>30</td>
<td>35</td>
<td>98</td>
</tr>
<tr>
<td>% within Year</td>
<td>24.3</td>
<td>26.3</td>
<td>28.9</td>
<td>26.4</td>
</tr>
<tr>
<td>Thermal burns</td>
<td>8</td>
<td>2</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>% within Year</td>
<td>5.9</td>
<td>1.8</td>
<td>4.1</td>
<td>4.0</td>
</tr>
<tr>
<td>Poisoning</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>% within Year</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Complications of injuries</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>% within Year</td>
<td>3.7</td>
<td>3.5</td>
<td>3.3</td>
<td>3.5</td>
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<tr>
<td>Total</td>
<td>136</td>
<td>114</td>
<td>121</td>
<td>371</td>
</tr>
<tr>
<td>% within Year</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

### Table No. 5: Distribution of Cases according to Involvement of Internal Organ

<table>
<thead>
<tr>
<th>Organ</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brain</td>
<td>40</td>
<td>28</td>
<td>37</td>
<td>105</td>
</tr>
<tr>
<td>% within Year</td>
<td>29.4</td>
<td>24.6</td>
<td>30.6</td>
<td>28.3</td>
</tr>
<tr>
<td>Lungs</td>
<td>20</td>
<td>17</td>
<td>17</td>
<td>54</td>
</tr>
<tr>
<td>% within Year</td>
<td>14.7</td>
<td>14.9</td>
<td>14.0</td>
<td>14.5</td>
</tr>
<tr>
<td>Heart</td>
<td>18</td>
<td>9</td>
<td>5</td>
<td>32</td>
</tr>
<tr>
<td>% within Year</td>
<td>13.2</td>
<td>7.9</td>
<td>4.1</td>
<td>8.6</td>
</tr>
<tr>
<td>Liver</td>
<td>28</td>
<td>22</td>
<td>17</td>
<td>67</td>
</tr>
<tr>
<td>% within Year</td>
<td>20.6</td>
<td>19.3</td>
<td>14.0</td>
<td>18.1</td>
</tr>
<tr>
<td>Spleen</td>
<td>18</td>
<td>14</td>
<td>23</td>
<td>55</td>
</tr>
<tr>
<td>% within Year</td>
<td>13.2</td>
<td>12.3</td>
<td>19.0</td>
<td>14.8</td>
</tr>
<tr>
<td>Kidneys</td>
<td>18</td>
<td>12</td>
<td>11</td>
<td>41</td>
</tr>
<tr>
<td>% within Year</td>
<td>13.2</td>
<td>10.5</td>
<td>9.1</td>
<td>11.1</td>
</tr>
<tr>
<td>Neck structures</td>
<td>37</td>
<td>49</td>
<td>50</td>
<td>136</td>
</tr>
<tr>
<td>% within Year</td>
<td>27.2</td>
<td>43.0</td>
<td>41.3</td>
<td>36.6</td>
</tr>
<tr>
<td>Total</td>
<td>136</td>
<td>114</td>
<td>121</td>
<td>371</td>
</tr>
<tr>
<td>% within Year</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Original Research paper

Evaluation of Errors and Its Etiological Relevance with Variables Associated With Death Certificate

* Madhao G. Raje.

Abstract

Tendency to commit serious & trivial errors while certifying death still looms large. So some one may say, there is only one certificate in the world which is full of errors and that is death certificate! This study is done to evaluate errors in medical & non-medical part and to assess causes of errors of COD. Total 353 death certificates from teaching hospital were evaluated to detect different errors. Causes of errors of COD were scrutinized & confirmed after examining COD statements extensively. 21% death certificates were incompletely written. 99% certificates were incorrectly written. P value of correct & complete certificates with that of incorrect & incomplete certificates was found insignificant. Commonest error was use of ‘with’ instead of ‘due to’ & mention of ‘MOD’ at I a. Causes of these errors (99%) were Lack of training & diagnostic difficulty. Several errors were found in non-medical part which highlight ‘routine attitude’ of certifier. To change this scenario team work is needed. Team of doctors need to certify & supervise death certificates closely. Possibility of legal action against often erring certifying doctor may be appraised publically.

Key Words: Death certificate, Error, Mode of death, Cause of death, p-value

Introduction:

Death certificate was first introduced in England & Wales in 1837. That means practice of writing death certificate is now 173 years old. Over these years appearance of death certificate has improved a lot but inaccuracies of death certificate (D.C.) still loom large. Inaccuracy of D.C. has been prevailing all around the world. Different reasons have been cited from time to time for inaccuracies or for errors of D.C. & various measures to over come errors of D.C. have been undertaken with some positive results [1].

Since 1948 strict international rules are implemented about the format of writing D.C. That means since more than half a century format of D.C. is made similar globally. So are errors of D.C. more or less similar all across the globe.

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There are many reasons for inaccuracies which include ante mortem diagnostic errors, omissions, coding errors, death before completion of medical work up, unavailability of medical records, misunderstanding of certification process, & complexity of sorting out causal sequence that led to death when multiple diseases are involved [2]. However not many investigators have probed in extensively to delineate causes of errors or to ascertain causal relationship of variables with that of errors in death certificate. Similarly errors of ‘non-medical part’ of D.C. too were evaluated by few.

So objectives of this study were framed around audit of errors in medical & non-medical part of D.C. Evaluation of ‘minor errors’ like ‘use of abbreviations’ or ‘listing of “with” instead of “due to”, etc. which show high prevalence in Indian context [3] are given substantial focus of attention in this study. Assessment of errors in non-medical part of D.C. too was given due consideration because over all quality of D.C. in Indian Teaching Institutions/Hospitals is quite poor⁴. And quality is hampered by errors in non-medical part of D.C. as well.

Aims/Objectives:
I. To assess errors in Medical & Non-medical part of D.C.
II. To explore etiological relevance of errors of Cause of Death Statement (COD).
Materials & Methods:

353 Death Certificates from 1.1.2006 to 31.10.2007 were examined. All death certificates were obtained from the record section of a teaching hospital attached with a Medical College in semi-urban part of, Vidarbha, Maharashtra, India.

Death certificates were evaluated to know prevalence of two sub classes i.e. (i) Completely written or incompletely written D.C. and (ii) Error-free or erroneous D.C. Evaluation of error/s was the main focus of this study. Errors were studied in (i) medical part of D.C. & in (ii) Non-medical part of D.C. Etiology of error/s was evaluated, brooded upon by repeated examination of (COD) cause of death statement. While doing so certain causes of error/s were speculated/considered/judged to begin with [3]. Then in view of such causes all D.C. were reviewed again & possibility of fixing one of the cause to the D.C. in hand was assessed. And thus cause of error of COD was ascertained.

All D.C. were written in standard format of D.C. provided by Govt. health department. So evaluation of complete or incomplete D.C. was readily done. These errors were detected by comparing them with published guidelines & definitions of immediate, intermediate, & underlying COD put forth by College of American Pathologist & NCHS (Table A) [3]. Base of evaluation of error in COD was international directions/instructions on how to write COD statement [16, 17].

In brief, COD statement contains two parts, Part I & Part II. Part I is formatted so that sequential information is reported with one condition per line, starting with the most recent condition on the top line & going backward in time on progressively lower lines. eg:

<table>
<thead>
<tr>
<th>Part I</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Most recent condition(closest to death)(Immediate COD) (e.g. Upper G I Bleeding) Due to or as a consequence of:</td>
</tr>
<tr>
<td>B. Next oldest condition (e.g. Ruptured Esophageal varices) Due to or as a consequence of:</td>
</tr>
<tr>
<td>C. Oldest (original/initiating) condition (e.g. Alcohol induced Liver Cirrhosis)</td>
</tr>
</tbody>
</table>

Each condition can cause the one on the line above it. There is a sequence of causes, C causes B & B causes A & A is a last disease which has resulted in death. Part II contains ‘Other significant condition’ which though contribute to death, does not become part of ‘causal sequence’, so cannot be included in Part I.

Table A. Guidelines Definitions* for proper completion of Cause of death statement as put forth by CAP & NCHS.

<table>
<thead>
<tr>
<th>Cause of death Part I#</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Immediate cause of death</strong>: Disease or complication that occurred closest to the time of death.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cause of death Part II$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intermediate cause of death</strong>: Disease/condition/complication that occurred in between underlying &amp; immediate cause of death.</td>
</tr>
<tr>
<td><strong>Underlying cause of death (UCOD)</strong>: Disease/condition that initiated the events which eventually led to death.</td>
</tr>
<tr>
<td><strong>Other significant conditions</strong>: Pre-existing/co-existing conditions which might have contributed to death but have not resulted into underlying cause of death.</td>
</tr>
</tbody>
</table>

Non significant conditions:

* Mechanism of death (MOD): - Physiological/Biochemical derangement that has been caused by COD & is the means by which COD exerts its lethal effect. Exam. – Cardiac arrest/cardio-respiratory arrest.

Non-specific processes:- Fatal derangement that involves Patho-physiological process but do not denote Specific underlying cause. E.g.-Multi-organ failure, Pulmonary edema.

*CAP indicates College of American Pathologists; NCHS, National center for health & statistics.

#All conditions listed in Part I have sequential cause & effect relationship when read from bottom to top.

$Incidental conditions that existed at the time of death but have no causal relationship with death & should Not be indicated unless local law/tradition.

*Mechanism of death & nonspecific conditions should not be indicated in COD, as they are of little value when cited as COD.

Omission of ‘Time interval’ in COD has always been found commonest of all errors by nearly all investigators. Some investigators observed that Time interval was not mentioned in the format of D.C. This study too observed that dotted line to be filled in was not printed in front of Time interval. Secondly time interval was not printed separately in front of each of Ia, Ib, & Ic.
So this omission of dotted line did create confusion in the minds of certifier. And that is why many certifiers opted to omit writing Time interval. So this single error was excluded from tabulation & measurement. Except this error of ‘Time interval’ Errors were typified into ten different types, & accordingly measured. To improve perfection of evaluation of errors of D.C. errors were typified according to ten characteristics [3].

Some investigators divided these errors into major & Minor, however in order to take holistic view such distinction was not exercised in this study while measuring them. Errors in Non-medical part of D.C. were observed in eight areas. Base of selection of these areas was standard format of D. C. itself. Errors were mostly of omission or incomplete write ups. Feed back was obtained from some certifiers to explore the reasons behind errors.

Then speculated causes of errors of COD were searched in pre-determined six areas. These areas are (i) Ambiguity of Ante-mortem diagnosis, (ii) Complicated format of D.C., (iii) Lack of training to certifying doctor, (iv) Death taking place before complete diagnoses. Diagnoses remain obscure in some of the deaths, (v) Indistinct or incomprehensible immediate cause of death (though diagnoses are known). To facilitate comprehension & illustrate methodology a few examples are mentioned here. Take first example of “Ambiguity of ante-mortem diagnoses”. COD of this certificate reads as follows, Cardio respiratory arrest i.e. mechanism of death, is written at I a, which is an error. This error indicates doctor’s lack of training. Because international instructions clearly state that mechanism of death should not be written at I a. (Table A) I b reveals ‘severe anemia with hepatosplenomegaly with peripheral circulatory failure with hypovolemic shock’.

This is cluster of sign, mechanism of death, part of diagnoses, which throws light on the confusion & ignorance of certifier. These observations disclose that certifier could not ascertain UCOD. So such certificate was included under ‘Ambiguity of ante-mortem diagnoses’. In another example PCF with CRA was mentioned in front of I a, K/c HTN, IHD, CRF, COPD was written in front of I b, and space in front of Ic was left blank. Here UCOD seems known to certifier, however Immediate COD was incomprehensible. So such certificate was included under ‘Incomprehensible Immediate COD’. Similarly causes behind errors of COD statement were derived.

Results:

Out of 353 279 Death certificates (79% certificates) were found written without omission. 74 (21%) or almost close to 1/4th of D.C. were not completely filled i.e. one more information either in medical or in non-medical part of 74(21%) D.C. was omitted. Correctly written D.C. was 1%, meaning errors are almost close to 100%. So accuracy of D.C. is lowest of all references this investigator came across. Table I. Most of the certificates (49%) belong to pediatric age i.e. below 10 years of age. And out of them only two certificates were accurately written & these two certificates did belong to pediatric age group. Table II.

Every single D.C. revealed multiple errors. So total number of errors outnumbered total number of D.C. Total number of errors were 1126. Error of mentioning ‘with’ instead of ‘due to’ while writing COD was the commonest of all, amounting to 25% of errors. ‘Use of abbreviation in COD’ was the second most common error (21%). Listing of ‘only MOD’ was the third commonest type of error, i.e. 19%. Fourth commonest error was mentioning of MOD & UCOD simultaneously at Ia of D.C. Listing of ‘signs & symptoms in COD’ comprised of 3% of errors. ‘Mention of multiple causes’ & writing ‘improper sequence of COD’ was 8% & 6% respectively. Table III. (MOD=Mechanism of death, UCOD=Underlying cause of death)

COD statement was excluded while evaluating non-medical part of death certificate. Information to be written in this part of certificate is not strictly medical. It may be written by a non-medical person if information is made available. However certifying doctor himself/herself invariably writes it [13]. 8 areas were selected where error/s could be found. Multiple errors were detected in every D.C. so number of errors outnumbered total number of D.C. Total number of errors in non-medical part of D. C. were 561. Commonest error was omission of ‘name of informer’, it comprised of 59% of errors. 15% of error was omission of ‘doctor’s name & signature’ at the end of the D.C. Error in mentioning Religion of deceased was 13%. Fourth commonest error (9%) was, not writing ‘identity’ of deceased correctly or completely. Date & time of death was written correctly every time i.e. 100% accuracy in writing exact time & date of death was observed. 3 D.C. were written without mention of sex of deceased. Age of deceased was not written by certifier in 9 death certificates. Table IV.

Five speculated causes were marked to be likely reasons behind errors of COD. Every
D.C. revealed possibility of multiple causes behind errors of COD. E.g. Presence of ‘Ambiguity of Ante-mortem diagnoses’ & that of ‘Untrained doctor’ were observed simultaneously in many D.C. So again number of speculated causes behind errors of COD were more in number than total number of D.C. Total number of speculated causes were 404. Out of them ‘Untrained doctor’ was the commonest cause of inaccurate COD, i.e. 73% errors were due to untrained doctors.

“Ambiguity of Ante-mortem diagnoses” & “Incomprehensible Immediate COD” both were 12% each, which were second most common cause behind errors. Complicated format of D.C. caused 1% error while Death-an overall incomprehensible event caused 2% of error.

**Table V.**

**Statistics:** Fisher exact test was applied. P value of correct & complete certificate was insignificant, P = 0.62. Other observations were subjected to measure of percentage. Percentage of certificate & that of errors were separately assessed.

**Discussion:**

Health statistics, national mortality, morbidity statistics & data of prevalence of disease is derived from D.C. Proper completion & accuracy of death certificate is essential to help create such data. To meet this need medical students & interns are taught about D.C. all over the globe. However despite repeated instructions, training workshops to clinician, frequency of error remains more or less static.

Hence this study included evaluation of death certificate, assessment of errors found in medical & non-medical part of certificate, & study of causes of these errors.

This study revealed 21% certificates incompletely written, or had omissions. However, Amel El Amin Mohammed EL-Nour et al found 98.2% certificates incompletely filled in a study conducted in pediatric hospitals of Khartoun state of Sudan during 2004. During 1993, Hanzlick reviewed 56 death certificates: 63% of certificates showed either omission or error in COD. This study found lower frequency of incompletely written D.C., may be because death certificate were obtained from a teaching hospital. 79% certificates were completely written, but showed inaccuracies (Table I). This is in accordance with Jordan JM & Bass MJ of Dept. of Family Medicine of University of Western Ontario, London who found 68.1% death certificates were written in an acceptable fashion.

Frequency of inaccuracy was quite high in this study. No similar reference was detected elsewhere. 99% COD of this study showed inaccuracies. Hanzlick & Randy MD et al examined 1267 deaths during May 2003 to May 2004 at The Fulton Medical Center, Atlanta, GA & found 47% of errors involved omissions, incomplete & incorrect information.

Reason behind inaccuracy was found to be lack of training (72% of errors, Table V), similar findings were observed else where but reason behind omission invites more analysis. High rate of pediatric deaths i.e. 49% (below 10 years, Table II) might be responsible for accelerated inaccuracies, because infants & children succumb to death many times before being properly diagnosed.

High pediatric death rate was also observed by Kathryn Wilkins of Canada. 24% of errors of ‘Diagnostic difficulty’ found in this study (Table V) do explain this high rate of inaccuracies. 81% of certificates of this study revealed mention of ‘With’ instead of ‘Due to’, a most common minor error. 60% of certificates showed ‘Listing of only MOD at Ia’, most common major error. Errors found in this study are slightly on a higher side. Table III.

This study observed 23% of certificates did not have legible signature or name of doctor mentioned at the bottom of certificate. Similarly, Pediatric hospitals of Sudan had observed 18% of certificates were not signed by doctors.

In Beirut, almost 50% of certificates did not contain signature of certifier. Omission in writing details of ‘Identity’ of deceased was found in 15% of certificates. 1% & 3% of
certificate did not mention sex & age of deceased respectively. B Swift & K West of Dept. of Histopathology from UK observed 10% of certificates were of very poor standard, illogical & inappropriately completed [1].

All inclusive, this picture points towards ‘attitude’ of certifier. However, to ascertain causes of these errors of Non-medical part of certificate other than the ‘attitude/mind set’ of certifying clinician seems beyond the scope of this study. G. Maudsley & EMI Williams of University of Liverpool mentioned in Journal of Public Health Medicine, that some certifiers appear ‘lazy’. They have further stated that major factor in deficient death certification is ‘routinized orientation’ of certifier [12]. Other investigators have derived the similar inference’. This mind’s set needs to be sternly dealt with. But it’s not one man’s job. Stringent action against erring doctor needs amendment in law. E.g. there are fines & penalties to physician for delaying death certification, in Texas law [16].

Various causes of errors of COD have been mentioned by other investigators [10, 13]. Based on repeated examination of certificates this study concentrated on five most pertinent causes of COD. Clerk & Gladwin in their report to Parliament of England, in 2003 mentioned that cause of error may be more serious, i.e. inadequate diagnosis of patient’s last illness or undiagnosed underlying cause of death [10]. Thus causes of errors of COD were speculated by many investigators. Based on those references this investigator pre-determined couple of speculated causes & worked upon them.

Ambiguity of ante-mortem diagnoses, death- an incomprehensible event, & incomprehensible immediate COD comprise together of “Diagnostic difficulty”, which is a reason behind 26% of errors of COD found in this study. Johannes Attems, Stephanie Arbes, et al from Austria observed that over all clinical diagnostic accuracy rate of immediate cause of death was (CDARCD) 52.5% in geriatric population [8] So ‘lack of training (73%) & diagnostic difficulty (26%) comprises major chunk of causes of errors of COD (Table V). Together they amount to 99% & are responsible for almost all errors of COD, according to this study. Complicated format of D.C. caused only 1% of error in this study, indicating that complicated format was not bothersome. A study in Sudan too disclosed that 90% of doctors confirmed clarity of format of death certificate [13]. So amendment of format appears needless.

Conclusion:
Magnitude of errors was overwhelming; nature of errors was trivial in medical & non-medical part of certificate. To minimize these errors ‘attitude’ & ‘skill’ of doctors need to be improvised. Instead of single doctor, team of doctors should be comprised to certify death. All death certificates should be subjected to supervision, if required.

References:
11. Guidelines on Tracking child & Maternal Mortality. The United nations Population Fund, task force on ICPD Implementation, 220 East, 42ndstreet, New York, NY 10017 USA or E-mail to: pierce@unfpa.org
Table I. Frequency of Errors against Complete & Incomplete D.C.

<table>
<thead>
<tr>
<th>Death Certificate</th>
<th>Correct COD</th>
<th>Incorrect COD</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. (%)</td>
<td>No. (%)</td>
<td>No. (%)</td>
</tr>
<tr>
<td>Completely written</td>
<td>2 (1)</td>
<td>277 (99)</td>
<td>279 (79)</td>
</tr>
<tr>
<td>Incompletely written</td>
<td>0</td>
<td>074 (100)</td>
<td>074 (21)</td>
</tr>
<tr>
<td>Total</td>
<td>2 (1)</td>
<td>351 (99)</td>
<td>353 (100)</td>
</tr>
</tbody>
</table>

Table II. Frequency of age group & COD

<table>
<thead>
<tr>
<th>Age Group</th>
<th>No. of Death Certificate</th>
<th>Correct</th>
<th>Incorrect</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-&lt;1Yr</td>
<td>109</td>
<td>1</td>
<td>108</td>
</tr>
<tr>
<td>1—10</td>
<td>64</td>
<td>1</td>
<td>63</td>
</tr>
<tr>
<td>11—20</td>
<td>12</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>21—30</td>
<td>21</td>
<td>0</td>
<td>21</td>
</tr>
<tr>
<td>31—40</td>
<td>20</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>41—50</td>
<td>26</td>
<td>0</td>
<td>26</td>
</tr>
<tr>
<td>51—60</td>
<td>42</td>
<td>0</td>
<td>42</td>
</tr>
<tr>
<td>61—70</td>
<td>37</td>
<td>0</td>
<td>37</td>
</tr>
<tr>
<td>71—80</td>
<td>17</td>
<td>0</td>
<td>17</td>
</tr>
<tr>
<td>81—90</td>
<td>5</td>
<td>0</td>
<td>5</td>
</tr>
</tbody>
</table>

Table III. Frequency of Typified Errors in COD

<table>
<thead>
<tr>
<th>Types of error in COD</th>
<th>Errors out of 351 COD</th>
<th>% of Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Listing of Only MOD At I a</td>
<td>211</td>
<td>60</td>
</tr>
<tr>
<td>Mentioned multiple Causes of Death</td>
<td>91</td>
<td>25</td>
</tr>
<tr>
<td>Incorrect sequence of COD</td>
<td>67</td>
<td>19</td>
</tr>
<tr>
<td>Single cause of death but not adequate</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Single cause but order not correct</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Single cause which needs further explanation</td>
<td>21</td>
<td>6</td>
</tr>
<tr>
<td>MOD at I a with UCOD</td>
<td>167</td>
<td>47</td>
</tr>
<tr>
<td>Use of abbreviations in COD</td>
<td>241</td>
<td>68</td>
</tr>
<tr>
<td>Listing of signs &amp; Symptoms in COD</td>
<td>31</td>
<td>9</td>
</tr>
<tr>
<td>Mentioned &quot;with&quot; instead of &quot;Due to&quot;</td>
<td>286</td>
<td>81</td>
</tr>
<tr>
<td>Total</td>
<td>1128</td>
<td>100</td>
</tr>
</tbody>
</table>

Table IV. Distribution of Errors in Non-Medical Part of D.C.

<table>
<thead>
<tr>
<th>Non Medical Part of D.C.</th>
<th>Errors Found</th>
<th>Errors (%)</th>
<th>Erroneous DC (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identity</td>
<td>53</td>
<td>9</td>
<td>15</td>
</tr>
<tr>
<td>Age</td>
<td>9</td>
<td>1.5</td>
<td>3</td>
</tr>
<tr>
<td>Sex</td>
<td>3</td>
<td>0.5</td>
<td>1</td>
</tr>
<tr>
<td>Date &amp; time of Death</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Hospital Reg. Number</td>
<td>11</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Religion</td>
<td>71</td>
<td>13</td>
<td>20</td>
</tr>
<tr>
<td>Legible signature &amp; name of certifying Doctor</td>
<td>82</td>
<td>15</td>
<td>23</td>
</tr>
<tr>
<td>Name of Informer</td>
<td>332</td>
<td>59</td>
<td>94</td>
</tr>
</tbody>
</table>

Fig 2: Age-wise Frequency of D.C.

Fig 3: Distribution of Errors in Non-Medical Part of DC

Fig 4: Causes of COD
Form no.4. (See rule 5)

Sr. No. ----
1. Dt. Of death: ----------------------------- Time : ------------
2. Full Name of deceased: -----------------------------------------
3. Name of the Father/Husband: ----------------------------------
4. Place of death, ward no. 41. Nationality: ----------------------
5. Permanent residential address: ----------------------------------
6. Cause of death: 62. Index Reg. No. of Hospital:---------------

And date of admission: ----------------------

<table>
<thead>
<tr>
<th>Sex</th>
<th>Age in years, Last Birthday</th>
<th>Date of birth</th>
<th>Single, Married, Widow, Widower, Divorcee/f.</th>
<th>Religion</th>
<th>Occupation</th>
<th>Age of death</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>If under 1 year</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Months, Days</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Cause of death:

I. Immediate cause

State the disease, injury, or complication
Which caused death, not mode of dying
Such as heart failure, asthenia etc.
Antecedent cause
Morbid conditions if any giving rise to last.
(b) above cause, stating underlying conditions
(b) above cause, stating underlying conditions
(c) above cause, stating underlying conditions

Other significant conditions contributing to the death but not related to the disease or
Conditions causing it.

Accident, Suicide, Homicide, (specify) How did injury occur? --- If deceased was female was pregnancy associated with death? (Yes/No). Was there a delivery? ---- (Yes/No).

13. Informants:
   (i) Name: ------------------------------------------
   (ii) Address: ----------------------------------------- Signature of Informer/Medical Officer.
   Date: ----------.

Table B. Format of Death Certificate
Original Research Paper

Relation between Organ Weights and Body Weight in Adult Population of Bhavnagar Region- A Post-Mortem Study

*J.A. Tanna, * P.N. Patel, ** S.D. Kalele

Abstract

The Current Study was conducted at mortuary complex of Sir T. Hospital, Bhavnagar, Gujarat, during the period of one year 01 Nov. 2009 to 30 Oct. 2010. In this study total 103 cases (72 Male, 31 Female) were selected as per Inclusion & Exclusion criteria. The data collected is tabulated, subjected to statistical analysis and then compared with standard Indian texts and the earlier studies. Brain weight in the region was noted to be 1.98% – 1.76% of body weight and also weight of spleen was noted to be 0.26% - 0.16% of body weight averagely, both of which are higher than data given in the textbooks. Whereas the Right lung weight and Left Lung weight was noted to be 0.90% - 0.66 % & 0.82% – 0.60% of body weight respectively, which is lower than the textbooks. All factors which are responsible for such differences, demands further research.

Key Words: Organ weights, % of body weight

Introduction:

In almost all the branches of Medicine, doctors need to know the normal organ weights and measurements, so also the Forensic Experts, as any deviation from the normal weight (increase or decrease), suggest presence of some pathology or trauma, guiding in determination of the exact cause of death. However, the organ weights depend on the Race, Age, Gender, State of Nutrition, the Environmental conditions of the place of residence and Socio-economic Conditions. In a vast country like India, where the Environmental and Socio-economic Conditions have a very wide range, it is very difficult to generalize the range of normal weights in the country.

The studies to establish the range of organ weights and relation to body weight are scanty in Gujarat. So, the current study was undertaken at the Mortuary Complex of Sir T. Hospital, Bhavnagar, to determine the normal range of organ weights, and also to establish the relation between organ weights and body weight in the adult population of Bhavnagar region (Bhavnagar and Amreli districts of Gujarat).

Methodology:

The current study was undertaken at the mortuary complex of Sir T. Hospital, Bhavnagar. Out of the total dead bodies brought to P.M. Room during the study period starting from Nov 2009 to Nov 2010 the cases of total 103 cases were selected for the study, and then their organ weights were noted on standard electronic weighing machine and measurements taken with wooden organ measuring boards. At the end of the study, Mean and Standard Deviation were used to determine the normal range of organ weights and their relation to the body weight.

Inclusion Criteria:

Out of all the Cases brought to P.M. Room, the Cases satisfying following criteria were selected:
1. Only cases of Vehicular Accident, Hanging and Poisoning cases were selected, where there is death within 24 hrs of the act and there is no evidence of gross pathology or trauma to the major internal organs.
2. The Post-mortem Examination was conducted within 6 hours of death.
3. Cases having age between 18-60 years.

Exclusion Criteria:

Cases not satisfying the above criteria were excluded from the study.

Method used for removing the organs is standard as under:
1. **Brain** – After opening the skull cap, the dura is cut open with a small cut and then
folded along the midline then e the falx is freed. Brain is removed by inserting four fingers of left hand under the frontal lobes and cutting the nerves and vessels in the floor. The tentorium is cut open along the posterior border of petrous bone. The knife is passed in to the foramen magnum and cervical cord, and vessels are cut. The right hand grasps the cerebellum and brain is removed from the cranial cavity.

2. **Heart** – It is held from the apex and lifted upwards and pulmonary vessels, superior & inferior vena cava and ascending aorta are cut as far away as possible from the heart.

3. **Lungs** – One hand is passed between parietal and visceral pleura. Pleural adhesions, if any, should be cleared. Slip both hands between the lateral portion of one lung and the inner side of the chest wall. The left hand works up to apex and right hand up to base then they meet at the hilum, from where it is cut with a knife as far away as possible.

4. **Liver** – is pulled medially and knife is passed behind it to free it from its attachments.

5. **Spleen & Pancreas** – Spleen and tail of pancreas are held in the left hand and dissection is carried out behind them up to mid line. The diaphragmatic surface is held in the hand and the vessels in the hilum are cut and spleen and pancreas are separated.

6. **Kidneys** – The peritoneum & fat are cut just outside the lateral border of kidney, which is then grasped in the left hand and mobilized by dissection up to midline. The ureter is identified and freed up to bladder and then both the kidneys are cut near its hilum.

**Note:**
- After removal of the organ, if any blood is present on the surface, it is removed by washing and drying.
- If any peritoneal fat or any other attached tissues present with the organ, then it is removed with careful dissection and washing.
- In heart, if blood is present in the cavities, it is removed with running tap-water.
- Brain weight is weight without pituitary gland.
- Liver weight is weight without gall-bladder.

**Statistical Analysis:**

The data collected from the Post-mortem Examination of the cases was subjected to statistical analysis by initially, finding the % of body-weight for each organ and then Maximum, Minimum, Mean were calculated and than

Standard Deviation (S.D.) was derived by the formula

\[
S.D. = \sqrt{\frac{\sum_{n=1}^{n} (x - \bar{x})^2}{n-1}}. \quad [\text{Where } x= \text{organ weight}, \quad \bar{x}= \text{Average}].
\]

Here the Standard Deviation will signify, that, if the Mean ± 2S.D. value is considered than 95% of the observation will fall in the normal distribution curve. So, the range is established as Mean ± 2S.D. The same Exercise was done for male and female data separately also, where n=72 for Males and n=31 for Females.

**Observation:**

During the period of one year (01<sup>st</sup> Nov 2009 to 30<sup>th</sup> Oct 2010), total 103 cases as per the inclusion & exclusion criteria were selected and data collected. The following table is drawn out of the data collected:

**Table 1: Range of Organ Weights & its Relation to Body Weight (BW) in Total 103 Cases:**

<table>
<thead>
<tr>
<th>Organ</th>
<th>In Grams</th>
<th>Max</th>
<th>Min</th>
<th>Range</th>
<th>10% of BW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brain</td>
<td></td>
<td>1532</td>
<td>689</td>
<td>1369–990</td>
<td>1.98–1.76</td>
</tr>
<tr>
<td>Heart</td>
<td></td>
<td>399</td>
<td>150</td>
<td>323–234</td>
<td>0.51–0.39</td>
</tr>
<tr>
<td>Rt. Lung</td>
<td></td>
<td>675</td>
<td>238</td>
<td>557–413</td>
<td>0.90–0.66</td>
</tr>
<tr>
<td>Lt. Lung</td>
<td></td>
<td>630</td>
<td>185</td>
<td>517–374</td>
<td>0.82–0.60</td>
</tr>
<tr>
<td>Rt. Kidney</td>
<td></td>
<td>182</td>
<td>90</td>
<td>141–104</td>
<td>0.24–0.16</td>
</tr>
<tr>
<td>Lt. Kidney</td>
<td></td>
<td>189</td>
<td>83</td>
<td>146–108</td>
<td>0.25–0.17</td>
</tr>
<tr>
<td>Liver</td>
<td></td>
<td>1712</td>
<td>734</td>
<td>1444–995</td>
<td>2.09—1.77</td>
</tr>
<tr>
<td>Spleen</td>
<td></td>
<td>202</td>
<td>88</td>
<td>157–100</td>
<td>0.26–0.16</td>
</tr>
<tr>
<td>Pancreas</td>
<td></td>
<td>106</td>
<td>39</td>
<td>82–52</td>
<td>0.12–0.10</td>
</tr>
</tbody>
</table>

Calculated as Range = Mean ± 2 S.D.

* In Range in grams – Round Figures are taken for easy interpretation. If, the figures after decimal point is >0.5 then it is taken as 1, and if it is <0.5 then it is taken as 0.

**Discussion:**

The above table is matched with the results of the earlier investigators for the comparison. The data as per Essentials of Forensic Medicine – Dr. K.S.N. Reddy is as in (Table A). As per Study conducted at New Delhi “Normal organ Weights in Indian Adults – Medico legal Update- Vol. 6. No .2 (2006-03-2006-06)”

<table>
<thead>
<tr>
<th>Organ</th>
<th>Male</th>
<th>Organ</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brain</td>
<td>1219.7gm</td>
<td>Brain</td>
<td>1156.2gm</td>
</tr>
<tr>
<td>Liver</td>
<td>1210.9gm</td>
<td>Liver</td>
<td>1092.5gm</td>
</tr>
<tr>
<td>Heart</td>
<td>259.9gm</td>
<td>Heart</td>
<td>217.7gm</td>
</tr>
<tr>
<td>Spleen</td>
<td>131.3gm</td>
<td>Spleen</td>
<td>121.9gm</td>
</tr>
<tr>
<td>Lung (Rt.)</td>
<td>417.6gm</td>
<td>Lung (Rt.)</td>
<td>369.7gm</td>
</tr>
<tr>
<td>Lung (Lt.)</td>
<td>376.8gm</td>
<td>Lung (Lt.)</td>
<td>340.6gm</td>
</tr>
<tr>
<td>Kidney (Rt.)</td>
<td>108.3gm</td>
<td>Kidney (Rt.)</td>
<td>98.6gm</td>
</tr>
<tr>
<td>Kidney (Lt.)</td>
<td>104.2gm</td>
<td>Kidney (Lt.)</td>
<td>98.3gm</td>
</tr>
</tbody>
</table>
Brain - The above data comparison shows that the Brain Weight in our study ranges 1.98 – 1.76% of the body weight which is higher than, 1.4% given in Dr. K S. N. Reddy’s book. Probable reasons are (i) Out of 103 cases, in 40 cases Cause of Death was Head injury, so this could have implications in raising the brain weight. However, increased figures of brain weight are not very significant in the head injury cases alone, as it has been observed with other cases too. (ii) Edema after death may interfere with the results.

Lungs - Right lung (0.90 – 0.66% of B.W.) weighed greater than Left lung (0.82 – 0.60% of B.W.), and averagely weighed less than 1% of bodyweight given in the textbooks. Probable Reason is that Males outnumber the Females in the study, and as can be seen from table no. 2, lungs of Males weigh less, in terms of percentage of bodyweight, this may be due to the prevalence of smoking in this region.

Kidneys- Left Kidney (0.25 – 0.17% of B.W.) weighed slightly greater than the Right one (0.24 – 0.16% of B.W.).

Liver – Livers in Females (2.43- 1.47% of B.W.) weighed greater than in Males (2.12 – 1.78% of B.W.).

Spleen – Weight of spleen (0.26 – 0.16% of B.W.) is greater than 0.16% average given in the books. Probable reason is High prevalence of Malaria in the area, which in chronic form raise the spleen weight. All of these demands further detailed study, with histo-pathological examination of the organs & Blood peripheral smear examination for Malarial Parasite.

References:

Table A

<table>
<thead>
<tr>
<th>ORGAN</th>
<th>In Gms</th>
<th>% of BW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brain</td>
<td>1400(M) 1275(F)</td>
<td>1.4</td>
</tr>
<tr>
<td>Heart</td>
<td>300(M) 250(F)</td>
<td>0.40-0.45</td>
</tr>
<tr>
<td>Lt. Lung</td>
<td>360-570</td>
<td>1</td>
</tr>
<tr>
<td>Rt. Lung</td>
<td>325-480</td>
<td>1</td>
</tr>
<tr>
<td>Rt. Kidney</td>
<td>130-160(M)</td>
<td></td>
</tr>
<tr>
<td>Lt. Kidney</td>
<td>120-150(F)</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Comparison between organ weights in Males & Females:

<table>
<thead>
<tr>
<th>ORGAN</th>
<th>Range In Gms</th>
<th>Range of % of B.W.</th>
<th>Range In Gms</th>
<th>Range of % of B.W.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brain</td>
<td>1412 – 1097</td>
<td>1.99 – 1.77</td>
<td>1157 – 860</td>
<td>1.96 – 1.76</td>
</tr>
<tr>
<td>Heart</td>
<td>330 – 251</td>
<td>0.49 – 0.39</td>
<td>303 – 196</td>
<td>0.53 – 0.39</td>
</tr>
<tr>
<td>Rt. Lung</td>
<td>568 – 440</td>
<td>0.88 – 0.64</td>
<td>528 – 353</td>
<td>0.93 – 0.69</td>
</tr>
<tr>
<td>Lt. Lung</td>
<td>528 – 401</td>
<td>0.81 – 0.59</td>
<td>488 – 313</td>
<td>0.85 – 0.63</td>
</tr>
<tr>
<td>Rt. Kidney</td>
<td>146 – 109</td>
<td>0.23 – 0.15</td>
<td>130 – 92</td>
<td>0.24 – 0.18</td>
</tr>
<tr>
<td>Lt. Kidney</td>
<td>151 – 113</td>
<td>0.24 – 0.16</td>
<td>135 – 96</td>
<td>0.25 – 0.19</td>
</tr>
<tr>
<td>Liver</td>
<td>1501 – 1104</td>
<td>2.12 – 1.78</td>
<td>1181 – 874</td>
<td>2.43-1.47</td>
</tr>
<tr>
<td>Spleen</td>
<td>164 – 105</td>
<td>0.25 – 0.15</td>
<td>135 – 95</td>
<td>0.24 – 0.18</td>
</tr>
<tr>
<td>Pancreas</td>
<td>80 – 57</td>
<td>0.12 – 0.10</td>
<td>72 – 41</td>
<td>0.11 – 0.09</td>
</tr>
</tbody>
</table>

*Range is calculated as Range = Mean ± 2 S.D.
*In Range in grams – Round Figures are taken for easy interpretation. If, the figures after decimal point is >0.5 then it is taken as 1, and if it is <0.5 then it is taken as 0.
Developing and Maintaining Website of Department of Forensic Medicine and Toxicology: a need of the hour

*Sabri I., **Kumar A. ***Husain M., ****Yadav M. *****Das S., ******Usmani J. A.

Abstract

With recent advancement of civilization, man has been inventing various tools to assist him in living in the changed environment. Online Medical Education System has now become reality. Developing and maintaining website of Department of Forensic Medicine and Toxicology by every medical college is the need of the hour. Developing and maintaining a website is not a difficult task for any department irrespective of the status of the institution. The financial burden is not very much. What makes this task so difficult is the lack of knowledge in this area rather than hurdles on the way. Authors have tried to clarify the various doubts regarding this area i.e. how the website can be developed, the financial burden to register a website, website maintenance, role of on-line medical education, undergraduate and postgraduate students benefits by the website, website use to associate different departments and institutions, obtaining updated information via Internet and other websites, the security issues while sharing the information as well as updating. It is envisaged that whence the departments develop their website, they may be affiliated to IAFM website for their greater visibility.

Key Words: Internet, Website, Forensic Medicine, IAFM, Toxicology, Medical Education System

Introduction:

The word Internet is an abbreviation of INTERNATIONAL NETWORK, an INTERnational NETwork of computers spread throughout the globe. The basic idea of internet is to connect all these computers with each other by connection network [dial-up connection, LAN, WAN, Wireless network.]

INTRANET: An intranet is an internal, secured business environment, which uses HTML and TCIP protocols like the Internet, but operates on a LAN (local area network) With recent advancement of civilization; man has been inventing various tools to assist him in living in the changed environment.

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****Professor, DFM, JNMC, AMU, Aligarh,
*****Professor, DFM, SMSR, Sharda University
****** Prof. & HOD, DFM, HIHT Univ., Dehradun
Office bearers IAFM:*.*, ***, ****, *****

URL: Uniform Resource Locator. The URL specifies the Internet address of a file stored on a host computer.

NIC: an abbreviation for Network Interface Card, this is a card inserted into your computer or laptop that allows it to communicate with a network.

The use of mobile phone, Computer and internet is a daily routine these days. Internet is increasingly utilized by researchers, health care providers, and the public personals to seek medical as well as other information.

India also provides a powerful tool for public health messaging. In the present scenario, a degree of adeptness in the use of the Internet is a grave necessity. Search engine is a searchable database of Internet files collected by a computer program. Understanding the needs of the intended audience and how they use websites is critical for website developers to provide better services to the intended users. [1]

India has the highest number of medical schools in the world. Teacher shortages and inadequate training of existing faculty are a major problem. On-line faculty development and learning is a plausible component of developing medical teachers in the essentials of pedagogy [2]. Online Medical Education System has now become reality with more and more websites providing online education useful for both medical students as well as doctors involved in medicolegal work.
With the advent of internet the means of communication has now changed to emails instead of letters. Likewise to have a fast communication as well as imparting knowledge gradually the websites are being created to have a robust system; rather in present era it has become imperative to have greater visibility all over the globe.

There is a dire need to have professionally managed website of Indian Academy of Forensic Medicine to keep pace with present scenario. In the field of medicine, especially in forensic medicine, internet can be most important tools to popularize this branch amongst younger generation. Simultaneously developing and maintaining website of Department of Forensic Medicine and Toxicology by every medical college is the need of the hour.

Developing and maintaining a website is not a difficult task for any department irrespective of the status of the institution. The financial burden is such that any department can maintain a website by using some amount of imprest money. What makes this task so difficult is the lack of knowledge on this area rather than hurdles on the way.

Authors have tried to clarify the various doubts regarding this area i.e. how the website can be developed, what is the financial burden to register a website, how the website can be maintained, role of on-line medical education, how undergraduate and post-graduate students can be benefitted by the website, how the website can be used to associate different departments and institutions, how updated information can be obtained via Internet and other websites etc. It will also cover various security issues while sharing the information as well as updating. It is envisaged that whence the departments develop their website, they may be affiliated to IAFM website for their greater visibility.

**Website:** Internet website contains all the information offered by a particular organization, individual, or company, and will sometimes include links to other sites as well.

Website providing Online Training in Forensic Medicine
1. www.dna.gov,
2. www.nfstc.org,
3. www.cftco.com,

**Webpage:** Webpage is a small portion of website allotted to particular part.

What is the need to have a website of department of Forensic Medicine and Toxicology?

1. To provide information related to the department online.
2. To discourage use of paper and have eco-friendly communication.
3. To display information online for undergraduate and post-graduate students in forensic medicine department.
4. To develop an online museum concept so that the need of specimens is minimized.
5. Sharing information via internet by providing to each other.
6. PowerPoint sharing is a good idea to help each other.
7. Person can visit each other and can interact with each other.
8. One can just search for each other to have external examiners from nearby places.

In order to develop a website of his department, the following is necessary
1. Atleast one Computer with printer and internet facility installed on it.
2. Atleast one domain name to be registered by internet domain registrar.
3. Webspace to be booked from a reputed webhosting company.
4. A person/ resident/faculty member with specialized training in the field.
5. Webmaster to develop the website.
7. Server level programming of Domain Control panel, Hosting Control panel

**Domain Name** is the name of website eg: forensicindia.com, medbeats.com. Domain Name is very similar to house number and name of person living in that house. http://www.yahoo.com: this complete url [Uniform Resource Locator] of a website. http [hypertext transfer protocol] Yahoo.com is domain name, .com is the domain extension and stands for commercial, www is superdomain or subdomain,

The domain is to be registered through a domain registrar after payment of the registration fee. Domain is your property. It is registered for one year which is to be renewed each year or you can register it for more than one year.

Domain is a kind of nameplate of your website. To register a domain name checking availability.Checkdomain.com, networksolutions.com etc.

**DOMAIN REGISTRAR ONLINE:** godaddy.com, networksolutions.com, stargateinc.com, registrar.com, enom.com,
The Server Space is required to host/ load a website. The space is to be provided by webhost companies after payment of the hosting fee. Server is not your property. It is allotted to you for one year which is to be renewed each year or you can register it for more than one year. Server Space is a kind of rented house on Internet. Server

**Space provider online**
1. www.siliconhouse.net
2. www.fatcow.com
3. www.squarebrothers.com
4. www.manashosting.com
5. www.greengeeks.com
6. www.hostgator.com
7. www.economicalhost.com
8. www.pluginspace.org
9. www.godaddy.com
10. www.hostvoice.com
11. www.manashosting.com
12. www.speedhost

**Websites Providing free Serverspace**
1. www.000webhost.com
2. www.freewebhostingarea.com
3. www.bravenet.com
4. www.awardspace.com
5. www.doteasy.com
6. www.webs.com
7. www.minster.net
8. www.110mb.com
9. www.geocities.com
10. www.freewebhosting.com

**Developing Website:**
Various languages to design website are HyperText Markup Language [HTML] [Most easy & Common], PHP, ASP [Active Server Pages], JAVA, FLASH, CFM, PERL etc.

**Available Programmes to develop website**
- Microsoft Frontpage,
- Dreamweaver,
- JAVA,
- Flash

**Designing in Frontpage**
Open Microsoft Frontpage, you will find three pages in one page: Normal, HTML, Preveiw

**Normal page** is where your have to type or insert your information as you do during typing on microsoft word.

**Html page:** the software automatically generate html of what you wrote or insert on normal page.

**Preview page** shows how the website appears finally.

You can create Webpage, Hyperlink, Marquee, Table, Links, Viewing in Browser, Inserting Picture, Inserting Script, View Code with Microsoft FrontPage.

**Creating Hyperlink**
- Open Microsoft Frontpage
- Create new page
- Type any text in normal page
- Select the text
- Right click
- Select hyperlink
- Select the page to be hyperlinked
- Save Changes

**Creating Marquee or Moving Text**
- Open Microsoft frontpage.
- Open any page or create new page
- Open webcomponents in INSERT on bar
- Insert marquee, add text to display.
- Click on OK, Save the change
- You can edit speed/color etc later

**Creating Hoverbuttons**
- Open Microsoft frontpage.
- Open any page or create new page
- Open web-components in INSERT on bar
- Insert Hover-buttons
- Add text which you want to display.
- Click on OK
- Save the change
- You can edit border/color etc later

**Creating Table**
- Open Microsoft frontpage.
- Open any page or create new page
- Open INSERT on task bar
- Insert Table
- Add text which you want to display.
- Click on OK
- Save the change
- You can edit border/color etc later

**Inserting Picture in Page**
- Open Microsoft frontpage.
- Open any page or create new page
- Open INSERT on task bar
- Insert Picture from file/web
- Click on OK, Save the change
- You can edit border/color etc later

**Inserting Script [not for beginners]**
- Just open the html page
- Add <html>
- Paste your script
- Add </html>
- View Source Code
- Just right click on any webpage
- Click on view source code, that’s it
Seeing Links Pattern
• Open Microsoft FrontPage
• Open the page whose links you want to see.
• Just click on hyperlink given on left side.
• It will show the link pattern
• Click on normal.
• Seeing your design

Website templates: There are website templates [ready made website] available in Microsoft FrontPage that can be used as predesigned website.
A web template is a pre-designed webpage that only lacks content and photos. Web templates reduce or eliminate the need for a professional webpage designer.
The first step in creating a webpage is to design a layout. This will involve choosing various fonts, frames, graphics, a color scheme and basic functionality. The next step is creating this design in an HTML editor, which can require a great deal of skill. The final step is to add the content -- the actual text and images.
A web template takes care of the first two steps for you. By loading the template into an HTML editor, you can add your text and images to the ready-made pages.

Creating webpage from template
• On the File menu, point to New, and then click Page or Web.
• In the New Page or Web task pane, under New from Template, click Page Templates.
• Click the tab for the template you want to use, and then click the template. A thumbnail of that template is displayed under Preview.
• Click OK.
• Microsoft FrontPage opens a new page based on the template.

Website providing free templates online
• freewebtemplates.com
• freesitetemplates.com
• templatesbox.com
• freelayouts.com
• websitestemplates.com
• www.e-webtemplates.com
• www.steves-templates.com

Creating new theme
• On the Format menu, click Theme.
• You will find a list.
• In the list, select a theme on which you want to base your new theme.
• Select a theme that has the characteristics closest to the theme you want to create so that you have fewer elements to change.
• Or, select the Blank theme; its elements are very plain so that you can easily tell what you've changed.
• Click Modify.
• Do any of the following to modify the theme:
  o Change the colors
  o Change the graphics
  o Change the styles
• Click Save As, type a name for the new theme, and then click OK.

Creating website from predesigned themes
1. On the File menu,
2. Point to New, and then
3. click Page or Web.
4. Click on format
5. Click on Theme
6. Select the theme of your choice
7. Click on OK

Creating website scripts
• If you have not already done so, add the Insert Script command to the Tools menu.
• On the Tools menu,
• Click Customize
• Click the Commands tab.
  o In the Categories box, click Tools.
• Drag Insert Script from the Commands box over the Tools menu.
• When the Tools menu displays the menu commands, point to the Macro submenu.
• When the Macro submenu displays the menu commands, point to the location where you want Insert Script to appear on the menu, and then release the mouse.
• In the Categories dialog box,
• Click Close.
• Click your page where you want to add script.
• On the Tools menu, point to Macro
• Click Insert Script.
• Use the Microsoft Script Editor to write script.
• Return to the Office program.
• To update your Web page with the changes,
• Click Refresh on the Web toolbar.

Uploading website
• Open FTP put website name, used ID and Password [provided by webhost company]
Click on Connect.
After connection with your website server open the folder where do you want the file to be uploaded [www folder]
Click on upload, That’s it

**Available FTP softwares**
Filezilla FTP, Cute FTP, CoffeecupFTP, SmartFTP, CoreFTP, FireFTP

**Nameserver or DNS Setting**
A DNS (Domain NameServer) record (also known as a zone file) is a small set of instructions for resolving specified Internet domain names to the appropriate number form of an Internet Protocol address (an IP address). Nameserver provided by webhost.
NS1.domainname.com
NS2.domainname.com
Mail Setting: For website providing email service Modify the Mail Exchange setting in your DNS record.
MX to pointed to host.

**Websites providing free webtools and Stuffs**
- www.homepagetool.com
- www.dynamicdrive.com
- www.bravenet.com
- www.hotscripts.com
- www.webweaver.nu
- www.websitegoodies.com
- www.freebyte.com
- www.1000websitetools.com
- www.webweaver.nu
- www.websitegoodies.com
- www.sitetoolcenter.com

**Useful Forensic websites**
1. www.forensicindia.com
2. www.iafm1972.org
3. www.icfmt.org
4. www.forensicwayout.com
5. www.forensicmed.co.uk
6. www.forensiccourse.org
7. www.forensicdentistryonline.com
8. www.vifm.org
9. www.forensic.gov.uk
10. www.dna.gov

**Summary:**
It is summarized that various in order to develop a website firstly you need to register a domain name, secondly develop content, thirdly develop a design, fourthly build the site, and finally host the website on a server.

**Conclusion:**
It can be concluded that every department must have a website linked with each other. Developing a website is very easy task. Lack of information is a hurdle rather than financial burden. The financial burden is very minimal. It is only the mindset which needs be changed may be more younger professional who are computer savvy should contribute in this task.
IAFM website needs be developed properly and handled so that department of Forensic Medicine of every medical college should be interlinked in future. It will be of immense help in getting the recognition of subject as well as academy at world level.
It is suggested that all the departments of Forensic Medicine and Toxicology to maintain separate website with full details about the departmental activities and to link all the website with each other. The museum photographs is made available online so that to help each other in maintaining good quality of medical education in India.

**References:**
2. Available at www.mciindia.org accessed on January 6, 2011
Role of Nitric Oxide in Male Infertility

Vidya Garg, S. P. Garg

Abstract

It has been proposed that oxidative stress plays an important role in male infertility. Many environmental, physiological and genetic factors have been implicated in poor sperm function and infertility. Although there are some definite causes for male infertility still the term “idiopathic infertility” remains. Various studies are going on effect of oxidative stress on fertility potential of male which can be one of the causes of idiopathic infertility. Reactive oxygen species (ROS) are highly reactive oxidizing agent belonging to class of free radicals. Excessive generation of ROS in semen by leukocytes as well as by abnormal spermatozoa could be a cause of infertility because it leads to injury to spermatozoa. Nitric oxide (NO) is one of the reactive oxygen species that has been implicated in variety of physiologic cell signaling mechanisms in many tissues and is recognized as a molecule that importantly regulates the biology and physiology of reproductive function. The clinical significance of seminal oxidative stress is suggested by several independent studies indicating a link between peroxidative damage to human spermatozoa and the incidence of male infertility.

Key Words: Reactive Oxygen Species (ROS), Nitric Oxide (NO), Oxidative stress, Male Infertility

Introduction:

Infertility is defined as no conception after at least 12 months of unprotected intercourse. Traditionally female partner is held responsible for failure to conceive. However in reality, male reproductive function is found to be deficient in not less than 50% of infertile couples.

Many environmental, physiological and genetic factors have been implicated in poor sperm function and infertility. Although there are some definite causes for male infertility still the term “idiopathic infertility” remains. Various studies are going on effect of oxidative stress on fertility potential of male which may be a causes of idiopathic infertility.

In recent years, the generation of Reactive Oxygen Species (ROS) in male reproductive tract has become a real concern because of their potential toxic effects at high levels on sperm quality and function.

Oxidative stress and ROS

Reactive oxygen species (ROS) are highly reactive oxidizing agent belonging to class of free radicals [2]. When levels of reactive oxygen species overwhelm the body’s antioxidant system, oxidative stress (OS) occurs.

It is the imbalance between the production of reactive oxygen species by spermatozoa, leucocytes and antioxidant capacity of the seminal plasma.

Oxidative stress is a condition in which elevated levels of ROS damage cells, tissues or organs. Spermatozoa are sensitive to oxidative stress (OS) because they lack cytoplasmic defenses.

Sources of ROS in semen

There are two main sources of ROS in semen, leukocytes and immature spermatozoa. Of these; leukocytes are considered to be the primary source. Leukocytes, particularly neutrophils & macrophages, have been associated with excessive ROS production that ultimately leads to sperm dysfunction. Spermatozoa produce ROS mainly when a defect occurs during spermatogenesis that results in retention of cytoplasmic droplets. The two main sites of ROS production are the mitochondrion and the sperm plasma membrane.

Role of NO in oxidative stress induced damage to spermatozoa

Nitric oxide (NO) is one of the reactive oxygen species that has been implicated in variety of physiologic cell signaling mechanisms in many tissues. Nitric oxide (NO) is produced by various cells in different organs, including smooth muscle cells, mesengial cells, neurons, platelets, hepatocytes, macrophages, fibroblast and epithelial cells. NO regulates smooth muscle cell tone, platelet aggregation and adhesion, cell growth, apoptosis,
neurotransmission and injury as well as infection induced immune reactions. These processes are known to be associated with biology, physiology and pathophysiology of various reproductive processes and hence in the past, NO has been recognized as a molecule that importantly regulates the biology and physiology of reproductive function. The nitrogen derived free radical nitric oxide, peroxy nitrite anion (ONOO⁻) also appear to play a significant role in reproduction and fertilization [14].

ROS can have beneficial or detrimental effects on sperm function depending on the nature and concentration of ROS as well as location and length of exposure to ROS. Under physiological conditions spermatozoa produce small amount of ROS, which are needed for capacitation and acrosome reaction. Superoxide anion appears to play a role in this process. During epididymal transit sperm acquire ability to move progressively. However they acquire the ability to fertilize in the female tract through a series of physiological changes called ‘capacitation’. Studies have indicated that male germ cells at various stages of differentiation have the potential to generate ROS [1].

Excessive generation of ROS in semen by leukocytes as well as by abnormal spermatozoa could be a cause of infertility because it leads to injury to spermatozoa. ROS causes infertility by two principal mechanisms. First, ROS damages the sperm membrane which in turn reduces the sperm’s motility and ability to fuse with the oocyte. Secondly, ROS directly damage sperm DNA, compromising the paternal genomic contribution to the embryo.

**Review of Literature:**

Hellstrom WJ et al. [9] analyzed the effect of sodium nitroprusside, a nitric oxide releaser, on sperm motion and lipid peroxidation induced membrane damage in cryopreserved human sperm. They suggested that sodium nitroprusside is beneficial to the maintenance of post thaw sperm motion and viability for up to 6 hours and the reduction of lipid peroxidative damage to sperm membranes may be the mechanism for these benefits.

Rosselli M et al. [13] evaluated the direct effects of NO, chemically derived from S-nitroso-N-acetylpenicillamine and sodium nitroprusside, on the motility and viability of human spermatozoa. Treatment of purified spermatozoa with SNAP or SNP decreased forward progressive sperm motility and straight line velocity, and also increased the percentage of immotile spermatozoa in a concentration-dependent manner. Furthermore, as compared to untreated controls, a significantly higher percentage of forward progressive sperm motility as well as viability was maintained in washed semen incubated with N-nitro-L-arginine-methyl-ester (L-NAME), a NO synthesis inhibitor.

Donnelly et al. [6] investigated NO production by human spermatozoa and the effects of stimulation and inhibition of NO on motility of spermatozoa. NO production in human spermatozoa was significantly increased by the addition of the calcium ionophore A23187 30 seconds after stimulation. Furthermore, this response was greatly diminished by pre-incubating the samples with competitive inhibitors of L-arginine, the substrate for NOS, before treatment with calcium ionophore.

HerreroM B et al. [10] investigated whether the generation of nitric oxide by human spermatozoa is associated with human sperm capacitation and with the tyrosine phosphorylation of sperm proteins. Human spermatozoa were capacitated in the presence or absence of nitric oxide-releasing compounds or nitric oxide synthase inhibitors, and then the percentage of acrosomeloss induced by human follicular fluid or by calcium ionophore was determined.

The presence of the nitric oxide-releasing compound primed spermatozoa to respond earlier to human follicular fluid whereas nitric oxide synthase inhibitors decreased the percentage of acrosome reaction. Moreover, nitric oxide modulated tyrosine phosphorylation of sperm proteins. A direct correlation between capacitation and tyrosine phosphorylation regulated by nitric oxide was observed. Their results indicated that nitric oxide is involved in human sperm capacitation and emphasize the importance of oxiido-reduction reactions in the fine control of sperm physiology.

Francavilla et al. [8] suggested that there was evidence that mouse and human spermatozoa contain constitutive nitric oxide synthase (cNOS) and can synthesize nitric oxide. They investigated whether the inhibition of human sperm cNOS could affect sperm-oocyte fusion and sperm binding to the zonapellucida (ZP). From this study it was evident that cNOS plays a role in the human sperm’s capacity to fuse with oocyte but not in the ZP binding.

Aksoy et al. [3] investigated relation between NO and seminal parameters in patients with oligozoospermia and/or asthenozoospermia due to cause other than varicocele. They suggested that NO production could be specifically related to the varicocele.
production was not increased in oligoand/or asthenozoospermia cases without varicocele. Balerica et al. [5] correlated NO concentration in semen and kinetic features of sperm cells from normozoospermic fertile donors and infertile patients affected by idiopathic asthenozoospermia. Normozoospermic fertile men exhibited NO concentrations that were significantly lower than those of asthenozoospermic infertile men. A significant linear negative correlation was evident between NO concentration and percentage of total sperm motility. A further significant linear negative correlation was found between NO concentration and spermatozoa kinetic characteristics. These data suggested that the overproduction of this free radical and the consequent excessive exposure to oxidative conditions have potential pathogenetic implication in the reduction of sperm motility.

MehranDarab et al. [12] evaluated the role of nitric oxide in damaging the sperm function in varicocele and elevated nitric oxide levels have been shown to have toxic effects on sperm function and motility. The study was conducted to compare nitric oxide levels in the seminal fluid of infertile men with varicocele with those of infertile and fertile men without varicocele. Significant correlations were seen between NO concentration and grades of varicocele, sperm count, sperm motility or ages of the patients.

Huang et al. [11] evaluated levels of Nitric Oxide (NO) and testosterone (T) in seminal plasma of men with normal & abnormal semen analysis (SA) & determined correlations between seminal plasma (SP), NO, T & sperm quality. In subjects with abnormal SA, there was a significant positive correlation between SP, NO & sperm morphology, as well as a positive trend between SP, NO and T. They concluded NO & T are detectable in seminal plasma & are potentially involved in spermatogenesis. Low levels of seminal plasma NO and T are associated with defects in sperm morphology.

Eskiocack S et al. [7] reported that mental stress causes abnormality of spermatogram parameters. They investigated the effect of psychological stress on the L-arginine-nitric oxide (NO) pathway. Semen samples were collected from 29 healthy fourth semester medical students just before (stress) and 3 months after (non-stress) the final examinations. Psychological stress was measured by the State Anxiety Inventory questionnaire. After standard semen analysis, arginase activity & NO concentration were measured spectrophotometrically in the seminal plasma. Measurements were made in duplicate. During the stress period, sperm concentration, rapid progressive motility of spermatozoa and seminal plasma arginase activity were significantly lower than in the non-stress situation, whereas seminal plasma NO was higher compared to the non-stress period.

During stress there was a negative correlation between NO concentration and sperm concentration, the percentage of rapid progressive motility and arginase activity. Their results indicated that psychological stress causes an increase of NO level and a decrease of arginase activity in the L-arginine-NO pathway. Furthermore, poor sperm quality may be due to excessive production of NO under psychological stress. Amiri et al. [4] suggested that low concentration of nitric oxide is essential in biology and physiology of most of the cells, but high amounts of nitric oxide is toxic and has detrimental effects on cells. In this study nitric oxide concentration was measured in the seminal plasma of both fertile and infertile males and compared with spermatogram parameters. There was a significant negative correlation between the nitric oxide concentration and sperm motility, viability in infertile males. They concluded that level of nitric oxide in seminal plasma of infertile man was higher than that of fertile men. The increasing level of nitric oxide concentration in seminal plasma leads to decrease in sperm motility and viability and pathologic and physiologic process depends on the alternative redox state & relative level of nitric oxide.

**Summary:**

Production of very low amounts of NO in semen appears to play a physiological role in regulating normal sperm functions, whereas as high levels of NO endanger sperm function and viability.

Oxidative stress due to excessive production of NO precipitates a range of pathologies that are believed to negatively affect the male reproductive function.

Oxidative stress-induced damage to sperm mediated by lipid peroxidation can causes reduction of sperm motility & damage to DNA in sperm nucleus.

**Conclusion:**

Oxygen toxicity is inherent challenge to aerobic life forms, including the spermatozoa. NO is involved in the physiology, biology & pathophysiology of the reproductive system may have great clinical implications in developing
therapeutic strategies to prevent NO-related reproductive disorders.

References:
Biological Warfare, Bioterrorism and Biodefence

Alok Kumar, Archana Verma, Mukesh Yadav, Imran Sabri, Ashish Asthana

Abstract

Biological warfare is the intentional use of micro-organisms and toxins to produce disease and death in humans, livestock and crops, their attraction in war, and for use in terrorist attacks is attributed to various unique features. Biological weapons (BWs) can be disseminated by aerosol sprays, explosives or food and water contamination. Bws can strike suddenly without any warning and inflict considerable mortality and morbidity that can continue for a long period, such attacks may create high level of panic, environment contamination and extreme pressures on emergency health services. Bioterrorism is the use of bws in terrorism. Current concerns regarding the use of bws result from the increasing number of countries that are engaged in the proliferation of such weapons and their acquisition by terrorist organizations. The need of the hour is to develop biodefence by full international cooperation and to educate the likely target populations about precautions and protective measures to be taken in such attacks.

Key Words: Biological Warfare, Bioterrorism, Biodefence.

Introduction:

Humans, regrettably, have used all the available technologies for destruction of enemies as well as for beneficial purposes throughout history. Biological agents are one of them.

Apart from the conventional weapons various countries have developed a variety of weapons of mass destruction e.g. Nuclear, chemical & biological weapons. Terrorists can get control of these weapons and can cause havoc. The concept of employing disease as a weapon has existed for centuries. Different factors have influenced a number of countries to pursue Biological Warfare (BW) throughout the 20th century. International agreements, such as Biological Weapons & Toxins Convention (BWC), have arguably done little to deter BW programs.

Sometimes the purpose is causing panic rather than destruction like dirty bombs; conventional bombs with nuclear waste which spread on detonation & people get panicky.

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Biological warfare & bioterrorism is a powerful tool in the hands of the states and terrorists. History dates back to the eighteenth century (1754 – 1767) when British distributed blankets used by small pox patients to the Native Americans and the mortality in some tribes were as high as 50%. Japanese also used smallpox weapon against the Mongolians & Chinese during II world war. The preferred agents are bacillus anthracis, yersinia pestis, small pox virus or any genetically engineered organism that can survive, express or perpetuate in the natural environment. BWs are clubbed with the nuclear and chemical weapons. However, bws are very different, while nuclear & chemical attacks cause their damage maximally immediately, biological attacks become manifest after sometime.

The attraction for bws is attributed to their following features:

- Low production costs - called the "poor man's atomic bomb"[3] / "poor man's weapons of mass destruction". (5a). for atomic bombs, conventiona] weapons & nerve-gas weapons, the cost per causality would be approximately $2000, $800 & $600 however, for BW, the cost would be about $1 per causality.
- Easy access to a wide range of disease producing biological agents.
- Non-detection by routine security system and easy transportation.
- High fatality: biological toxins are among the most toxic agents known e.g. the quantity of botox in the dot of an 'i' is enough to kill ~10 people. [4] BWs have the added advantage of destroying an enemy while leaving his infrastructure intact as booty for the winner.
Definition:

Biological weapons are defined as “microorganisms that infect & grow in the target host producing a clinical disease that kills or incapacitates.” Such microbes may be natural, wild- type strains or may be the result of genetically engineered organisms. These may be the products of metabolism (usually of microbial origin) that kill the targeted host & include biological toxins, as well as substances that interfere with normal behavior, such as hormones, neuropeptides & cytokines. It is now possible to design and manufacture substances that mimic the action of biologics e.g. Nerve gases, pesticides etc. "Designer" substances may also be created that can be specifically targeted to a particular cell-type in an enemy (e.g. People with blonde hair and blue eyes). [5]

**Bioterrorism** is the use of BWs as terror attack or threat. Usually terrorists are using the conventional means of destruction but there are chances that unprotected biological weapons may get into their hands and may used to create terror on a vast scale. Anthrax letters were used after 9/11 in the U.S.A. to create terror. Recently ricin letters were used in the U.S.A. by the terrorists.

**Bioterrorism agents**’ important features of a perfect BW are:
1. Highly infectious and highly effective.
2. Easily produced with a long shelf life.
3. Efficiently dispersible. 4-
4. Readily grown and produced in large quantities.
5. Stable on storage.
6. Resistant enough to environmental conditions.
7. Resistant to treatment

**Current and near-term threats:**

A proliferator nowadays is likely to attempt initially to weaponize those agents which have been successfully tried previously & have already been proved to be effective. Strategic application leading to considerable food shortages was the intended use of these stockpiles. [6] Nowadays, there use to attack the agricultural sector of a target country would more likely be for economic reasons, and the consequences could include international trade sanctions whose economic impact could far exceed the direct costs of disease mortality & morbidity. [7]

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### Some Potential Bacterial, Viral & Toxic Bws

<table>
<thead>
<tr>
<th>Bacteria</th>
<th>Viruses</th>
<th>Toxins</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacillus anthracis</td>
<td>Variola virus</td>
<td>Cholera toxin</td>
</tr>
<tr>
<td>Clostridium perfringens</td>
<td>Rift valley</td>
<td>Botulinum toxin</td>
</tr>
<tr>
<td>C. Tetani</td>
<td>Murray valley encephalitis virus</td>
<td>Tetanus toxin</td>
</tr>
<tr>
<td>C. Botulinum toxins</td>
<td>Omsk haemorrhagic fever virus</td>
<td>C. Perfringens toxin</td>
</tr>
<tr>
<td>Ehec 0157 and other verotoxin serotypes</td>
<td>Ebola &amp; marburg viruses</td>
<td>Modescin</td>
</tr>
<tr>
<td>Legionella pneumophila</td>
<td>Japanese encephalitis virus</td>
<td>Ricin, abrin</td>
</tr>
<tr>
<td>Yersinia pestis, psudotuberculosis</td>
<td>Dengue fever virus</td>
<td>Shiga toxin</td>
</tr>
<tr>
<td>Brucella abortus</td>
<td>Louping ill virus</td>
<td>Trichothecenes</td>
</tr>
<tr>
<td>B. Melitensis &amp; b. Suis</td>
<td>Oropouche virus</td>
<td>Volkensin</td>
</tr>
</tbody>
</table>

In regard to the use of anti-personnel biological agents, it is of course true that highly lethal weapons such as anthrax, plague and smallpox have been weaponized and produced enormous casualties. Yet lethal biological weapons could also be used on a smaller scale for tactical purposes. Non-military use of lethal agents could also be undertaken on a range of scales by terrorists. Furthermore, non-lethal biological agents could be used as incapacitants in different types of operations. In short, when thinking about biological warfare and the potential impact of new technology, we have to keep in mind that we are not just dealing with one particular type of weapon and how it might be changed. We are dealing with many different kinds of potential weapon systems, many different ways they could be used, and, as we shall see, many different ways in which they could perhaps be modified. Biological warfare could have a multiplicity of future trajectories

**Effect of Biotechnology on Biological Warfare Conventional / Traditional Agent:**

Historically, BW agents of concern have included a selective group of pathogens and toxins. They are all naturally occurring organisms or their toxic product, e.g. Anthrax, plague, botulinum toxin, etc.

**Genetically Modified Agents**: with the advent of recombinant dna technology, an organism's genetic makeup may be altered and genetically modified BW agents may be produced. Examples of potential modifications include antibiotic resistance, increased aerosol stability, or heightened pathogenesis. Importantly, genetic modifications may alter
epitopes or sequences used for detection and diagnostics, necessitating that multiple points of reference be incorporated into these systems and highlighting the need for security regarding biodetection strategies. However, genetically modified bw agents will remain closely related to the parent agent at the genetic level and should be generally identifiable using traditional diagnostics. Ultimately, these modifications serve to increase effectiveness of a traditional bw agent or counteract known aspects of the target population's biomedical defense strategy without significantly manipulating the parental organism in a manner that might compromise natural properties suitable for biological warfare use.

**Advanced Biological Warfare Agents (ABW):**

Developed technologies across multiple disciplines in the biological sciences have revolutionized biowar by facilitating an entirely new class of fully engineered agents referred to as advanced biological warfare (abw) agents. Emerging biotechnologies likely will lead to a paradigm shift in bw agent development; future biological agents could be rationally engineered to target specific human biological systems at the molecular level. This is a departure from the traditional model of BW, which is focused on the naturally occurring agent, not the target organism. Biological science allow BW agent developers to identify biochemical pathways critical for physiological processes and engineer specific abw agents to exploit vulnerabilities.

The threat presented by traditional agents has been increasing since the early 20th century but eventually will level off because of two major factors:
1. Development of targeted medical countermeasures probably will reduce threats posed by current biological warfare agents.
2. The number of such agents that contain properties suitable for biological warfare is finite.

**New BW Use Options:**

The wide range of effects that can be designed into abw agents will expand options for employment significantly. Among these new use options, for example, would be the opportunity to covertly target a civilian population for strategic effect with minimal risk of attribution. Other may include:-

- Unusual clinical presentation could allow a biological warfare attack to be mischaracterized as a natural outbreak and remain undetected.
- Development of novel agents previously unknown to the medical community would yield BW agents that are difficult to diagnose and treat.
- Advanced agents could be developed to circumvent vaccines or treatments designed to counter traditional agents.
- Agents could be tailored to target a specific population based on genetic or cultural traits.
- Sterilizing, oncogenic, or debilitating agents could be created for use as a strategic weapon against a target population for long-term effects.

These new use options likely will make bw more attractive. Thus, advances in biotechnology research may lead to a coming revolution in BW development for technologically proficient rogue nations and possibly sophisticated terrorist organizations. [8]

**Microbial Forensics:**

A new Forensic discipline has come up, dedicated to analyzing evidence from a bioterrorist attack, biocrime or inadvertent microorganism / toxin release for attribution purposes (who was responsible for the crime).[9] Microbial forensics has led to some high-pro-file discoveries. For example, sequencing of amplified viral fragments from the dentist and the infected patients supported the alleged transmission of HIV from a Florida dentist to several patients. [10] Recently, using multiple-locus Variable Number Tandem Repeat (VNTR) analysis, the Aum shinrikyo b. Anthracis bioterror strain was identified as the veterinary vaccine strain, Sterne 34f26.

**Significance of Microbial Forensics:**

It will help law enforcement to identify the source of the evidence sample. Evidence can stand to the scrutiny of judges in the courtroom as well as national decision and policy makers.
1. Prevents and deters biocrime and identifies perpetrators
2. Having a well-prepared response plan might discourage at least some terrorists.
3. Cases in which infected people have intentionally infected others may well end up in court.
4. A major benefit, however, is that much of the outcome would also be applicable to tracing natural outbreaks of disease.
Biodefence:
Major challenges are [11]
- Proper collection of specimens at site
- Recognizing that an attack is occurring and prompt management of the disease
- Analysis of specimens.
- Validation -- quality assurance and control

Important Measures & Handling of Such Disasters:
Preventive measures:
1. Develop full international cooperation on dealing with this problem.
2. Educate at risk populations
3. Coordinate the monitoring of the potential producers and users of bw
4. Continue to improve on BW monitoring techniques and apparatus.
5. Stockpile BW fighting supplies.

Detection of BW is a big problem unless it is an announced event by the terrorists but this may not be always and it may be a covert incidence; many times there may be hoaxes only. In such situations it may become very important to detect and diagnose such an attack precisely. Such attacks can be tackled only by the awareness. It can be integrated into emergency management or any other mass disaster management. It will involve a multidisciplinary approach involving health departments of the governments, private health care providers, local administration, epidemiologists and media people and there should be effective communication between these groups. There should be proper lab facilities to diagnose and confirm the samples which should be properly packed to prevent the spread of the disease from the samples. Triple packing is advised and there should be no leakage. Visitors should be strictly prohibited to visit the patients in the hospitals.

Decontamination of the patient and environment should be considered in case of gross contamination and removed clothes should be handled minimally & should be put in an impervious bag.

Proper arrangements should also be made to handle large number of cadavers. During postmortem on such cases all standard precautions should be taken to prevent the spread of the disease and relatives should be instructed to take precautions while cremating or burying them.

Usually there is panic, horror and anger against the state and terrorists. There is fear of infection and social isolation, leading to demoralization of the public. Such an event should be handled carefully by trained psychiatrists, social workers and volunteer religious and NGOs by providing psychological support. At the same time anxiety in the health care providers should also be taken care of and they should be properly educated to protect themselves. This fear can be greatly reduced if they are regularly taking part in the disaster drills held regularly.

People should be properly informed through the media about the features of the disease, its mode of spread, precautions to be taken and when & where should they seek medical advice. This will greatly alleviate the anxiety, fear and misunderstanding in the public who usually in such circumstances attribute nonspecific symptoms to an attack of bioterrorism.

We should develop and apply biosafety precautions and safeguards in institutions. Dealing with potentially harmful and dangerous organism, which can be used as an agent of bioterrorism. We have to prepare emergency plans to tackle the bioterrorism attack and there should be cohesion between various agencies involved in tackling such situations. We should have good working relations with the media to avoid panic and horror.

Need For “Next-Generation” Approaches to Biodefense [8]

First, resources should be allocated to permit evaluation of emerging biotechnologies that may encourage abw agent development and prioritize threats presented by that agents. Recommendations from intelligence professionals regarding BW agents should be considered when determining research priorities.

Importantly, these assessments should be based primarily on foreign technological capabilities.

Second, a federally funded venue for experimentally validating biotechnology threat assessments needs to be established. Many of their findings of threat assessment research should not be published openly; [12] however, public confidence in this effort could be maintained by establishing an independent panel of bioscience experts responsible for approving & reviewing research at the facility.

Third, some federal bioscience research funds should be allocated to promote development of next-generation systems for environmental detection, medical diagnostics, prophylactics, and therapeutics. Researchers should be focused on identifying agents based on the presence of a panel of indicators, keeping in mind that such agents probably would contain
genetic material from a variety of organisms, including humans, bacteria, and viruses. Successful implementation of a national biosecurity strategy will require integration of a variety of independent efforts across the federal, bioscience research, and medical / public health communities.

The Road Ahead:
A variety of steps should be taken to ensure that our biodefense capabilities provide sufficient protection from emerging threats. A relational and fully secure database needs to be created of all the potential BW agents. Additionally, this database would have significant value for avoiding duplicative research efforts, and for making current information available on sequencing efforts and typing methods.

Establish a national program for forensics of biological weapons and terrorism (npfbwt) and allocate responsibility to a lead agency. A national strategy and plan should be developed for this. Build an educated constituency for microbial forensics with leading policy makers, senior agency managers, key national scientific institutions & organizations, and experts. Assess current capabilities, gaps, and needs, and use the report as a basis for the national investment strategy.

Organize independent, or loosely connected, laboratories that have relevant capabilities into a coherent biological warfare and terrorism forensics consortium, using policies and standards developed by the assigned lead agency, and key stakeholders.

Determine the potential impact and value of microbial forensics and the npfbwt on global nonproliferation, counterproliferation, and deterrence of BWs and bioterrorism. Execute a national summit on microbial forensics, in conjunction with the npfbwt, for key scientists, agencies, organizations, and stakeholders to initiate national focus and direction.

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Review Paper

Recent Advances in the Management of Poisoning Cases

*Dasari Harish, **K H Chavali,**Amandeep Singh, ** Ajay Kumar

Abstract

Deaths due to poisoning are on the rise over the years, despite advanced knowledge regarding their pharmacokinetics and pathology, and newer and better techniques being developed for the management of poisoning cases. The management of a poisoned patient has changed over the years. Though the general principles of treatment of a poisoned patient remain the same, traditional methods like gastric lavage, for example, have taken a back seat. There has been gaining popularity of newer methods like use of activated charcoal and a variety of newer antidotes. Attention has also shifted to toxidromes, the collection of symptoms and signs that consistently occur after ingestion of a particular toxin or drug. Grouping the various signs and symptoms exhibited by a poisoned patient into different toxidromes helps the physician in rapid identification of the toxidrome and saves time in evaluating and managing a poisoned patient. However, the mainstay of the treatment, according to the experts is stabilization of the patient.

Key Words: Poisoning, Poisoned Patient, Management, Gastric Lavage, Charcoal, Toxidromes

Introduction:

“All substances are poisons; there is none that is not a poison; The right dose differentiates a poison from a remedy” – Paracelsus [1]

Poisoning and deaths due to poisoning are on the rise over the years, despite advanced knowledge regarding their pharmacokinetics and pathology, and newer and better techniques being developed for the management of poisoning cases. It is estimated that there are more than nine million synthetic and natural chemicals available today.[2] In India, the trends of poisoning have changed over the years, from insecticides in the earlier times to fumigants, at present.[3] The commonest agents in India are the pesticides, followed by sedatives, drugs, chemicals, alcohols, plant toxins and house-hold cleansing agents.[4,5] Of late, aluminum phosphide has emerged as the commonest suicidal agent in Northern India.[6] In UK, around 15-20% of workload of medical units is due to self poisoning.[7] and paracetamol is one of the commonest drugs involved in self-poisoning, accounting for 43% of hospital admissions with history of self-poisoning. [8]

While in the US, it accounted for 4.1% of deaths from poisoning.[9] The commonest agent causing deaths in poisoning cases in the UK up to 1998 was carbon monoxide.[10] The manner of poisoning differs with the age and poisoning in the paediatric age group generally occurs due to accidental ingestion of commercial and house-hold poisonous products (due generally to curiosity), while in the adolescents and the adults, intentional self poisoning is the common mode.[11]

General Principles:

The general principles of management of poisoning cases, as we know are:
1. Stabilization → which includes assessment and management of
   a) The airway and Breathing
   b) Circulation, and
   c) Depression of the Central Nervous System
2. Evaluation, if the patient is already stable
3. Decontamination → including skin/ eye decontamination, gut evacuation, etc
4. Poison Elimination → diuresis, peritoneal/ haemo dialysis, haemoperfusion, etc
5. Antidote administration → As of now, antidotes are available for < 5% poisons

Now-a-days, stabilization of the patient is being considered as the main stay of management of poisoning emergencies. Gastrointestinal evacuation, in use for centuries, is undergoing critical appraisal. The role of ipecac and gastric lavage are being questioned, while activated charcoal is gaining importance in the management of such cases. [12] Antidotal
therapy is no more the mainstay of the management and the fact that we have antidotes for only about 5% poisons, is mainly responsible for this development.[13] Grouping the signs and symptoms produced by the poisons in to various toxicidromes helps in rapid and effective management of the case.

**Gastric Decontamination:**

Interference with absorption of ingested poison from the gastrointestinal tract is the mainstay of poison management. Because few specific antidotes are available to treat poisonings, absorption prevention, observation, and supportive care are the clinician’s greatest assets. The challenge for clinicians managing poisoned patients is to identify those who are at most risk of developing serious complications and who might potentially benefit from gastrointestinal decontamination.[14] American Academy of Clinical Toxicology and European Association of Poison Centers & Clinical Toxicologists gave the position statements in gut decontamination in 1993. [15, 16]

**Table 1: Summary of recommendations [15, 16]**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gastric Lavage</td>
<td>Should not be considered unless a patient has ingested a potentially life-threatening amount of a poison and the procedure can be undertaken within 60 minutes of ingestion.</td>
</tr>
<tr>
<td>Activated charcoal</td>
<td>May be considered if a patient has ingested a potentially toxic amount of the poison (known to be adsorbed by charcoal) up to 1 hour previously; there are insufficient data to support or to exclude its use after 1 hr of ingestion.</td>
</tr>
<tr>
<td>Ipecacuanha</td>
<td>Its routine administration in the emergency department should be abandoned; there are insufficient data to support or to exclude its administration soon after ingestion.</td>
</tr>
<tr>
<td>Whole-bowel irrigation</td>
<td>May be considered for potentially toxic ingestion of sustained release or enteric coated drugs; there are insufficient data to support or to exclude its use for potentially toxic ingestion of iron, lead, zinc, or packet of illicit drugs (body – packer)</td>
</tr>
<tr>
<td>Cathartics</td>
<td>The administration of a cathartic alone has no role in the treatment of a poisoned patient and is not recommended as a method of gut decontamination.</td>
</tr>
</tbody>
</table>

**a) Gastric Lavage:**

Stomach emptying by gastric aspiration and lavage has been in use in the management of poisoning by ingestion, for almost 200 years. [14] Studies, as early as 1959 [17] have demonstrated that gastric lavage is no more effective than ipecac emesis induced in specific instance. Other investigators, however, have challenged those studies on the basis of improper technique as the studies were carried out with animals and in non-overdose situations. The effectiveness of both gastric lavage and ipecac in removing stomach contents is time dependent and best results are obtained when performed within one hour. [12] Unfortunately, many overdose patients do not arrive to the emergency department within this valuable one hour. Although emptying the stomach in the first hour generally works [12, 18] and may be beneficial for up to a certain period of time thereafter, it is usually not helpful beyond 4 hours of ingestion. Sadly, the same is not applied in our country. Irrespective of the time gap, gastric lavage is performed in most of the hospitals, as the initial part of the treatment. Legal requirement, necessitating the preservation of a sample of the return lavage fluid for toxicological analysis, plays an important role in the continuing use of this technique, despite its efficacy being highly questionable.

Gastric lavage carries potential complications, including aspiration pneumonitis and, rarely, esophageal perforation. It can also promote the rapid passage of tablets into the small bowel rather than removing them. Studies have now shown that gastric lavage did not prove any more beneficial than activated charcoal, alone. [19, 20]

**b) Activated Charcoal:**

Activated charcoal has been used in the treatment of poisonings since 1830, when its effects were first demonstrated by the French chemist Bertrand.[21] Produced by pyrolysis of carbon containing materials and activated by oxidation with steam at a high temperature, these processed carbon products adsorb many drugs. Most commercially available preparations have a surface area of approximately 1000m²/g. In addition to direct intra-luminal binding, activated charcoal can also decrease the resorption of agents that undergo enterohepatic or enterogastric cycling. [22] It also has a “gastrointestinal dialysis” effect, whereby the charcoal serves as a large “sink” with movement of toxin molecules across semi-permeable membranes from splanchnic circulation. [23]

During the last decade, however, activated charcoal became increasingly popular as a first-line agent for the treatment of poisonings, particularly if more than several hours have passed since ingestion. It is generally considered ineffective against caustics, ethanol, ethylene glycol, methanol, iron lithium, metals, and petroleum distillates. Usually complications of its use are rare, but they include aspiration of activated charcoal and gastric contents, as well as intestinal obstruction, particularly when repeated doses of activated charcoal are given. [24]

The use of multiple-dose activated charcoal (MDC) is now recommended for the
clearance of drugs such as -- carbamazepine, digoxin, glutethimide, nadolol, phenobarbital, phenytoin, theophylline, and others. [25] Multiple dosing appears to decrease both the absorption and blood concentration of many drugs. The multiple-dose regimen consists of an initial dose of 50-100g followed by maintenance doses of 30-50 g every 2-6 h with or without the administration of a cathartic agent. Maintaining a constant amount of activated charcoal in the gut adsorbs the toxin as it is secreted back in to the gut, thereby preventing a delayed peak in the serum concentration.[18]

When activated charcoal is continually present in the gut, it might act as an infinite “sink”, keeping the level of the toxin low in the lumen of the gastrointestinal tract. As most of the drugs and toxins are absorbed by simple diffusion, this “sink” may reverse the normal gradient, and actually permit transit of the toxin out of the blood in to the lumen of the tract→ gastrointestinal dialysis. [23] This has been shown to occur with theophylline, carbamazepine, dapsone, quinine and Phenobarbital.

Table 2: Charcoal & M D A

<table>
<thead>
<tr>
<th>Substances not readily adsorbed to activated charcoal[18]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ferrous salts</td>
</tr>
<tr>
<td>Lithium preparations</td>
</tr>
<tr>
<td>Potassium salts</td>
</tr>
<tr>
<td>Ethanol</td>
</tr>
<tr>
<td>Methanol</td>
</tr>
<tr>
<td>Ethylene glycol</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indications for multiple dose activated charcoal[18]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slow release preparations such as theophylline (but not lithium)</td>
</tr>
<tr>
<td>Carbamazepine</td>
</tr>
<tr>
<td>Dapsone</td>
</tr>
<tr>
<td>Digoxin</td>
</tr>
<tr>
<td>Paraquat</td>
</tr>
<tr>
<td>Phenobarbital</td>
</tr>
<tr>
<td>Quinidine</td>
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</tbody>
</table>

The Coordination Committee in Accident and Emergency (A&E) Services of Hong Kong Protocol advocates activated charcoal as the treatment of choice for most poisons, except metals, alcohol, cyanide, acids and alkalies, which are not adsorbed by it.

c) Cathartics:

Catharsis actually means purification and this is achieved in the poisoning cases by purging the gastrointestinal tract of all the poisonous material. This is the premise that promotes their use for the rectal evacuation of gastric contents - both the drug and the drug-charcoal complex. Despite their widespread use, however, little evidence exists that cathartics alter the outcome of poisoned patients. The most commonly used cathartics are magnesium sulfate, magnesium citrate, and sorbitol. Sorbitol works the most quickly; causing bowel movements within one hour.[12] Contraindications to cathartics include caustic ingestions and signs of intestinal obstruction. If being considered, one dose is generally sufficient.

d) Whole - Bowel Irrigation:

Polyethylene glycol-electrolyte solutions, which once were used for bowel cleansing before surgical procedures, are now being applied for gastrointestinal decontamination. These iso-osmotically balanced, non-absorbable solutions are safe, causing no fluid retention or electrolyte disturbances.[26] The procedure has been advocated for overdoses of agents such as iron, lithium, arsenic, lead-oxide and enteric-coated or sustained-release medications. In practice, hemodynamically stable and cooperative patients are best suited for this intensive cathartic treatment. [24, 27] Adults should be given the solution at a rate of 2 L/h, children at 500 ml/h, either orally or through a naso-gastric tube. The endpoint of treatment is a clear effluent, which may take 4-6 hours to appear. Contraindications include ileus or bowel obstruction, hemodynamic instability or where airway cannot be protected. [28]

e) Emesis:

Ipecac syrup has long been used as a first-line agent for prevention of toxicity from ingested poisons, especially in children. However, this is not freely available in our country [13] and its effectiveness in recovering ingested substances is poor, and its ability to reduce the severity of poisoning has never been demonstrated. Moreover, the emesis induced by ipecac may preclude the use of other oral treatment options. [29] It is contraindicated in ingestion of caustic substances and volatile hydrocarbons, in patients who have decreased gag reflex or altered mental status, and in patients at risk for rapid alteration in consciousness. Complications of ipecac include aspiration pneumonia, lethargy, diaphragmatic rupture, Mallory-Weiss esophageal tears and cerebral hemorrhages.[30] Ipecac is also still recommended by poison control centers for use in the home, where early administration can be assured.

Laboratory Tests:

Although laboratory analysis of various body fluids of overdose patients frequently identifies substances that are clinically unsuspected, these additional findings rarely alter the patient’s clinical course, largely because the presence of a substance does not necessarily correlate with acute toxicity;
moreover, analysis can be time-consuming and in most clinical settings falls short of being comprehensive.[12] Most poisoned or overdose patients do well with supportive care alone. Again, no rapidly available universal screening tool exists and many patients require little, if any, laboratory investigation.

Rational use of Antidotes:
Antidotes are chemical or physiological antagonists that prevent the toxicological effect of specific poisons. In most toxicological emergencies, effective antidotes are not available. Symptomatic treatment and supportive care are still the primary approach to treatment; antidotal therapy often plays a relatively minor role. When appropriately used in specific situations, however, antidotes can substantially reduce morbidity and mortality in the poisoned patient.

Some Newer Antidotes:

a) Hydroxycobalamin: [31] It is the synthetic form of vitamin B₁₂ and is given in cases of cyanide poisoning presenting with hypotension, where the conventional antidote sodium nitrite is contraindicated. It works by sequestering cyanide from the plasma-cyanide to give non-toxic cyanocobalamin. The only adverse effects are brown discoloration of the body fluids, nausea and vomiting. The recommended dose is 5g of the reconstituted solution over 30 minutes.

b) Digoxin specific antibodies (Fab antibodies): [32] Digoxin specific antigen binding fragments are indicated in life-threatening arrhythmia/hyperkalaemia caused by intoxication with cardiac glycosides. As the antibodies are produced in sheep, monitoring for anaphylaxis and serum sickness is necessary.

c) Esmolol hydrochloride: [32] It is a short acting cardioselective beta-adrenoceptor blocking drug that has no sympathomimetic activity. It is used to control hypertension and tachyarrrythmia due to poisoning by sympathomimetic drugs.

d) Octreotide: [32] A synthetic polypeptide that antagonizes pancreatic insulin release, it is indicated in overdose of insulin or oral hypoglycemic agents, mainly sulphonylurea.

e) Succimer (2,3dimercaptosuccinicacid): [33] it is a chelating agent used for the treatment of lead, mercury and arsenic poisoning. It is the water soluble analogue of dimercaprol and can be taken orally.

f) Fomepizole (4-methy pyrazol): [33] It is a potent competitive inhibitor of alcohol dehydrogenase and prevents the formation of toxic metabolites following methanol and ethylene glycol poisoning. It is now preferred to ethanol as the antidote as it does not cause sedation.

g) Nalmefene and Naltrexone: [33] they are long acting opioid antagonists and are used to manage opioid dependence. They are more potent than Naloxone but are much more expensive.

Toxidromes:

The term was first coined by Mofenson and Greensher. [34] They are a collection of symptoms and signs that consistently occur after ingestion of a particular toxin or drug and can often be identified with a basic history & physical examination. Many physicians now group the various signs and symptoms of the poisons into different toxidromes as the rapid identification of the toxidrome saves time in evaluating and managing a poisoned patient. The various toxidromes are anticholinergic, cholinergic, sympathomimetic (adrenergic), opioid and sedative-hypnotic. Each of these toxidromes has specific signs and symptoms and requires a set pattern of management. Hence even if the poison cannot be identified, it can be classified into one of the above syndromes based on the signs and symptoms exhibited and appropriate treatment can be initiated.

Conclusion:

There has been a major change in the treatment of poisoned patients, particularly in the area of gastric decontamination. The trend is away from the use of ipecac, except in limited situations such as accidental ingestions in pediatric patients. For that reason, activated charcoal has attained a prominent role, not only as an adjunct for gastric emptying with either ipecac or gastric lavage but also for use as the sole decontamination agent. Gastric lavage still plays an important role, especially if it can be performed early, or if drugs are involved that may delay gastric emptying. Whole–bowel irrigation is safe and effective in limited situations such as iron, lithium, or sustained-release medications, and for body packers. Antidotes play an important role in specific situations. Oxygen is extremely useful for the treatment of CO. Naloxone is useful for the treatment of opiate intoxication. Fab fragment antibodies are safe and effective for the treatment of digitalis intoxication. Despite the advances in gastric decontamination and the development of new antidotes, the mainstay of treatment for the poisoning victim remains
supportive care and frequent re-evaluation for a change in clinical status.

Table 3: Common Toxidromes: Signs and Symptoms [35]

<table>
<thead>
<tr>
<th>Physical findings</th>
<th>Adrenergic Toxidrome (decongest., amphetamine, cocaine)</th>
<th>Anticholinergic Toxidrome (antihist., phenothiazine)</th>
<th>Cholinergic Toxidrome (Insecticides)</th>
<th>Opiod Toxidrome</th>
<th>Sedative-hypnotic Toxidrome (tranquilizer, barbiturates, ethanol)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vital Signs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resp. Rate</td>
<td>Increased</td>
<td>No change</td>
<td>Increased/ no change</td>
<td>Decreased</td>
<td>Normal/ decreased</td>
</tr>
<tr>
<td>Heart rate</td>
<td>Increased</td>
<td>Increased</td>
<td>Decreased</td>
<td>Normal/ decreased</td>
<td>Normal</td>
</tr>
<tr>
<td>Temperature</td>
<td>Increased</td>
<td>Increased</td>
<td>No change</td>
<td>Normal/ decreased</td>
<td>Normal</td>
</tr>
<tr>
<td>Blood P</td>
<td>Increased</td>
<td>Increased/ no change</td>
<td>No change</td>
<td>Normal/ decreased</td>
<td>Normal</td>
</tr>
<tr>
<td>Physical Examination</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mental status</td>
<td>Alert/ agitated</td>
<td>Depressed/ confused/ hallucinating</td>
<td>Depressed/ confused</td>
<td>Depressed</td>
<td>Depressed</td>
</tr>
<tr>
<td>Pupils</td>
<td>Dilated</td>
<td>Dilated</td>
<td>Constricted</td>
<td>Constricted</td>
<td>Normal</td>
</tr>
<tr>
<td>Mucous membranes</td>
<td>Wet</td>
<td>Wet</td>
<td>Normal</td>
<td>Normal</td>
<td></td>
</tr>
<tr>
<td>Skin</td>
<td>Diaphoretic</td>
<td>Dry</td>
<td>Diaphoretic</td>
<td>Normal</td>
<td>Normal</td>
</tr>
<tr>
<td>Reflexes</td>
<td>Increased</td>
<td>Normal</td>
<td>Normal/ decreased</td>
<td>Normal/ decreased</td>
<td>Normal/ decreased</td>
</tr>
<tr>
<td>Bowel sounds</td>
<td>Increased</td>
<td>Decreased</td>
<td>Decreased</td>
<td>Decreased</td>
<td>Normal</td>
</tr>
<tr>
<td>Urination</td>
<td>Increased</td>
<td>Increased</td>
<td>Increased</td>
<td>Decreased</td>
<td>Normal</td>
</tr>
<tr>
<td>Other</td>
<td>Possible seizures</td>
<td>Possible seizures</td>
<td>Musclefasciculations</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

References:
Protest against Vision 2015

AllMS, New Delhi: Forensic Medicine Experts & Other Doctors Observing Black Day against MCI/BOG, Vision 2015 on 5th Feb, 2011
Case Report

Fatal Pseudo Aneurysm in Common Femoral Artery
A Case Report

* C Behera, ** G.V Garudadhri, *** Kulbhushan, **** Sunil.

Abstract

Pseudoaneurysm is a rare condition arising from disruption in arterial wall with blood dissecting into the tissues around the damaged artery creating a perfused sac that communicates with the arterial lumen. Its incidence is on rise due to increase in endovascular procedures, hemodialysis and intravenous drug abuse. Here we report an young male who was found by a NGO worker, lying on roadside near a Mandir with a pulsatile inguinal swelling and blood oozing out from it. He was taken immediately to emergency department of LN Hospital. He was a rickshaw puller and known drug addict. The swelling was diagnosed as pseudo-aneurysm of common femoral artery on clinical examination and by Doppler ultrasonography. He was referred to CTVS department and admitted there for surgery. In the meanwhile, he collapsed in the hospital toilet and died due to hemorrhagic shock consequent upon rupture of pseudo-aneurysm of femoral artery. In this report the gross and histopathological findings of pseudo-aneurysm of common femoral artery were described in autopsy.

Key words: Pseudo aneurysm; Femoral artery, Abscess, Drug addict

Introduction:

An aneurysm is defined as a dilatation of an artery greater than 1.5 times its normal diameter [1]. It can be classified as true and false (pseudo) aneurysm. When all three layers of the arterial wall in the aneurysm sac present, it is called true aneurysm. In pseudo aneurysm, only a single layer of fibrous tissue is present in the wall of the sac. Aneurysm can be grouped according to their shape like fusiform, saccular, dissecting or on the basis of etiology like atherosclerotic, traumatic, mycotic, syphilitic, collagen vascular disorder (Marfan’s syndrome)[2]. Mycotic aneurysm is defined as a localized irreversible dilation of an artery due to destruction of the vessel wall by infection, which can arise following an infection of a previously healthy artery wall, or through secondary infection of a preexisting aneurysm. Staphylococcus aureus is the most common pathogen responsible for mycotic organism. It is seen more frequently in femoral artery followed by abdominal aorta, superior mesenteric, brachial, iliac and carotid artery. However, mycotic pseudo-aneurysms of femoral artery are rare [3]. Incidence of pseudo-aneurysm is on rise due to increase in endovascular procedures, hemodialysis and intravenous drug abuse.

In general, all aneurysm can cause symptoms due to its expansion, thrombosis, release of emboli and rupture. Rupture of aneurysm occurs when the tangential stress exceeds the tensile strength of the artery. The law of Laplace decrees that the tensile strength of the arterial wall is a function of the pressure multiplied by the radius. Consequently, larger aneurysms are more likely to rupture. Death can be occurred if it is not treated at appropriate time. In this paper we are presenting one isolated case of fatal pseudo-aneurysm in femoral artery.

Case Report: A 30 year old male, rickshaw puller was found lying on roadside by an NGO worker on 19/05/10 at 11.00 A.M near a Mandir with an inguinal swelling, which was globular with intact skin over it. Then he saw, there was a leak on the swelling and blood oozing out from it. He was taken immediately to LNJP Hospital. He was a known drug addict and used to take sleeping pills and injectible drugs. On examination in the casualty, the patient was of thin built, poorly nourished and in conscious state. There was history of progressive swelling in the inguinal region. The patient did not remember any history of trauma to the inguinal region or surgical procedures undergone in this region. He was afebrile. His blood pressure was 110/80mm Hg and pulse 72/minute was recorded. On auscultation, heart sounds and bilateral airway entry was normal. Respiratory rate: 24/min. A pulsatile swelling, with blood oozing out was seen in left inguinal region with
associated parenthesis of lower limb without motor involvement. He was investigated for the pulsatile inguinal swelling. A Doppler ultrasound of the left inguinal swelling was done. A large mass, heterogenous, ill-defined margin noted in the left inguinal region in close proximity to left common femoral artery with evidence of arterial flow in central part, surrounding area showing no vascularity. Distal part of left superficial femoral artery showed normal flow. Left superficial femoral vein and popliteal vein showed evidence of turbid flow and are compressible.

No deep vein thrombosis was seen. Hematological studies drawn in the emergency were, hemoglobin 7.8g%; white blood cell count, 20,000/micro liter. Tests for HIV showed negative. Anti HCV found positive. The chest radiographs showed no abnormality. No other external injury was present over the body. The patient was given injection augmentin, injection pantop and injection voveran. He was advised to keep the lower limb elevated.

Then the patient admitted to the surgery department where a planning was done for surgery by a CTVS surgeon. On 21/05/10 around midnight, a hospital attendant found this patient lying in a pool of blood in the wash room. He was examined by the doctor immediately. He was not responding to oral commands, pulse and BP were not recordable. CPR was started and intubation was done. CPR continued for thirty minutes but he could not be revived and declared dead on 22/05/10 at 12.30 AM.

**Autopsy Findings:**

The body was that of a 30-year-old male with rigor mortis present all over the body. Faint postmortem lividity was present on back and dependent part of the body except over pressure points. No signs of decomposition were present. Dried blood stains were present over lower limbs, buttock, left inguinal region, abdomen and chest. Venesection wound of length 3 cm was present over the right lower arm medial aspect. Multiple old injection marks were present over left forearm ventral aspect. A wound of length 4.5 cm, width 3cm, was present over left inguinal region 2c.m below the left mid-inguinal point, 9 cm below and medial to anterior superior iliac spine and 4 cm below and lateral to pubic symphysis (Fig.1). The wound was associated with surrounding swelling in an area of (9x6) c.m. The wound surface was covered with clotted blood. On removing the clot, a defect of 4x3mm was found in the anterior wall of the femoral artery. After fixation in 10% formalin, the area occupied by clot appeared as cystic space (Fig.2). Rest of the femoral artery was intact. On internal examination, stomach was found to contain about 200 ml semi-digested food material. All internal organs were pale. There was no aneurysm present in other blood vessels. Qualitative Toxicological analysis of the blood and stomach contents revealed absence of alcohol. Histopathological examination of local soft tissue revealed infiltration of fibrofatty and fibroskeletal tissue with acute inflammatory cells forming multiple pus pockets. The abscess irradiated into femoral artery and vein with formation of pseudo-aneurysm. The wall of the common femoral artery showed destruction and it is surrounded by bacterial colonies, areas of hemorrhage and acute inflammatory cells (Fig.3). We concluded that death was due to hemorrhagic shock consequent to rupture of common femoral artery pseudo-aneurysm.

**Discussion:**

In this case, the deceased presented to the casualty with a bleeding pulsatile mass in the left inguinal region. There was history of IV drug abuse. He tested positive for hepatitis C virus infection. There was no significant history of trauma to the left inguinal region. There was no past medical history for any endovascular procedure undergone. Histopathological examination of local soft tissue revealed abscess irradiating into femoral artery and vein with formation of pseudo-aneurysm. Hence the pseudo-aneurysm was due to infective origin. The probable source of infection was due to intravenous injection. Other risk factors that predispose for mycotic aneurysm are the impaired immunity due to hepatitis C virus infection and chronic drug abuse. The arteritis may be caused by direct extension or via blood stream. Subsequently the arterial wall undergoes destruction and blood from the artery continues to leak forming perivasular hematoma. Later it may encapsulated and retain communication with the lumen, in which case it is referred to as pseudo-aneurysm.

The incidence of false aneurysm of femoral / external iliac artery is increasing from 0.6 -1.0%[4, 5] However, that of anastomotic false aneurysms occurs with an increasing incidence of 1.5% to 3.0% [6, 7]. Pseudo –aneurysms of femoral artery is often iatrogenic and could occur following percutaneous canulations, or graft dysfunction. Common etiologic factors include host vessel degeneration, femoral triangle sepsis, prosthetic dilation & suture deterioration. Other risk factors include use of large-bore catheters, female gender, & use of anticoagulant, thrombolytic agents, inadvertent.
Pseudo-aneurysms of femoral artery may present as groin mass, which may be pulsatile. May thrombose & rupture spontaneously & bleed profusely [10, 11]. Color flow duplex USG, CT, MRI, conventional and CT contrast angiographic studies are useful in the diagnosis [12]. Whenever they occur, treatment is surgical exploration usually through a long longitudinal groin incision over the femoral artery. Control of bleeding is gained by proximal and distal clamping and starting the patient on anticoagulant. Duplex-guided compression is a valuable technique for treating femoral artery false aneurysms [13]. Accepted method of managing is resection with interposition grafting or ligation accompanied by arterial bypass [14, 15]. The aneurismal wall can be rejected and the laceration on the arterial wall can be repaired using 6/0 prolene by interrupted suturing. Pulsatile swelling in inguinal region bleeding from wound & falling hemoglobin level should be warning for early recognition & effective treatment. Hence doctors in emergency must be cautious about such fatal complication and be prepared to avert the same.

References:

Case Report

Never Be a Roman, while you are in Rome,
Be a Roman, while you are in Rome,
(A Fallacy and Some Times Fatal Also)

*J.Jayaraju, ** A. Yadaiah

Abstract

The unlucky deceased was an American who checked in to a star hotel in Hyderabad along with his colleagues on a company assignment. When his colleagues called him, at 11-30 am for a shopping spree, he has told them that he has back-ache and wants to take rest in his room. At about 2-30 pm again, when they contacted him on phone, no response came, at about 5-00 pm again as there was no response, with a master key the door was opened and the dead body of the deceased found on the carpet besides a long sofa with a metal beeding in a prone position with right hand under the chest and the left upper limb parallel to the body, with a disconnected cable of laptop nearer to his head which was still in switched on position. A dimmer light with a long pedestal was found beside the body with bulb towards head and base towards the feet. There was a plug point at floor level near the head of the deceased, with an insitu adapter, as the pin of the laptop cannot be inserted, directly in to it. The adaptor was loosely hanging in the socket of the plug.

Key Words: Dead body, Upper limb, Electrocution.

Introduction:

The unlucky deceased was an American who checked in to a star hotel in Hyderabad along with his colleagues on a company assignment. When his colleagues called him, at 11-30 am for a shopping spree, he has told them that he has back-ache and wants to take rest in his room. At about 2-30 pm again, when they contacted him on phone, no response came, at about 5-00 pm again as there was no response, with a master key the door was opened and the dead body of the deceased found on the carpet besides a long sofa with a metal beeding in a prone position with right hand under the chest and the left upper limb parallel to the body, with a disconnected cable of laptop nearer to his head which was still in switched on position. A dimmer light with a long pedestal was found beside the body with bulb towards head and base towards the feet. There was a plug point at floor level near the head of the deceased, with an insitu adapter, as the pin of the laptop cannot be inserted, directly in to it. The adaptor was loosely hanging in the socket of the plug.

Case Report:

The body was shifted in the same position to the mortuary, for autopsy, and before the commencement of the autopsy the police have taken finger prints from all the fingers by applying roller ink to the finger tips. During external examination the body showed severe congestion (1) of the face, neck, with congested conjunctiva, and blood stained discharge (2) from mouth and nostrils. Internally the viscera showed severe congestion with alcohol i.e., contents in the stomach. The chemical analysis report for viscera positive for alcohol, the overall impression from scenic and corporal evidence is that, death was from electrocution, which was accidental in nature, while disconnecting the laptop from the

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plug socket, while lying on the sofa with his right hand under the influence of the alcohol.

**Statistical Evaluation:**
Internal and External Naked eye examination of dead body. Thorough washing of the fingers of the deceased, showed charred marks over the tips of the thumb and index finger of the right hand and a small avascular split on the sole of the left foot. The chemical analysis report for viscera is positive for alcohol.

**References:**
Case report

Res Ipsi Loquitor in Post Mortem Examination

* Rahul Jain, ** P.N. Mathur

Abstract

The doctrine of Res ipsa loquitor means that “facts or thing speaks for itself”. It signifies that further details are unnecessary; the facts of the case are self-evident. This doctrine is applied when there is gross medical negligence on the part of treating doctor. It is often being presented when the damage resulted from teamwork where the doctor and some other persons were involved. In such circumstances, the doctor himself being ignorant about the cause of damage and the person actually responsible may find it difficult to prove his innocence, though he may actually be innocent. I am presenting here a case report of year 2008, which is a new type of example of Res Ipsi Loquitor in which an expert opinion was given by a board of medical doctors about medical negligence as per orders of Hon’ High Court on the basis of documents forwarded by Police.

Key Words: Medical Negligence, Consent, Histopathology, Medical Board, Post-Mortem Examination

Introduction:

Res ipsa loquitor is a Latin word which was first put forward by Baron Pollock in Byrne Vs Boadle an 1863 English case. Byrne was struck by a barrel of flour falling from a second story window. The court’s presumption was that a barrel of flour falling out of a second story window is itself sufficient evidence of negligence.

Medical negligence is defined as “Failure to carry out reasonable care and skill by a registered medical practitioner while treating his patient who causes some damage or death of the patient”.

Ordinarily the burden to prove negligence of the doctor lies on the complainant. But when this doctrine is applied the position is reversed. The doctor has to prove that he was not negligent.

This doctrine is pleaded by the complainant when the negligence and the damage are quite evident, with the argument that the damage could not have been caused but for the negligent act of the person.

The doctor being the concerned or one of the concerned people has to establish that the damage suffered by the patient was not due to negligence.

The basic idea being that it is not a right to deny the plaintiff any possibility of recovery when the types of injury suggest a negligent causation. Three essential conditions considered necessary are:

1. The nature of injury suggest by common knowledge or expert evidence that without negligence it does not occur
2. The plaintiff must not contribute to his own injury.
3. The defendant must be in exclusive control of instrumentalities.

Some Examples of Res ipsa loquitor are:

1. Failure to remove a swab during an operation which may lead to complications or death.
2. Blood transfusion misadventure.
3. Performing an operation on wrong side (Instead of left leg operation is performed on right leg).
4. Prescribing overdose of medicine which produces ill effect.

When an instrument or a swab is left inside a body cavity the doctor may say that the job of counting the swab etc at the end of the operation is not his job but the job of assisting nurse. But this argument may not be helpful for the doctor as in many cases the trial courts have observed that the ultimate responsibility to complete the operation safely lies on the
surgeon. It is the duty of the surgeon to see that his assistants discharge their duties carefully.

**Some Defenses of Doctor against Medical Negligence:**

1. That he discharged his duties in accordance with the prevailing standard of medical practice.
2. The damage caused to the patient is not due to his negligence but due to the act of another person who was also concerned with the treatment.
3. The damage is caused due to third party who interfered in the treatment without his consent.
4. That the patient did not follow his advice.
5. That the damage complained off is an expected outcome for the particular type of disease the patient suffered from.
6. That it was a reasonable error of judgment.
7. That the damage was the result of taking some unavoidable risk which was taken in good faith in the interest of the patient with his or his guardian’s consent.

*Res ipsa loquitur* is often confused with *prima facie* ("at first sight"), the common law doctrine that a party must show some minimum amount of evidence before a trial is worthwhile. The difference between the two is that *prima facie* is a term meaning there is enough evidence for there to be a case to answer. *Res ipsa loquitur* means that because the facts are so obvious, a party need explain no more.

**Recent Supreme Court Rulings:**

Before the case of Jacob Mathew Vs State of Punjab, the Supreme Court of India delivered two different opinions on doctors' liability. In Mohanan Vs Prabha G Nair and another, it ruled that a doctor's negligence could be ascertained only by scanning the material and expert evidence that might be presented during a trial. In Suresh Gupta’s case in August 2004 the standard of negligence that had to be proved to fix a doctor's or surgeon's criminal liability was set at “gross negligence” or “recklessness.”

In Suresh Gupta’s case the Supreme Court distinguished between an error of judgment and culpable negligence. It held that criminal prosecution of doctors without adequate medical opinion pointing to their guilt would do great disservice to the community. A doctor cannot be tried for culpable or criminal negligence in all cases of medical mishaps or misfortunes.

A doctor may be liable in a civil case for negligence but mere carelessness or want of due attention and skill cannot be described as so reckless or grossly negligent as to make her/him criminally liable. The courts held that this distinction was necessary so that the hazards of medical professionals being exposed to civil liability may not unreasonably extend to criminal liability and expose them to the risk of imprisonment for alleged criminal negligence.

Hence the complaint against the doctor must show negligence or rashness of such a degree as to indicate a mental state that can be described as totally apathetic towards the patient. Such gross negligence alone is punishable.

On September 9, 2004, Justices Arijit Pasayat and C.K. Thakker referred the question of medical negligence to a larger Bench of the Supreme Court. They observed that words such as “gross”, “reckless”, “competence”, and “indifference” did not occur anywhere in the definition of “negligence” under Section 304A of the Indian Penal Code and hence they could not agree with the judgment delivered in the case of Dr Suresh Gupta.

The issue was decided in the Supreme Court in the case of Jacob Mathew Vs State of Punjab. The court directed the central government to frame guidelines to save doctors from unnecessary harassment and undue pressure in performing their duties. It ruled that until the government framed such guidelines, the following guidelines would prevail:

A private complaint of rashness or negligence against a doctor may not be entertained without prima facie evidence in the form of a credible opinion of another competent doctor supporting the charge. In addition, the investigating officer should give an independent opinion, preferably of a government doctor. Finally, a doctor may be arrested only if the investigating officer believes that she/ he would not be available for prosecution unless arrested.

**Case Report:**

A patient was admitted in a private hospital for delivery at 5.30 AM. On examination the gynecologist found her to be a previous case of lower segment caesarean section. The patient was kept on fetal monitor but the heart sounds were feeble and labor did not progress so the Caesarian section (CS) was advised.

But the patient and her relatives refused to give consent for Caesarian section, and requested the doctor to conduct a normal delivery. This refusal of consent by the Patient and her relatives was noted on bed head ticket (BHT). The labor did not progress normally therefore the treating doctor again asked the
uterine foetal death; this was told to the patient’s relative. From 1 to 3 PM normal delivery was tried. The treating doctor then told to the relatives of the patient either to give consent or to take the patient to some other hospital. 

Treating doctor then suggested that she can try for forceps delivery but the scar of previous operation (Caesarian section) can open while applying the forceps. Patient’s relative than gave consent for forceps delivery at 4 PM. Patient was taken in operation theatre immediately and delivery was conducted by forceps. She delivered a male dead born child at 4.30 PM.

Patient was shifted to private ward at 6.15 PM. At 8 PM doctor again examined her, she was normal and requested for water and biscuits which were given to her. After 10 minutes patient vomited and complained of difficulty in respiration. At 10 PM, the patient expired. Cause of death as mentioned in BHT by treating doctor was pulmonary embolism or severe Myocardial Infarction.

The relatives of the patient alleged that the death has occurred due to medical negligence and they lodged a complaint against the treating doctor. Next day medico-legal post mortem examination was conducted by a medical board comprising of three doctors. Medical board gave its opinion that “Death is due to shock and hemorrhage as a result of lower uterine segment rupture (size of rupture 4 inch x 3 Inch x cavity deep)”. Uterus and heart were preserved for Histopathology examination. Meanwhile the treating doctor was arrested and kept in judicial custody on receipt of Post mortem report.

Next day the Police asked the Principal Medical Officer (PMO) of the Government District hospital to give opinion on the basis of records seized from that private hospital and from the findings of post mortem report that whether any negligence has been done by the treating doctor and sufficient precautions were taken during the procedure or not.

PMO constituted the same medical board which had conducted the post mortem to give opinion. Medical board gave the opinion that the rupture of uterus can be due to pressure, they cannot give any opinion in this case that whether any negligence has been done by treating doctor or not. Medical board further advised that opinion about negligence can be taken by board of doctors affiliated to a Government Medical College.

By then bail application of doctor was rejected by the Hon’ Session’s court. The Police also did not approach the nearest Government Medical College for opinion as advised by the medical board.

After about 2 months histopathology report was send to police in which findings were: Uterus and cervix showed edema and hypertrophy of muscles. At places hemorrhage, dilated and congested blood vessels were seen. Soft tissue attached to uterus shows hemorrhage, congestion and acute inflammatory reaction. Uterus is intact and heart is normal. Than the treating doctor applied for bail at Hon’ High court. Hon’ High court then ordered to the investigating officer to immediately take opinion from a board of specialist doctors of Government Medical College as mentioned by doctors of medical board.

The medical board of the Medical college after going through the documents and histopathology report was of the opinion that since the uterus was intact therefore the patient had not died due to hemorrhagic shock due to rupture of uterus and there was also no negligence on the part of the treating doctor. If the Patient had such an extensive tear than it would not have been possible for the patient to survive for six hours, she would have died immediately.

After receiving the report of medical board, Hon’ High court gave bail to the treating doctor, who had by then already spend 3 months in jail. The intact uterus spoke for itself that the treating doctor was not negligent. The intact uterus also spoke for itself that the doctors of the medical board who had done the post mortem examination were negligent.

Conclusion:

It can be inferred by saying that Medical negligence arises from an act or omission by a medical practitioner, which no reasonably competent and careful practitioner would have committed. When the concept of negligence is extended to professional people such as a doctor the test is that the medical practitioner must bring to his task a reasonable degree of skill and knowledge and must exercise a reasonable degree of care. Neither the very highest nor a very low degree of care and competence judged in the light of the particular circumstances of each case is what the law requires. But where you get a situation, which involves the use of some special skill or competence, then the test as to whether there
has been negligence or not is the standard of the ordinary skill, a man exercising and professing to have that special skill.

In medical malpractice litigation, juries have the responsibility to decide whether a medical practitioners conduct in a particular instance fell below an acceptable professional standard of care, and if so, was that conduct a proximate cause of injury to the plaintiff.

In this case the doctor who had carried out the medico legal post mortem were negligent, but when the investigating officer asked them to give opinion whether any negligence was done by treating doctor or not, than also, these doctors did not give any clear opinion about negligence. The investigating officer, also intentionally did not approach the nearest Government Medical College for expert opinion, as a result of negligence of these doctors and investigating officer, innocent treating doctor had to suffer in jail for three months.

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Case Report

Bride Burning: A Heinous Crime

* Pranav Prajapati, ** M I Sheikh, *** Rajesh Patel

Abstract

"Dowry" is defined as meaning money, or other thing estimated in terms of money, demanded from the wife or her parents or her relatives by the husband or his parents or other relatives, where such a demand is not properly referable to any legally recognized claim and is relatable only to the wife’s having married into the husband’s family. Dowry death, a heinous crime is gradually engulfing and polluting the entire society. Newly married young women are the victims who adopted the way of suicide to end their lives by burning, hanging, poisoning or drowning. A 23 years old married female had died in her kitchen under suspicious circumstances within one year of her marriage life by burning with some inflammable material on dated 22/12/2009. The post-mortem examination revealed that death was due to asphyxia as a result of pressure over neck. 98% of dermo-epidermal burn present over body was post mortem in nature. Manner of death was homicidal. A medico legal aspect of the case is discussed in this article.

Key Words: Dowry death, post mortem burns, domestic violence, strangulation

Introduction:

“Dowry” is defined as meaning money, or other thing estimated in terms of money, demanded from the wife or her parents or her relatives by the husband or his parents or other relatives, where such a demand is not properly referable to any legally recognized claim and is relatable only to the wife’s having married into the husband’s family.[1]

Dowry is exchanged in a majority of Indian weddings. Although its practice became illegal in 1961, dowry flourishes among all social classes. The brides are tortured mentally and physically by various ways. They adopt a way like burning, poisoning, drowning and hanging to end their unhappy married life. Many of them are killed by poisoning, smothering, throttling, strangulating first and then burned to hide the crime.

In 1961, the Government of India passed the Dowry Prohibition Act, making the dowry demands in wedding arrangements illegal. In 1986, the Indian Parliament added "dowry deaths" as a new domestic violence crime.

According to the new section 304-B of the Indian Penal Code, where the death of the bride is caused by any burn or bodily injury or occurs other than under normal circumstances within 7 years of her marriage, and it is shown that soon before her death she was subjected to cruelty or harassment by her husband or any relative of her husband for, or in connection with, any demand for dowry, such death shall be called ‘dowry death’ and such husband or relative shall be deemed to have caused her death. Various sections of IPC (304-B, 498-A, 113-A, 113-B) are directly or indirectly related to the dowry death. The offenders can be sentenced for any period from a minimum of 7 years in prison to a maximum of life. [2]

According to data compiled by the National Crime Records Bureau (NCRB), a total of 2,276 female suicides due to dowry disputes were reported in 2006 that is six a day on an average, while the figure was 2,305 in 2005. In 2004, at least 2,585 such cases were registered across the country. [3]

Case history:

A 23 years old married female was living with her husband, mother in law and brother in law in a village of Saurashtra region of Gujarat. After one year of marriage, they moved to Surat for employment. On dated 22/12/2009, the neighbor noticed black colored smoke emitting from the window of the kitchen at 11:00 am and called the fire brigade. As the entrance door was closed from inside they broke the window of the kitchen and noticed that cotton mattresses, bed sheets, pillows were on fire. They found a
female lying on the floor of kitchen was alight. They informed to the concern police station and shifted the victim to the New Civil Hospital, Surat. Casualty medical officer declared brought dead. The victim’s father alleged a dowry torture death against her in-laws. The investigating officer prepared an inquest and dead body of the victim was sent to the Forensic Medicine & Toxicology Dept of Surat Municipal Institute of Medical Education and Research, Surat for medico-legal post mortem examination on the same day.

On Post-mortem examination:

**External Findings:**
- Scalp hairs over frontal region were completely burnt while hairs of occipital region showed singeing effect.
- Body showed pugilistic attitude.
- Mouth was partially open.
- Tongue was protruded and caught between jaws.
- 98% post-mortem dermo-epidermal burns were present over the body.
- Base of the burnt area was dry, hard, pale yellow in color without line of redness.
- Heat rupture of size 10cm x 3cm was seen over right elbow joint exposing muscles & tissue showed pale yellow in color.

**Internal Findings:**
- Contusion was present on left side and back of the trachea in an area of 6cm x 3cm.
- Contusion present was present over right side of trachea at the level of thyroid cartilage in an area of 4cm x 2cm.
- Three contusions were present over right side of trachea at the level of thyroid cartilage of size 2cm x 2cm, 4cm x 2cm, 3cm x 1cm, 2cm and 1cm distance above downwards respectively.
- Petechial hemorrhages were seen over epiglottis on both side and below vocal cord in an area of 2cm x 3cm.
- Laryngeal edema was not seen.
- Trachea congested, soot particles absent.
- Both lungs were congested and edematous.
- All organs were congested.
- Stomach contains 200ml of straw colored fluid. Unusual smell not perceived.
- Uterus: non-gravid

Viscera was preserved for chemical analysis, blood with layer of liquid paraffin in air tight container for carboxy-hemoglobin level and plucked scalp hairs for detection of inflammable material were sent to the Forensic Science Laboratory, Surat.
Carboxy haemoglobin (CoHb) was not found from the victim’s blood as per Forensic Science Laboratory report. After considering FSL reports and post-mortem findings, the final cause of death was given as “Asphyxia due to pressure over neck”.

Discussion:

Dowry death, a heinous crime is gradually engulfing and polluting the entire society. Newly married young women are the victims who adopted the way of suicide to end their lives by burning, hanging, poisoning or drowning. In police records they are classified under three specific categories, which invoke different sections of the law. They are "dowry murders" (committed by the woman's husband or members of his family for additional dowry or non-payment of promised dowry); "suicides" (forced or voluntary, but in most cases related to dowry demands); and "accidents" (a majority classed under "stove-burst" or "kitchen-accident"). Deaths under these three categories add up to an alarming figure. In Bangalore city, 1,133 women died in murders, suicides and accidents in 1997, 1,248 in 1998, and 618 till mid-July 1999.[4]

The unnatural deaths of newly married women are hitting the headlines of every newspaper. Hardly a day passed when the newspapers do not report the occurrence of this tragic event. The groom or his family members torture the bride physically or mentally. Some of them are burnt to death and others choose to die by fire; while still others are put to death by some means other than fire like poisoning, pressure over neck and disposed of by burning in order to hide the heinous crime. The commonest way used to end bride’s life is burning with inflammable material like kerosene or petrol and creating a scene like kitchen accident / stove burst. Killing the bride by giving pressure over neck in form of smothering, strangulating or throttling are rare but when these ways are used, the groom or his family always tried to hide the findings of asphyxia or injuries over body and neck.

In the present case, before post-mortem examination when we took the history of the incident from her husband, he told that she attempted suicide by pouring kerosene over herself. Only on seeing the dead body, our forensic team came to know about some foul play because 98% dermo-epidermal burn present over body was post mortem in nature which was not matched with history given by her husband. Medico legal point of view, this case was becoming more important to solve the puzzle of cause of death and manner of death. During neck dissection, we found extravasation of blood on both side of trachea which is ante mortem in nature, petechial hemorrhage seen over epiglottis and absence of soot particles from trachea.

In this type of suspicious cases, our forensic team always demands for visiting the scene of crime. After visiting the scene of crime, we came to know that someone created a scene like suicide to hide homicide attempt. Scientific officer of the Forensic Science Laboratory also observed unusual things which were not favoring to suicide or accident. There was no preparation of breakfast or lunch in the kitchen so there is no question of stove burst or kitchen accident. Now the question of suicide was ruled out by absence of any ligature mark beneath the neck skin, no ligature material or any suspension point was found from the scene of crime. Extra vasation of blood around trachea, post-mortem burn, and absence of carboxy hemoglobin (CoHb) from victim’s blood and unusual scene of crime were favored to put this case in homicidal category.

Carboxy hemoglobin detection from the victim’s blood is the most important laboratory finding to differentiate ante mortem and post mortem incidence of bride burning. More than 10% blood hemoglobin saturation with carbon monoxide in bodies recovered from fire usually indicates that the victim inhaled smoke and hence was alive at the time of fire. [5] In this case, carboxy hemoglobin was not found from victim’s blood and burns injuries were post-mortem in nature. These findings reflect that the victim was already dead at the time of fire.

Suggestions:

The visit of the scene of crime and complete post mortem examination of the victim, history from investigating officer and relatives in suspected bride burning by forensic expert / medical officer are useful to decide manner of death, mode of death, cause of death and time since death.

References:

Book Review:
Forensic DNA Isolation and Recovery in Blood and Semen

First Issue: Volume 1/ December 2010 of *Forensic DNA Isolation and Recovery in Blood and Semen* by Dr Imran Sabri, presently working as Assistant Professor, Department of Forensic Medicine & Toxicology, School of Medical Sciences and Research, Sharda University, illustrates and illuminates the various facets of Forensic DNA with great lucidity, clarity and felicity of expression that the reader get the subject easily. It has been published with ISBN: 978-3-8433-8103-1 by Lambert Academic Publishing, Germany,[ LAP publishes academic research worldwide].

The book is based on his thesis work “Recovery and Isolation of DNA in some selected samples of Forensic Significance” and is for the benefits of research scholars working in DNA based research/laboratories. The book is also useful for teaching and training of students working in the FORENSIC DNA based researches. The book contains standard protocol for DNA isolation and procedures for FORENSIC DNA collection from various samples, which are described in detail. This Book will also be helpful for crime scene investigators and Forensic Sciences laboratories globally working in DNA based investigations. Please visit www.forensicindia.com for further details and updates on this book.

It is my proud privilege and pleasure to write a review of this textbook, a treasure of an exemplary piece of communication skill conglomerated with experiences and intellectual potentials.

*Mukesh Yadav*
Editor, JIAFM
News and Views

Imran Sabri, webmaster, forensicindia.com

Conference of IAFM 2012:
Nellore, A.P.: In the General Body Meeting of Indian Academy of Forensic Medicine it is decided that the venue for next conference will be Pandit Jawahar Lal Nehru Medical College, Raipur, Chhattisgarh. Prof. R. K. Singh, Organizing Secretary will announce the dates and the formal announcement at a later stage. The next conference will be termed as Forensic Medicine-2012.

Dr Adarsh Kumar, Secretary, IAFM

Congress of International Society of Forensic Genetics, Austria
24th World Congress of the International Society for Forensic Genetics that will be held at the University of Vienna (founded in 1365) from August 29, 2011 to September 3, 2011.

Wolfgang R. Mayr, Congress President

2012 Conference of IAMLE
Reveria De Goa, Goa: It has been decided that the next conference of Indian Association of Medico-legal Experts will be held at Jaipur, Rajasthan in the month of March 2012. It will be 3rd International Conference on Legal Medicine, Medical Negligence and litigation in Medical Practice & 3rd International Conference on Recent Advances in Forensic Sciences, Forensic Medicine & Toxicology.

Professor R. K Sharma, Organizing Secretary.

Black Day of Forensics, Feb 5, 2011
Forensic Medicine & Forensic Science experts observed one day Black Day on Feb. 5, 2011, against the Vision 2015 of Medical Council of India/BOGs. Forensic Expert from all over the country participated in the protest and tied black ribbons. Protest was in collaboration with IMA before MCI Office at Dwarka, New Delhi, in Jan. 2011. All the members of IAFM were in sorrow about Vision-2015. The IAFM is taking this matter very seriously and is in a mood to do or die fight with MCI/BOGs.

VIII annual conference of PAFMAT
The VIII annual conference of Punjab Academy of Forensic Medicine and Toxicology was held on December 4, 2010 at Govt. Medical College, Patiala. Journal of PAFMAT was released by the chief guest who was presented to him By President, PAFMAT. Concerns were raised regarding recent reduction in the faculty of Forensic Medicine in the medical colleges.

Dr Pooja Rastogi, Associate Professor

Views: Vision-2015 of MCI/BOGs
The start of year 2011 saw one of the most atrocious attacks on the very existence of subject of Forensic Medicine in the form of Vision 2015 document as proposed MCI. The way it was tried to push up without taking inputs from forensic fraternity & IAFM; everybody smelt a rot in it. A detail Memo was submitted by IAFM on 15 Jan, 2011 which brought out various lacuna & impending consequences of such recommendations as envisioned. It was out rightly rejected by whole fraternity in its present form and called as “Tunneled & Myopic”. BOG-MCI has taken the cognizance of our genuine demands & now it seems things are moving in right direction to the satisfaction of forensic fraternity & working on recommendations submitted by the said memo. Hope we will not only restore our pride but revamp Forensic Medicine & Toxicology for MBBS UG teaching.

Dr Adarsh Kumar, Secretary, IAFM

Nightmare: Vision
Now in post "Vision 2015" era (although it is not yet over) - I have recently noticed that the faculty has been divided into two groups namely private lobby and govt. lobby. Blame game has already started. Those sincerely working in either setup are blaming the faculty of other lobby with number of reasons, not working fellows (Jamai raja) are happy anywhere.

Dr. Manish Nigam, Quality of Medical Education

Tube-Vision 2015
‘Vision 2015’ appears to be more of a ‘TUBE-VISION’. How can a group of just 8 people sit and make a ”VISION' for the whole fraternity? They should have taken representation from all the departments and sections of the profession.

Dr R. Kaushal, discuss medico lega -issues-with-prof-r-k-sharma
To,
The General Secretary,
Indian Academy of Forensic Medicine
Dear Sir,
I want to become a Life Member of the Indian Academy of Forensic Medicine. I have gone through the rules and regulations of the Academy and I agree to abide the same. I furnish the necessary particulars. Kindly enroll me as a member and oblige. Life member fee of Rs.3000/- (Rupees Three Thousand only) vide bank draft no………………………………dated……………….of……………………….. ..bank is also enclosed herewith.

Yours faithfully,
Place:…………………………Date:………………………….

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Treasurer

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President

______________________________
Gen. Secretary