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Patiala.

From Editor's Desk

It is my pleasure to present before you the penultimate issue of this year. It is heartening to note that all the members of academy are showing a great interest in the journal and now I am getting the good articles from you uninterruptedly. I must congratulate all of you for this. It is my pleasure to thank all of you for your renewed interest in the journal. I appeal to all of you to maintain this tempo in future also for the betterment of forensic medicine and toxicology in India. I appreciate the efforts of Dr. Amandeep Singh in bringing this journal to you.

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Editorial

TRANSPLANTATION OF HUMAN ORGANS: CRITICAL ANALYSIS

Due to various scam and sting operations being reported in the news, and prosecution of medical professionals thereupon in such cases, the medical fraternity is scared of granting permission for donation of human organs on one ground or another. Those cases that are refused permission go to the courts for justice. There is a long protracted procedure in the courts and many times such cases get death earlier than the verdict. All this needs a critical evaluation that whether the act is serving the purpose for which it was enacted or it is the hindrance in a noble cause of donation of human organs.

Most of the reputed institutions have made it a policy that they will operate upon on only those cases where the donor is near relative i.e. spouse, son, daughter, father, mother, brother or sister; and permission of the authorization committee to donate the organ and operation is not required.

Due to the fact that many medical professionals have been caught unaware because they did not knew the intricacies of law. They were supposed to check the affidavits whether they were genuine or not. Without any training for such purposes obviously they relied upon these documents and when these documents turned out to be fake, the axe of law fall on them. They were supposed to find the genuineness of the donor without any investigative powers with them. But keeping in mind the urgency of the situations they took decisions and made judgments which in a few cases turned out to be wrong.

After the cases were made out against medical professional the entire medical profession got scared. Then the authorization committees felt that they have to be cautious to save themselves from inadvertent passionate wrong decisions. In this process they became overcautious and in the process of verifying all the documents it started taking a long time.

Medical professionals were in a dilemma that they had taken a solemn oath they will try to save the life of the patient by all means. When they were sitting in such committees they were not trying to save the life of critically ill patients of renal failure but trying to rule out that there is no monetary involvement in these organ donations. They were at great pains, when they had to deny permission as now they were not trying to save the life of the patient but were just acting contrary to it.

To lessen this burden on the conscious of medical profession it was suggested that some senior police officer and some revenue officer should be the member of such authorization committees. Police officers will be able to establish the identity of the donor as they had investigative teams with them. They will be able to rule out the monetary transaction. Revenue authorities could verify the affidavits so they were made members.

After the introduction of these members it was thought that the process will become simpler and it will take less time. But it was a general feeling that this is a tricky situations and nobody wanted to take onus for decisions and waiting time for the renal failure patients did not decrease.

As the donors were mostly from a different state than the recipient, a question arose that which of the authorization committee will give permission for donation, whether the committee where the recipient is living, donor is living or where the patient is getting operated. Appropriate authority took the decision that authorization committee of the place, where the hospital carrying out renal transplantation is situated, will take the decision.

This raised a problem of verifying the persons from very distant places. Papers were sent back to the different states for verifying the antecedents of the donors and recipients. This process took a lot of time. During this time patients, many a times became more critical.

Appeal in such cases against the decision of the authorization committee, was with appropriate authority. They were also medical professionals and they had the same dilemma as members of the authorization committees. They also could not expedite the process of quick decisions. After this appeal lied with the Central Government where the appeal is against the order of the Authorisation Committee constituted under clause (a) of sub-section (4) of Section 9 or against the order of the Appropriate Authority appointed under sub-section (1) of Section 13; or the State Government, where the appeal is against the order of the Authorisation Committee constituted under clause (b) of sub-section (4) of Section 9 or against the order of the Appropriate Authority appointed under sub-section (2) of Section 13 of HOTA-94.

Many patients went to the courts for getting quicker decisions regarding permission for organ transplantation. But courts have also their own lengthy procedures and sometimes they got the death call earlier than the verdicts from the courts.

To expedite the process now Deputy Commissioners, who were earlier members of the committees had now been made the chairman of the authorization committees in Punjab and there is one medical professional as a member along with Senior superintendent of police and member of NGO.

The purpose of the Human Organ Transplantation Act was to provide for the regulation of removal, storage and transplantation of human organs for therapeutic purposes and for the prevention of commercial dealings in human organs and for matters connected therewith or incidental thereto.

"Donor" means any person, not less than eighteen years of age, who voluntarily authorizes the removal of any of his human organs for therapeutic purposes. "Human organ" means any part of a human body consisting of a structured arrangement of tissues which, if wholly removed, cannot be replicated by the body; therapeutic purposes" means systematic treatment of any disease or the measures to improve health according to any particular method or modality; and "transplantation" means the grafting of any human organ from any living person or deceased person to some other living person for therapeutic purposes.

Where the body of a person has been sent for post-mortem examination for medico-legal purposes by reason of the death of such person having been caused by accident or any other unnatural cause; or for pathological purposes, the person competent under this Act to give authority for the removal of any human organ from such dead body may, if he has reason to believe that such human organ will not be required for the purpose for which such body has been sent for post-mortem examination, authorize the removal, for therapeutic purposes, of that human organ of the deceased person provided that he is satisfied that the deceased person had not expressed, before his death, any objection to any of his human organs being used, for therapeutic purposes after his death or, where he had granted an authority for the use of any of his human organs for therapeutic purposes after his death, such authority had not been revoked by him before his death.

No registered medical practitioner shall undertake the removal or transplantation of any human organ unless he has explained, in such manner as may be prescribed, all possible effects, complications and hazards connected with the removal and transplantation to the donor and the recipient respectively. It has been observed that most of the times surgeons involved in organ transplantation do not tell exactly what is needed to be told and just explain it is a simple operation and they need not be afraid. This is not a good practice. It is the need of the hour that donor is told clearly as per the law so that later on donor does not feel cheated.

Any person who renders his services to or any hospital and who, for purposes of transplantation, conducts, associates with, or help in any manner in, the removal of any human organ without authority, shall be punishable with imprisonment for a term which may extend to five years and with fine which may extend to ten thousand rupees. Where any person convicted under sub-section (1) is a registered medical practitioner, his name shall be reported by the Appropriate Authority to the respective State Medical Council for taking necessary action including the removal of his name from the register of the Council for a period of two years for the first offence and permanently for the subsequent offence.

In western countries organ donation is mostly from the brain dead persons but in India this phenomenon has not picked up. It has been seen that poor persons posing as servants of the person and showing attachment due to love and affection to their masters, are the donors mostly. It becomes very difficult to rule out involvement of money in such cases. Many times donors give wrong affidavits that they are not accepting money when the situation points otherwise.

People should be made aware that organ donation after death can save the life of many patients. Procedure for organ donation after death should be made simpler. People who want to donate organs may be issued cards like driving licenses which can be kept in their pockets. To make it more simpler consent for organ donation may be entered on the driving licenses of the donors. Organs then may be removed as early as possible from dead bodies of such persons without any further legal formalities. Organ banks may be started in good hospitals and may be given to the needy patients as per the waiting list of that state or a particular area.

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SOCIODEMOGRAPHIC PROFILE OF POISONING CASES

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ABSTRACT

Acute poisoning is an important medical emergency and one of the causes of death. A thorough knowledge of the profile of the victim is essential for management and prevention of poisoning. The present paper evaluates pattern of poisoning cases including deaths over a period of two years from 1999 to 2001 in Berhampur, Orissa. 53.3% of the cases were male with male to female ratio 1.14:1. Peak incidence was observed in the age group 21-30 years(124 cases). More than four-fifth of the cases belonged to medium socioeconomic status and 58.1% cases were from rural areas. Majority of the victims were literate and married outnumbered the unmarried cases. Occurrence of poisoning was more common in day time and during Summer season. Organophosphate compounds was the most commonly (22.9%) abused substance. Based on these findings preventive measures like restriction of sale and strengthening the legislature on availability of poison, promoting poison information center etc have been put forward.

Key words: Deaths, organophosphates, poisoning, preventive measures, victims

INTRODUCTION

Owing to the vast development in the field of chemical technology a significant number of new compounds have been added as new poisonous substances, used in the field of trade, industry and medicine. Poisoning is a medical emergency and a patient is always invariably rushed to the hospital at the earliest possible moment, irrespective of the amount and nature of poison ingested. All the cases of poisoning are admitted through emergency services where the safety of life of the patient is the main issue for the doctor. In many countries the number of patients who suffer from some or other form of acute poisoning is increasing. Easy availability of poisons plays a major role in both accidental and suicidal poisoning cases. A person prefers to swallow a pill and have a peaceful death rather than die by hanging or shooting on self.

Sickness squanders the true wealth of a nation. Although sickness cannot be avoided or cured but those due to poisoning is largely preventable. But it is a matter of great disappointment that the number of persons in this state, specifically in southern Orissa, suffering from acute poisoning is increasing year by year. Although statistically the figure of acute poisoning cases is somewhat less than that of those injured in road accidents, the numbers of death from either case is very nearly the same. It is surprising that whilst the number of deaths from road accidents is rightly a matter of great public concern far less attention is paid to an almost equal number of deaths caused by poisoning. The complexity of the possible causes and the rapid increase in newer drugs and chemicals with potentially harmful effects is a matter of concern to those responsible for treatment, and makes it increasingly difficult for them to retain their confidence and command of the situation, which is very essential in dealing with cases of acute poisoning. A thorough knowledge about the nature and magnitude of the problem in a particular area is essential for the doctors in hospital practice. Present study was taken up to

identify the more common causative agents and to analyse the epidemiological and social factors, which can provide a practical guide for the general practitioners and resident hospital staffs towards the management of acute poisoning.

MATERIAL AND METHODS

This is a prospective study in which all the acute poisoning cases admitted in M.K.C.G. Medical College Hospital, Berhampur , the only referral hospital of southern Orissa, present on the Eastern part of India and the records of fatal cases of poisoning died due to drugs or chemicals referred for medicolegal autopsy to the Department of Forensic Medicine and Toxicology during the period from September 1999 to August 2001 were subjected to post mortem examination were taken up and evaluated in detail. As majority of the cases being admitted to the M.K.C.G. Medical College Hospital, the bed head tickets which contain the details of treatment and laboratorial diagnostic aspects of the cases in poisoning were also reviewed during post mortem examination in the hospital..During the above mentioned period a total of 306 poisoning cases came to M.K.C.G. Medical College Hospital, Berhampur for treatment and 62 No. of cases were subjected to post-mortem examination in the central mortuary of F. M. & T. Department of M.K.C.G. Medical College, Berhampur.

Particulars in respect of poisons/drugs history, household remedies by the deceased and any peculiar finding seen in the deceased after suffering from poisoning were obtained not only by direct interrogation with the relatives, friends or others accompanying the deceased but also from the police. Identification of etiological/precipitating factor responsible for poisoning was made by discussing the matter with patient or his/her relatives after establishing a proper rapport with them.

The clinical diagnosis of the nature of the poison consumed was based on Reliable History, presentation of the remaining stuff/container from which the poison had been consumed/gastric aspirates (vomitus) and suggestive clinical picture which further confirmed by post mortem examination and further steps are also taken to confirm the nature of the poison as per the reports obtained by chemical analysis (C.E.) and post mortem findings are studied to corroborate the diagnosis in cases where such chemical examination reports unavailable.

Information on the type of poison consumed, socio-economic status, incidence on age and sex, marital status, seasonal variation, details as any other accompanying ailment (domicile, literacy etc.) were noted from records in a separate proforma for each case.

RESULTS

Three hundred and six cases were admitted to the Hospital with diagnosis of acute poisoning. Total male affected are 163 (53.3%) dominating the female. (Table - 1) The incidence of poisoning according to age and sex shown in Table - 2 reveals that there is an increasing trend of poisoning with increase in age up to 30 years and then declines with a peak incidence in the age group 21 - 30 years which represented 124 (40.5%) cases in this study.

It is evident that 256 (83.7%) of victims were of medium socio-economic status (Table-3). The domicile pattern of the victims shows 178 (58.2%) cases were from rural area. (Table - 4)
Literacy status of the victims reveals that at the time of incidence 257 (83.9%) cases were literate(Table- 5). Among the 306 cases admitted to the hospital with diagnosis of acute poisoning 156 (50.9%) cases were married. (Table-6)

Maximum incidences of cases 97 (31.7%) were recorded in Summer season. (Table - 7)
Considering the time of poisoning, this shows that the majority of cases (55.9%) were observed during the daytime, between 6 AM to 6 PM. (Table - 8)
Organophosphrous is the most commonly abused poison. (Table 9)

DISCUSSION

Out of 306 poisoning cases admitted to M.K.C.G. Medical College Hospital, Berhampur 62 cases succumbed to the complications of poisoning. The sex incidence affected with poisoning was more with male which outnumbers the female the ratio being 1.14 : 1 and tallies with the study of others.[1-7] Male preponderance in this study could be accounted to the fact that males

are more often exposed to the stress and strain of day to day life, as well as to the occupational hazards than the females in this place.

The age group with maximum incidence of poisoning was between 21 - 30 years and is significantly less in the extremes of age. The present study coincides with the study of other workers.[1,3,5,7-9] It is obviously due to the fact that this age group is the determining factor of the life in terms of studies, service, marriage and other life settlement factors. Therefore, they are subjected to substantial amount of mental stress and strain during this period.

Poisoning is more prevalent among the medium socio-economic group The similar type of finding was presented by other authors. [5,10,11] The middle and low socio-economic groups are more vulnerable for poisoning (suicide) which may be due to the fact that they are under continuous financial and other stress during life.

The Southern parts of Orissa , mostly comprising of agricultural land, the geographic distribution of the Victims chiefly being from rural areas and comprising of 178 cases . This study correlates with the study of many authors. [2,10-12]The preponderance of poisoning and death due to poisoning is more in rural areas than in urban areas as shown by different authors including the present study which can be reasoned out that the occurrence is due to abundant use of pesticides in agricultural fields of rural areas and inhabitation of poisonous reptiles (snakebite) in unhealthy and hilly rural areas.

In respect of the incidence of literacy status in the present study, it is seen that majority of cases were literates and 49 (16%) are illiterate, which coincides with the studies by authors from Rohtak, Haryana. [10,12] Failure in the life and tolerance to the problems are better understood by the literates than the illiterates. Married person more often become victims of poisoning which is consistent with studies from Chandigarh[2] and Rohtak[10] owing to the fact that the married people (both medium and low socio-economic group) have to undergo more amount of stress in their day to day life than the single males or females which makes them more vulnerable to the poisoning.

A season-wise variation was seen in the poisoning incidence in the present study with Summer showing the maximum numbers of victims. The seasonal variation of poisoning was also reported by others [12]. Another study done at Manipal [13] shows that Winter is the most vulnerable period of poisoning. Incidence of poisoning is more during Summer months and can be attributed as because the Summer days being longer and during which the person becomes easily fatigued and exhausted as a result of extreme heat conditions tilting his mental balance and attitude towards life. The preservation of grain starts from March, which is related directly to the overall use of pesticides and variety of chemicals. Therefore the sudden rise of cases from February to March is mainly due to this fact, while the succeeding months are the time of school, college examination and results followed by admissions in new classes. The failure in any of these things may increase the tendency to commit suicide. The poison was consumed mostly during daytime. Similar type of observation was made by others. [4] The fact behind the trend can be explained as the literate mass mostly in the day time are engaged in multifarious works and are subjected to great stress and strain, which make them vulnerable to attempt self poisoning.

In the present study 84 (27.5%) cases were due to insecticidal poisons. Similar type of findings were noted by other authors. [6,13,14-17] Southern Orissa being mainly an agricultural area7, insecticides are available abundantly and easily even in local shops. The easy availability and cheaper price have made them a popular killer agent specially among the medium and low socio-economic groups in the present study.

The present study highlights the following features

(1) Males are affected more (53.3%) than the females, the highest incidence of poisoning being in the age group of 21 - 30 years.

(2) Most victims are recorded from the medium socioeconomic group belonging chiefly to the rural areas.

(3) Most victims belong to the literate group with married population outnumbering the unmarried.

(4) Maximum number of poisoning cases are encountered in the Summer season, daytime (6

AM to 6PM) being most suitable.

(5) Considering the commonly abused poisons, 84 cases (27.5%) cases constituted insecticidal poisons (OPC, OCC and Carbamates)

It is inevitable that younger generation has .become victim of poisoning with the number increasing year after year. Although there are restrictions on sale of drugs and drugs control in India, vulnerability to insecticide cannot be ignored. It is also important to strengthen the legislature on availability of drugs and poisons and more important to strengthen the preventive measures by such as educating people through Drug education programme, increasing awareness among the young about harmful effects of drugs, promoting poison information centers, introducing separate toxicological units in the hospitals and upgrading the peripheral health centres to manage cases of poisoning in emergency.

In spite of this extensive study it is further suggested to find out causes and nature of poisoning and design appropriate health education programme for prevention of both suicidal and accidental poisoning for the benefit of the public at large.

TABLE - 1
Showing incidence of sex

Sex	No. of cases N=306	Percentage
Male	63	53.3
Female	143	46.7

TABLE - 2
Showing the incidence of poisoning according to diff. age

Age in yrs	No. of cases N=306	Percentage
<10	7	2.3
11-20	64	20.9
21-30	124	40.5
31-40	66	21.6
41-50	40	13.1
>50	5	1.6

TABLE - 3
Showing the socio-economic status of the patients

Socio-economic Status	No. of cases n=306	Percentage
Low	49	16
Medium	256	83.7
High	1	0.3

TABLE - 4
Showing domicile pattern of the victims

Domicile	No. of cases N= 306	Percentage
Rural	178	58.2
Urban	128	41.8

TABLE - 5
Showing literacy status of the victims

Sex	Literate	Illiterate
Male	131(51%)	32 (65.3%)
Female	126 (49%)	17 (34.7%)
Total	257 (83.9%)	49 (16 %)

TABLE - 6
Marital status of the victims

Marital status	No. of cases N= 306	Percentage
Married	156	51
Unmarried	150	49

TABLE - 7
Showing seasonal incidence of poisoning

Seasons of the year	Total	Percentage
Summer (Mar, Apr., May)	97	31.7
Rainy (Jun, Jul, Aug)	85	27.8
Spring (Sept, Oct, Nov)	70	22.9
Winter (Dec, Jan, Feb)	54	17.6

TABLE - 8

Showing the incidence of day and night time of poisoning

Time	No. of cases	Percentage
Day (6 AM - 6 PM)	171	55.9
Night (6 PM - 6 AM)	130	42.5
Not known	5	1.6
TOTAL	306	100

Table 9

Showing the commonly abused poisons by the victims

Poison abused	No. of cases N= 306	Percentage
Organophosphates and compounds	70	22.9
Organochlorine	8	2.6
Carbamate	6	2
Snake bite	45	14.7
Benzodiazapines	31	10.1
Phenyl	29	9.5
Rat poison (Zinc Phosphide)	27	8.8
Oleander	20	6.5
Alcohol	12	3.9
Drugs	22	7.2
Corrosives	6	2
Scorpion sting	6	2
Dhatura	3	1
Cannabis	3	1
Kerosene	3	1
Unknown poison	15	4.9

References

1. Singh D and Tyagi S. Changing trends in Acute poisoning in Chandigarh Zone. A 25 years autopsy experience from a tertiary care hospital in Northern India. Am J Forens Med Pathol. 1999;20:203-210.
2. Sharma BK, Harish D, Sharma V and Vij K. The epidemiology of poisoning: An Indian View point. Journal of Forensic Medicine and Toxicology.2002; 19: 5-11.
3. Singh S, Sharma BK, Wahi PL, Anand BS and Chugh KS. Spectrum of Acute poisoning in adults (10 year experience). J Assoc Physic India. 1984; 32: 561-563.
4. Sinha US, Kapoor AK, Agnihotri AK and Srivastava PC. A profile of poisoning cases admitted in SRN Hospital, Allahbad with special reference to Aluminium Phosphide poisoning. Journal of Forensic Medicine and Toxicology.1999;16:40-43.
5. Singh S, Wig N, Chaudhary D, Sood NK and Sharma BK. Changing pattern of acute poisoning in adults: Experience of a large North-West Indian Hospital(1970-1989) J Assoc Physic India. 1997;45: 194-197.
6. Elif D, Akgur SA, Ozturk P and Sen F. Fatal poisoning in Aegean region of Turkey. Vet Hum Toxicol. 2003; 45: 106-108.
7. Senanayake N and Peris H. Mortality due to poisoning in a developing agricultural country: trends over 20 years. Hum Exp Toxicol. 1995;12: 435-438.
8. Nhachi CF and Kasila OM. The pattern of poisoning in Urban Zimbawe. J Appl Toxicol. 1992; 12: 435-438.
9. Rostrup M, Tonjum T and Ekeberg O. Self-poisoning in North-West Norway in 1975-1984. Tidsskr Nor Laegeforen. 1989; 109: 173-176.
10. Dhattarwal SK and Singh H. Profile of deaths due to poisoning in Rohtak, Haryana. Journal of Forensic Medicine and Toxicology.2001;18:28-29.
11. Agarwal R, Barthwal SP, Nigam DK, Saxsena S, Shukla SK, Shukla N, Shukla RP. Changing pattern of acute poisoning in eastern UP-Hospital based study. J Assoc Physic India.1995; 43:907-908.
12. Dhattarwal S.K. and Dalal S.S. : Profile of death due to poisoning in Rohtak Haryana in the year 1995. Journal of Forensic Medicine and Toxicology. 1995; 15 : 51.
13. Mohanty MK, Kumar V, Bastia BK and Arun M. An Analysis of poisoning deaths in Manipal, India. Vet Hum Toxicol. 2004; 46: 208-209.

14. Taruni Ng, Bijoy T and Momonchand A. A profile of poisoning cases admitted in RIMS Hospital, Imphal. Journal of Forensic Medicine and Toxicology.2001; 18: 31-32.

15. Gulati RS. Spectrum of acute poisoning cases admitted to service hospital(Abstract). J Assoc Physic India. 1995;43: 908.

16. Limaye MR : Acute organophosphorous compound poisoning. A study of the necropsies. J Ind Med Assoc 1966. 47;10 : 492 - 498.

17. Rao PP, Murty AK, Babu MM, Narayana RV., Devi MU. Clinical profile of 100 cases of poisoning admitted in acute medical care unit. JAPI. 1992;40: 206 - 210.

18. Bhalachandra SR, Zinc KV, Mohanty AC : Pattern of acute poisoning at Indira Gandhi Medical College and Hospital, Nagpur. JFMT, 1999;15:50 - 53.

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VIOLATION OF CHILDREN'S RIGHTS: CAN FORENSIC MEDICINE HELP?

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ABSTRACT

"Today's child is tomorrow's citizen" so goes a popular saying, stressing the need for proper care and protection of the children. India has ratified the UN convention on the Rights of Child, which came into force on 2nd September 1990 and our own National Policy for Children was adopted way back in 1974. However, if we look at the outcome of all the measures that have been taken "on paper" the record is dismal. Child abuse goes unabated in our country, right in front of the eyes of the Law. The present study was undertaken to assess whether our specialty - Forensic Medicine - can bring to focus the atrocities perpetuated on children. During the 5-year period of the study, 155 cases were examined medicolegally in the Emergency department of the Govt. Medical College Hospital, Sector 32, Chandigarh; of which 6% were referred for medicolegal autopsy. Physical abuse accounted for 70% cases and sexual for 30%; the police brought 61% of the children to the hospital. Boys were more at risk in cases of physical abuse, however of the cases of sexual abuse, 23% were boys. Maximum cases of abuse - both physical and sexual occurred at the home/ neighborhood of the victim. It was concluded that the society as a whole, including the Govt. NGOs, Parents, teachers, elders etc. has the responsibility for the proper upbringing of the child and until and unless all of us shoulder the responsibility with sincerity, the children will continue to be abused.

Key Words : Children's right, child abuse.

INTRODUCTION

India has the largest child population in the world, with about 40% of the total population below the age of 15 years and 51.5% of these between the ages of 0 to 6 years [1]. Right through the ages, care for children has been one of the causes to which Indian policy has remained committed. In the independent India, this commitment was enshrined in our Constitutional provisions. The Constitution of India in its Directive Principles of State Policy pledges that "the State shall, in particular, direct its policy towards securing... that the health and strength of workers, men and women, and the tender age of children, are not abused and that citizens are not forced by economic necessity to enter avocations unsuited to their age or strength; that children are given opportunities and facilities to develop in a healthy manner and in conditions of freedom and dignity and that childhood and youth are protected against exploitation and against moral and material abandonment". As a follow up to this commitment, Government of India adopted a National Policy for Children in 1974 which reaffirmed the Constitutional provisions and declared that "it shall be the policy of the State to provide adequate services to children, both before and after birth and through the period of growth, to ensure their full physical, mental and social development. It further stresses that the State shall progressively increase the scope of such services so that, within a reasonable time, all children in the country enjoy optimum conditions for their balanced growth" [2].

National Policy and Charter for Children, 2001 reads that, "Whereas the Constitution of India enshrines both in Chapter 3 and 4 of the Constitution of India, the cause and the best interest of children, in so far that:

· The State can make special provisions for children [Art 15 (3)]

· No child below the age of 14 years shall be employed to work in a factory, mine or any other hazardous employment (Art. 24)

· The tender age of children is not abused and that citizens are not forced by economic necessity to enter avocations unsuited to their age or strength (Art. 39 e), and that

· Children are given opportunities and facilities to develop in a healthy manner and in conditions of freedom and dignity and that youth are protected against exploitation and against moral and material abandonment (Art. 39 f),

· Whereas through the National Policy for Children, 1974, we are committed to provide for adequate services to children, both before and after birth and throughout the period of growth, to ensure their full physical, mental and social development,

· Whereas we affirm that children's rights - economic, social, cultural and civil, are fundamental, human rights and must be protected through combined action of the State, civil society, communities and families in their obligations in fulfilling children's rights.

· Whereas we also affirm that children's rights must be exercised in the context of intrinsic and attendant duties directed towards preserving and strengthening the family, society and the Nation, and by inculcating a sense of values directed towards the same end.

· Whereas India has acceded to the United Nations Convention on Rights of the Child in 1992, wherein it has committed itself to realize the best interests of the child through the maximum extent of its available resources,

· And whereas we believe that by respecting the child, society is respecting itself.

Recently the Government of India has decided to constitute a National Commission for Children that would be a statutory body setup by an Act of Parliament to give further protection to children and act as an ombudsman for them. The commission will have certain judicial powers, will guide policy on children related subjects and take effective steps for review and better implementation of laws and programs meant for the survival, development and protection of children. It would also oversee the overall and proper implementation of the laws and programs relating to children in the country [3]. However, destruction of unborn and new-born infants, stringent measures including physical torture at home and in teaching institutions to introduce discipline and teaching program, child labor system, etc. all extending up to cruelty on children are still there. The incidents of cruelty may not remain limited to assault and injury only, providing the child insufficient food, inadequate care, protection and education, child slavery (though banned is reported in this part of the world), kidnapping or seducing a girl child for immoral traffic and sexual assault on young girls and boys are the other examples of atrocities on children [4]. The present study attempts to examine the extent to which violation of children's rights can be brought to light by the specialty of forensic medicine.

MATERIAL AND METHODS

155 cases of alleged child abuse referred to Government Medical College Hospital Chandigarh, for medicolegal examination/autopsy from January 2000 to Dec. 2004 were retrospectively reviewed. The case records from the Medical Records Department of the hospital as well as the Investigating Agencies were analyzed with regards to the profile of the victims of abuse. The data pertaining to crimes against the children, published by National Crime Records Bureau from 2001 to 2003 was also analyzed to present the national scenario.

OBSERVATIONS

During period under study, a total of 155 children below 16 years were referred to the hospital for medicolegal examination, of which 9 (6%) were brought for medicolegal autopsy. Of the different cases of abuse, physical abuse accounted for 108 (70%) victims while sexual abuse accounted for 47 (30%) victims. Again, 89 (61%) cases were brought by police, while 57 (39%) were brought by their parents, either for treatment of injury/ pain etc., but who, on examination, were found to be either physically or sexually abused. Boys, 64 (60%), were more at risk in cases of physical abuse, while girls, 39 (83%), were at risk in cases of sexual abuse (Table 1).

Children, of the age group, 14-16 years, were the most common victims of both physical abuse

[35 (32%) cases] and sexual abuse [43 (28%) cases]. Their oppression decreased with the decrease in their age. An appreciable percentage of boys were also sexually abused, 11 (23%) cases, of which those belonging to the age group 8-10 years, constituted the most victims, 4 (36%) cases (Table 2).

Maximum cases of physical abuse occurred among the school dropouts / doing nothing 'at home', 36 (33%) cases, followed by those working at auto repair shops or small-scale factories, 23 (21%) and 22 (20%) cases, respectively whereas majority of sexual abuse also took place among the 'at home' category, (45%). (Table 3)

Data published by National Crime Records Bureau, Ministry of Home Affairs, Government of India, showing crimes against children in the country and percentage variation in 2003 over 2002 reveals the extent of reported cases (Table 4)

DISCUSSION

According to the State of Children report [5], there are over 35 million girls in India, who are out of school, are neglected or involved in one or the other work. Juveniles engaged in prostitution and children of sex-workers; children abused sexually or physically; underfed children; abandoned children; slum children; street children; refugee children; and juvenile servitude constitute the pool of neglected and destitute juveniles. Within the family, children are forcibly engaged in domestic servitude and used as first choice to assist parents on the field by the small farm families. Outside the family, they are engaged as indented servitude in workshops, hotels, small industries, footpath vending, fire-works, carpet weaving etc. For the employers, child workers are advantageous as they cannot form unions, could be exploited for longer hours for meager wages and could be even used in hazardous and unhygienic work environment.

Child labor is not a new phenomenon, what is, however, new is its perception as a social problem. In the recent past, there has been a distinct change in the value orientation and attitudinal ethos of the legitimizing groups of society vis-à-vis child labor. In the pre-industrial agricultural society in India, children worked as helpers and learners in 'hereditarily determined' family occupations under the benign supervision of adult family members. The work place was an extension of the home and the work was characterized by personal and informal relationship. The tasks of technology that the work involved, were simple and non-hazardous, which the child could learn smoothly, almost unconsciously over the years through imitation and association. With the advent of industrialization and urbanization, the social scenario changed. The family members no longer work as a team and in caste-sanctioned occupations. The child has to work as an individual person, either under an employer or independently, without enjoying the benevolent protection of his guardian. His work exposes him to various kinds of health hazards emanating from the excessive use of chemicals and poisonous substances in industries and the pollutants discharged by them and here arises the problem of child labor.

United Nations Convention on the rights of children sets out basic rights and standards for judging the welfare of children. It encompasses both the maltreatment of children within family settings and that occurring through group processes and social forces. In the United States, if any professional entertains any suspicion as to the maltreatment of the child, he is required by law to report the things to the local child welfare agency (mandatory reporting). In India, any doctor who has reason to suspect about the maltreatment of a child is required to report the matter to the police. However, despite the Juvenile Justice Act 2000 providing for taking special measures towards the care and protection of children, many types of abuse are frequently reported in media as is evident from the National crime records Bureau data.

The term child abuse refers to any act or failure to act that violates the rights of the child that endangers his or her optimum health, survival or development. A recent WHO estimate shows that 40 million children aged 0-14 around the world suffer form abuse and neglect and require health and social care. Child abuse or maltreatment is commonly divided into five categories: physical abuse, emotional abuse, sexual abuse, neglect and exploitation. Although any of these forms may be found separately, they often occur together [6] but the cases of abuse frequently seen by healthcare workers include physical abuse, sexual abuse and neglect.

Physical abuse has been explained as physical assault of a child by any person having custody, care, or charge of that child. Methods may include hitting, throwing inducing burns or scalds, biting, poisoning etc. Physical abuse occurs at all ages, although biological sequelae are more severe in infancy, becoming weaker throughout the childhood and disappearing by adolescence [7]. There is a strong association with low socioeconomic status [8]. To some extent, the problem of physical abuse was unveiled by Silverman (1953) and Wooley and Evans (1955) in its exact shape, magnitude and significance, who established the deliberate trauma character of certain specific types of pathological lesions, earlier detected by J. Caffey (1946) a pediatric radiologist (Caffey's Syndrome) [9].

Sexual abuse has been explained as sexual activities that involve a child and an adult, or a significantly older child. The abuse may be in the form of: 1) contact sexual activities that include - penile or digital penetration or acts like kissing or touching of genitalia or making the child touch or fondle genitalia of the perpetrator and 2) non contact sexual activities that may include exhibitionism or encouraging the children to have sex together [10].

Neglect refers to the under-provision of the child's basic needs, both physical and psychological that may occur through parents or through institutions like orphanages, nurseries, educational establishments etc [11]. However, this perspective is limited and may not afford adequate protection to children since societal factors (e.g., poverty) that compromise the abilities of parents to care for their children also impair children's health and development and as such 'neglect' must be evaluated within a societal context [12]. The present study also revealed that the problem was more prevalent in lower socio-economic group as majority of the victims 42% of physical abuse were working at auto repair shops or small factories or as roadside vendors. This necessitates the need for interaction among various agencies concerned with the welfare of children. However, implementation of legislation, policy and programs for children is extremely inter-sectoral, and is dispersed across eight departments both at the center and in the states - mainly the departments of Family welfare, Education, Labor, Social Justice and Empowerment, Water and Sanitation, Youth Affairs, Woman and Child Development, Information and Broadcasting and encompasses jurisdiction of the Center and States/Union Territories, often with the participation of the non-governmental sector [13]. Here the question arises that if any welfare program to be implemented is to be routed through so many channels what will actually reach the needy in general, and in the present scenario of "BANDAR-BAANT" prevalent in India, in particular.

CONCLUSION

It is too often reported that rural and urban India have pervasive practices of child labor, juvenile servitude, domestic juvenile servitude and trafficking of juvenile girls. Despite enactment of the Juvenile Justice Act 1986 and 2000, and in spite of several positive provisions embodied into the Indian Constitution and the Universal Human Rights Declaration aimed at safeguarding the rights of children - leisure, learning and play - the social reality continues to be grim. We find a large segment of children outside the school portals and equally a large number engaged either in work or in delinquent activities. There is a need to identify potential risk factors for baby battering, child labor, child sexual abuse etc., so as to better understand the problem, improve the treatment of the victim as well as perpetrator and take preventive steps to restrict the incidence of child abuse. Announcements of new legislation, commissions or programs by the respective governments in the absence of the will to implement the same has nothing more than politically motivated ornamental values. A societal awareness to boldly report the cases of child abuse, honest and scientific investigation by the Investigating Agencies and speedy delivery of justice by the Courts is all that is required in addition to a change in the attitude of the community towards the children. It must be remembered that rights and duties are two sides of being human. A child can achieve his rights only if others perform their duties. Proper performance of duties by the parents, teachers, government officials of the various departments associated with child welfare and community at large is necessary for fulfilling the rights of children and here comes the role of forensic medicine also.

Table 1
Nature of child abuse

Type of case	Number of cases												Total	
	Physical abuse						Sexual abuse							
	Male		Female		Total		Male		Female		Total			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Examination Brought by:	60	58.25	43	41.75	103	95.38	07	16.28	36	83.72	43	91.50	146	94.19
Police	39	60.00	26	40.00	65	63.10	04	16.67	20	83.33	24	55.81	89	60.96
Parents	21	55.26	17	44.74	38	36.40	03	15.80	16	84.20	19	44.19	57	39.04
Autopsy	04	80.00	01	20.00	05	04.62	01	25.00	03	75.00	04	08.50	09	05.81
Total	**64**	**59.26**	**44**	**40.74**	**108**	**69.68**	**08**	**17.02**	**39**	**82.98**	**47**	**30.32**	**155**	**100**

Table 2
Age and gender distribution of child abuse

Age of victim in years	Physical abuse						Sexual abuse						Total	
	Male		Female		Total		Male		Female		Total			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
0-2	01	100	00	00	01	00.93	00	00	01	100	01	02.13	02	01.29
2-4	02	50.00	02	50.00	04	03.70	00	00	01	100	01	02.13	05	03.22
4-6	08	61.54	05	38.46	13	12.04	00	00	02	100	02	04.25	15	09.68
6-8	05	55.56	04	44.44	09	08.33	02	28.57	05	71.43	07	14.89	16	10.32
8-10	07	63.64	04	36.36	11	10.19	04	40.00	06	60.00	10	21.27	21	13.55
10-12	09	56.25	07	43.75	16	14.82	01	14.29	06	85.71	07	14.89	23	14.84
12-14	13	68.42	06	31.58	19	17.59	03	27.28	08	72.72	11	23.40	30	19.36
14-16	23	65.71	12	34.29	35	32.41	01	12.50	07	87.50	08	17.02	43	27.74
Total	**68**	**62.96**	**40**	**37.04**	**108**	**69.68**	**11**	**23.40**	**36**	**76.60**	**47**	**30.32**	**155**	**100**

Table 3
Victims of physical and sexual abuse

Occupation of the victim	Physical abuse (n=108)		Sexual abuse (n=47)	
	No.	%	No.	%
At home	36	33.33	21	44.68
Student	03	02.78	02	04.26
Domestic help	11	10.19	06	12.77
Small scale factory worker	22	20.37	14	29.79
Auto repair shop worker	23	21.30	--	--
Road-side tea stall worker	13	12.04	--	--

Table 4

Crimes against Children in the country and percentage variation in 2003 over 2002

Crime Head	YEAR			% Variation in 2003 over 2002
	2001	2002	2003	
Murder	1042	1073	1212	13.0
Infanticide	133	115	103	-10.4
Rape	2113	2532	2949	16.5
Kidnapping & Abduction	2845	2322	2571	10.7
Foeticide	55	84	57	-32.1
Abetment of Suicide	26	24	25	4.2
Exposure & Abandonment	678	644	722	12.1
Procuration of Minor Girls	138	124	171	37.9
Buying of Girls for Prostitution	6	9	24	166.7
Selling of Girls for Prostitution	8	5	36	620.0
Child Marriage Restraint Act	85	113	63	-44.2
Other Crimes*	3685	3424	3700	8.1
Total	**10814**	**10469**	**11633**	**11.1**

References

1. Census 2001, Ministry of Human Resource development, Government of India.
2. National policy and charter for the children 2001, Ministry of human Resource Development, Government of India.
3. Sharma BR, Harish D, Gupta M. Innocence abused: an overview of the nature, causes and prevention of child abuse. Journal of Indian Academy of Forensic Medicine 2003; 25 (3): 87 - 92.
4. Sharma BR, Gupta M. Child rape - save the innocents. J Social Welfare 2004; 51 (9): 3 - 8.
5. Mukherjee S. Childhood robbed Deccan herald (Sunday) Dec. 14, 2003.
6. Sharma BR. Medicolegal aspects of child abuse. Physician's Digest 2005; 14 (1): 41 - 48.
7. Skuse D, Bentovim A. Physical and emotional maltreatment. In M Rutter, E Taylor, L Hearsov eds. Child and Adolescent Psychiatry, Blackwell Science, Oxford, 1994, 209 - 229.
8. Kolko D. Child physical abuse. In J Briere, L Berliner J Bulkley et al., eds. The APSAC hand book on child maltreatment , Sage , London, 1996, 21 - 50.
9. Nandy A. Principles of Forensic Medicine, 1st Ed. 1995; New Central Book Agency (P) Ltd.: 352 - 357.
10. Hunter RS, Kilstrom N, Loda F. Sexually abused children: identifying masked presentations in a medical setting. Child Abuse Negl 1985; 9: 17 - 25.
11. Black MM. The roots of child neglect. In Rees .RM. Ed. The treatment of child abuse. Baltimore; Johns Hopkins University Press; 2000
12. Helfer RE. The neglect of our children. Pediartic Clin North Am. 1990; 37: 923.
13. Ahuja D. Politics of Child Labor. Social Welfare 2001; Nov. 14 - 16.

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PROFILE OF FATAL POISONING IN AND AROUND JAMNAGAR

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ABSTRACT

The paper presents the study of 132 cases of poisoning received in the Dept of forensic Medicine M.P. Shah Medical College, Jamnagar for post-mortem examination (PME) during the span of one year. Out of 826 PME done during the study period 132 (15.98 %) cases were that of poisoning. The cases were then analysed on various epidemiological parameters feeding the information in the proforma prepared for this purpose. We concluded that majority of victims were married, Hindu, males from rural area and low socio economic group. Majority of victims died within 1-6 hours of consumption of poison. Suicidal cases were for more commoner than accidental one. No case of homicidal poisoning was detected in present study. Chemical analysis of viscera was done in 115(87.12 %) cases (snake bite cases excluded). During the span of study we could get report of C.A. in 98 (85.21 %) cases. Insecticides still toped the list as killer no one, while snakebite was second most common fatal poisoning. This study differs from most of the contemporary studies in one important aspect that is we could get C. A. report in large no of cases. C. A. reports were positive in 90 per cent cases.

Key Words : Poisoning, Jamnagar

INTRODUCTION

Poison and poisoning are known since time immemorial. This region is no different. When we got cases of poisoning every now and then in our post-mortem room we thought are we getting the same cases as others[1,2,3,4,5,6,7,8,9,10,11] have reported or any different? So we undertook this study to know what is the profile of poisoning in this part of world? Poisons are subtle and silent weapons, which can be easily used without violence and often without arousing suspicion. At present due to vast development in all fields of life like industries, medicine, and agriculture a significant number of new compounds have appeared as new poisonous substances, which lead to more number of poisoning cases. Even though the advanced medical treatment and awareness, the deaths due poisoning cases are increasing day by day. As various chemicals are in use in modern era, they are very handy for misuse or accidental calamity as well. Most of the people prefer them for the purpose of suicide, as poisons leading peaceful death. An attempt has made to find out some epidemiological factors, pattern and other significant features of poisoning.

MATERIALS AND METHODS

The present study was conducted in the Department of Forensic Medicine, Shri M. P. Shah Medical College, Jamnagar (Gujarat), during the period of 1 year - from 18.08.2003 to 17.08.2004. During this period total 826 autopsies were conducted. Out of these 826 cases, poisoning was observed in 132 cases (15.98%). Detailed and complete post mortem examination of the bodies was done, including chemical analysis of viscera, which was done at Forensic Science Laboratory, Junagadh. A proforma was prepared to fill up details of the parameters used in the study.

OBSERVATION

Out of total 826 cases, 132 cases (15.98%) of poisoning were detected from the present study. Incidence of poisoning was more in second (24.2 %) and third decade (43. 1%) as compared to both extremes of life. Males were more prone to death by poisoning (62.1%) compare to females (37.9%). Incidence of poisoning was more in Hindu people (90.9%) and maximum cases were from joint family (59.8%). Maximum persons were illiterate (55.3%), married (57.6%), and from lower socio-economic

class (87.1%) and from rural area (62.8%). The incidence was more in farmers (28.8%) compare to that in people of other occupation. Spot deaths were found in 40.1% of cases followed by 1 - 6 hours of duration of survival (33.3%).
Incidence of suicidal cases was highest in the present study (68.2%), followed by accidental poisoning (31.1%). this inference is based on history. According to history, insecticide was the commonest poison (22.7%), followed by snakebite poisoning (12.9%) and aluminium phosphide poisoning (4.5%).

In Gujarat, generally we get report of chemical analysis (CA) within two to three months. Out of 132 cases snakebite cases turned out to be second most common (17 cases; 12.9 %) behind only to agricultural poisons. Though poisoning due to snakebite is second most common, we did not sent the viscera for chemical analysis in such cases because we were aware that there were no facilities available in our region to test snakebite poisoning. In remaining 115 cases the viscera were sent for CA. The reports of CA were received in 98 cases (72.4%). According to the reports, insecticide was the commonest poison (71 cases; 72.44%), followed by aluminium phosphide (14 cases; 14.28%) and acid (cases 3; 06.3%). In ten cases (10.20%) no poison could be detected in CA. After CA in the insecticides category, organophosphorus compounds were the commonest (62.24%), followed by organochloro compounds (6.13%), and carbamates (4.09%).

DISCUSSION

Trends of the poisons seem to be a function of need and availability of specific substances. Since last few years, there is a significant increase in the misuse of agrochemicals. Despite of tremendous progress in all fields of life, snakebite continues to be the major cause of morbidity and mortality in India.

The incidence of poisoning in the present study was 15.98%, which is comparable to other studies[1,2,3,4,6,9,10,11]. The incidence of poisoning was higher in third decade of life, in males, in married people and people from joint family, which is similar to most of the studies by various authors [1,2,4,5,6,7,8,9,10,11]. This might be due to modern life style, stress, tension, family and social problems. The higher incidence was also observed in people from rural area, lower socio economic class. Most of the victims were Hindu, which can be explaining by the fact that major population of India is Hindu. Farmers and unemployed persons were more prone to death by poisoning in the present study; same as other studies[3, 4]. This is so because larger segment of our population comes from these groups.

Spot deaths were more in present study, which might be due to lack of awareness to go for the treatment, lack of proper treatment, distance between hospital and scene of incident, a firm commitment in the mind of suicides to die which did not allow them to go far the treatment and commonly the suicides choose agricultural poisons, the fatal dose of such poisons is in milligrams and most of these are classified under the category of extremely toxic and highly toxic group[12].

Most of the studies1,2,5,6,9,10 including this study show that most of the cases were suicidal deaths. This inference of manner of death is based on history given either by police or and relatives. We tend to believe history because when person is claiming that death is due to suicide he has nothing to hide, but when he claims that death may is due to accident; he may be having a motive to hide something. The suicides may be due to various stress factors coming from financial, social, family problems, low level of education, immaturity and many more aspects of life. Easy availability of poisons made them easy victims also.

Out of total 115 cases (87.1%) sent for chemical analysis, in 98 cases (85.2 %) the reports of chemical analysis were received. Accordingly, the analysis was then done. Out of total 98 cases, insecticides were found in 71 cases (53.79 %). aluminium phosphide poisoning - 14 cases (10.60 %), acid poisoning - 3 cases (2.27 %). While in 10 cases (7.37 %) no poison was detected. Among insecticides, the organo-phosphorus compounds were maximum - 61 cases (62.24 %), followed by organochloro compounds - 6 cases (6.13 %) and carbamates - 4 cases (4.08 %). However, snakebite poisoning was there in 17 cases (12.88 %).

Most of the authors have studied the incidence of type of poisoning according to the history given to them by police officers, relatives of the victim and by medical case papers

[1,2,5,6,9,10]. Except Nigam et al8 afore mentioned authors did not analyse or categorise incidence of poisoning after receiving the report of CA. While in present study we have scientifically and accurately calculated the incidence of poisoning according to the nature of poison after the chemical analysis that most common poison was one of the organophosphorus compounds in this region.

CONCLUSION

Pattern of poisoning in present study is more or less similar to the pattern found in most of the other studies. This similarity is there in almost all parameters used in study. Most poisoning is by agricultural poison. In that category the OPC tops the list. Most of the workers did not include the CA report in their analysis. Probably in their provinces they must be receiving very late. Our study did it.

Table 1

Age and sex wise distribution of poisoning cases

Age group(in years)	Male		Female		Total	
	Cases	%	Cases	%	Cases	%
0 - 10	02	2.4	0000	02	1.5	
11 - 20	10	12.1	2244	32	24.2	
21 - 30	41	50.0	1632	57	43.1	
31 - 40	13	15.8	0408	17	12.8	
41 - 50	10	12.1	0408	14	10.6	
51 - 60	04	4.8	0204	06	4.5	
Above 60	02	2.4	0204	04	3.0	
Total	82	100	50100	132	100	

Table 2

Area wise distribution of poisoning cases

Area	Cases	%
Urban	49	37.12
Rural	83	62.88
Total	132	100

Table 3

Distribution of poisoning cases according to religion and type of family

Religion	Cases	%
Hindu	120	90.9
Muslim	11	8.3
Christian	1	0.8
Total	132	100
Family	**Cases**	**%**
Nuclear	53	40.2
Joint	79	59.8
Total	132	100

Table 4

Distribution of poisoning cases according to educational status

Educational Status	Cases	%
Illiterate	73	55.3
Below metric	29	21.9
Metric and above	18	13.6
Graduate	12	9.1
Total	132	100

Table 5

Distribution of poisoning cases according to marital status

Status	Male		Female		Total	
	Cases	%	Cases	%	Cases	%
Married	43	52.4	33	66	76	57.6
Unmarried	39	47.6	17	34	56	42.4
Total	82	100	50	100	132	100

Table 6

Distribution of poisoning cases according to socio-economic class

Class	Cases	%
Upper	1	0.8
Middle	16	12.1
Lower	115	87.1
Total	132	100

Table 7

Distribution of poisoning cases according to duration of survival

Duration	Cases	%
Spot death	53	40.1
1 - 6 hours	44	33.3
6 - 12 hours	10	7.6
12 - 24 hours	8	6.1
1 - 3 days	13	9.8
3 - 7 days	3	2.3
More than 7 days	1	0.8
Total	132	100

Table 8

istribution of poisoning cases according to the manner of death

Manner	Cases	%
Suicide	90	68.2
Accidental	41	31.1
Homicidal	0	0
Not known	1	0.7
Total	132	100

Table 9

Distribution of poisoning cases according to type of poison

Poison	Cases	%
Insecticides	30	22.7
ALP	6	4.5
Acids	3	2.3
Snake bite	17	12.9
Not known	76	57.6
Total	132	100

Table 10

Distribution of poisoning cases according to the type of poison after chemical analysis

Poison	Cases	%
Insecticides	71	53.79
Snake bite	17	12.88
Aluminium phosphide	14	10.60
Acids	3	2.27
No poison detected	10	7.57
No report received	17	12.88
Total	132	100

Table 11

Distribution of poisoning cases according to the poisonous compound

Compound	Cases	%
Monocrotophos	20	20.41
Malathion	15	15.31
Methyl parathion	6	6.12
Chlorpyriphos	2	2.04
Phosphamidon	3	3.06
Dimethioate	5	5.10
Fanvalrat	2	2.04
Quinalphos	2	2.04
Dichlorwas	2	2.04
Phoselon	2	2.04
Fantion	1	1.02
Forate	1	1.02
Endosulphan	5	5.10
Benzene hexa chloride	1	1.02
Carbamates	4	4.08
Aluminium phosphide	14	14.28
Hydrochloride acid	3	3.06
No poison	10	10.20
Total	98	100

References

1. Aggarwal NK and Aggarwal BBL. Trends of poisoning in Delhi, Journal of Indian Academy of Forensic Medicine. 1998 ; 20 (2) : 32-36.
2. Dalal JS, Goria RK, Aggarwal AK, Thind AS and Sandhu SS. Poisoning Trends- a post mortem study, Journal of Indian Academy of Forensic Medicine. 1998; 20 (2) : 27-31.
3. Dhattarwal SK and Dalal SS. Profile of Deaths Due to Poisoning in Rohtak. Haryana in the year. Journal of Forensic Medicine and Toxicology. 1995 ; 14 (1) ; 51.
4. Dhattarwal SK and Harnamsingh. Profile of death due to poisoning in Rohtak, Haryana. Journal of Forensic Medicine and Toxicology. 2001 ; 18 (2) : 28-29.
5. Gargi J, Rai H, Chanana A, Raj G, Sharma G and Bagga IJS. Current Trends of Poisoning. A Hospital Profile, Journal of Punjab Academy of Forensic Medicine And Toxicology. 2003 ; 3 : 41-45.
6. Kapila P, Sekhon HS and Mishra VK. Study of poisoning deaths in and around Shimla, Internet Indian Journal of Forensic Medicine and Toxicology. 2003 ; 1 (2).
7. Murari A and Sharma GK. A comparative study of poisoning cases autopsied in LHMC New Delhi and JIPMER, Pondichery, Journal of Forensic Medicine and Toxicology. 2000 ;19 (1) : 18-20.
8. Nigam M, Jain AK, Dubey BP and Sharma VK. Trends of organophosphorus poisoning in Bhopal region - An autopsy based study, Journal of Indian Academy of Forensic Medicine. 2004 ; 26 (2) : 62 -65.
9. Sharma BR, Dasari H, Sharma V and Vij K. The epidemiology of poisoning. An Indian view point, Journal of Forensic Medicine and Toxicology. 2000 ; 19 (2) : 5-11.
10. Shingh VP, Sharma BR, Dasari H and Krishan V. A ten year study of poisoning cases in a tertiary care hospital, Internet Indian Journal of Forensic Medicine and Toxicology. 2004 ;1 (2).

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FRACTURE OF HYOID BONE IN CASES OF ASPHYXIAL DEATHS RESULTING FROM CONSTRICTING FORCE ROUND THE NECK.

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ABSTRACT

When any case of hanging, strangulation or throttling comes to the Department of Forensic Medicine for Post-mortem examination, the hyoid bone becomes the most integral part of internal examination at the autopsy table. Many authors and workers in this field have seriously highlighted fracture of hyoid bone. Some have claimed hyoid bone fracture in about 20% cases of hanging. Some have claimed hyoid bone fracture in about 68% cases of hanging. They also claimed that hyoid bone fracture increases with age above 40 years due to calcification and immobilization of joints. Some also claimed that hyoid bone fracture increases with using hard ligature for hanging and strangulation. Fracture of hyoid bone has been ascribed to many factors like manners of constriction, level of application of ligature or force of constriction, long drop or short drop suspension, age of victim, sex of victim etc.

Besides getting hyoid bone fracture at autopsy table, it is also very important to check whether it is ante-mortem or post-mortem in nature or just an artifact. For this difficulty some have even advised pre-autopsy X-ray of the neck structures to detect ante-mortem hyoid bone fracture. Observing the importance given to hyoid bone fracture in hanging, ligature strangulation and throttling cases by many authors at the past and present days, the present authors have taken up the study in 257 cases of hanging, 7 cases of ligature strangulation and 5 cases of throttling to notice that hyoid bone fracture is nil or very rare in hanging where as it is very common in both forms of strangulation.

Key words: Hanging, Strangulation, Throttling, Hyoid bone, Fracture

INTRODUCTION

Observation of hyoid bone fracture is one of the most integral parts of internal examination during autopsy of hanging, ligature strangulation or throttling case. This fact has been highlighted by many workers where the observation of hyoid bone fracture ranges from 0% to 68% in hanging1-12 and the incidence of hyoid bone fracture in hanging said to be increased with age after 40 years2, 11.

Some workers also claimed a hard ligature material can cause fracture of hyoid bone depending upon the factors like level of constriction, force of constriction, distant of drop from suspension, age and sex of victims.

Besides getting hyoid bone fracture at autopsy table, it is also very important to check whether it is ante-mortem or post-mortem in nature or just an artifact of joint mobility between greater cornu and body of hyoid bone. For this difficulty some have even advised pre-autopsy X-ray of the neck structures to detect ante-mortem hyoid bone fracture2. Observing the importance given to hyoid bone fracture in hanging, ligature strangulation and throttling cases by many authors at the past and present days, the present authors have taken up the study in 257 cases of hanging, 7 cases of ligature strangulation and 5 cases of throttling to notice actual percentage of hyoid bone fracture in these type of asphyxial deaths taking all the factors responsible for hyoid bone fracture into consideration.

The present study has been carried out over 257 cases of hanging, 7 cases of ligature strangulation and 5 cases of throttling referred to the Department to the Departments of Forensic Medicine of S.C.B.Medical College, Cuttack and

Lady Hardinge Medical College, New Delhi over the period of August 1995 to May 2003. It can be mentioned here that 1 case of homicidal hanging with throttling has been included under throttling only for convenience.

MATERIALS & METHODS

A series of medico-legal autopsies were conducted over 269 deceased died due to hanging, ligature strangulation and throttling which were referred to the Department of Forensic Medicine of S.C.B.Medical College, Cuttack and Lady Hardinge Medical College, New Delhi over the period of August 1995 to May 2003.

Information relating to cause of death, manner of death etc. and other associated information particularly in cases of deaths due to hanging were gathered from the police records and accompanying relatives of the deceased.

Irrespective of the information gathered from the police records and accompanying relatives of the deceased, in all such deaths (hanging, ligature strangulation and throttling), both external and internal findings were observed meticulously during postmortem examination to include or exclude hanging, ligature strangulation and throttling.

Care has also been taken not to confuse a post-mortem artifact with that of ante-mortem autopsy findings both externally by adopting standard autopsy technique in all such death cases.

After observing all the associated findings in relation to hanging, ligature strangulation or throttling whatever the case may be, the hyoid bone was dissected out for its fracture and ante-mortem characteristics maintaining all the precaution not create to any post-mortem fracture.

The data/ findings thus obtained in individual cases have been put in tabular form in relation to all the factors responsible for causing fracture of hyoid bone.

OBSERVATIONS & ANALYSIS

During detail observation and analysis the following things came out.

Table- 1
Nos. and types of cases:

Hanging	:	257
Strangulation	:	7
Throttling	:	5
Total	:	269

Strangulation = Ligature strangulation

Table-2
Sex distribution among the victims:

	Male	Female	Total
Hanging	97	160	257
Strangulation	2	5	7
Throttling	0	5	5
Total	99	170	269

Table-3
Age distribution among the victims :

Age group (in years)	Hanging			Strangulation			Throttling			
	M	F	T	M	F	T	M	F	T	Total
Upto 10	0	0	0	1	0	1	0	0	0	1
11-20	16	48	64	0	0	0	0	1	1	65
21-30	48	88	136	0	5	5	0	4	4	145
31-40	21	18	39	1	0	1	0	0	0	40
41-50	4	3	7	0	0	0	0	0	0	7
51-60	4	0	4	0	0	0	0	0	0	4
61-70	3	2	5	0	0	0	0	0	0	5
71-80	0	0	0	0	0	0	0	0	0	0
81-90	1	1	2	0	0	0	0	0	0	2
Total	97	160	257	2	5	7	0	5	5	269

Table-4
Level of Constricting Force / Ligature :

Level	Hanging	Strangulation	Throttling	Total
Above LP	159	1	1	161
On LP	53	0	0	53
On & Above LP	33	3	4	40
Below LP	12	3	0	15
Total	257	7	5	269

* LP = Laryngeal prominence

Out of 269 cases, in most cases of hanging (159) the level of constriction was found above the

laryngeal prominence where as in most cases of strangulation and throttling the level of constriction found on and above the laryngeal prominence.

Table-5
Nature of Ligature material used

Ligature used	Hanging	Strangulation	Total
Soft Ligature	127	2	129
Hard Ligature	105	5	110
Total	232	7	239

Considering the information gathered from the police records and from the relatives of the deceased and taking the examination findings of the ligature material where ever it has been sent along with the dead body, it is observed that soft ligature like scarf, napkin, sari, bed sheet etc. were used in 127 cases of hanging and hard ligature like jute rope, plastic or nylon rope, electric wire etc. were used in 105 cases of hanging where as hard ligature were used in most cases of strangulation.

Table-6
Ligature Material in-situ:

Hanging	:	32
Strangulation	:	6
Total	:	38

Out of 257 cases of hanging, ligature materials were found in-situ i.e., around the neck only in 32 (12.45%) cases whereas ligature in-situ found in 6 (85.7%) cases of ligature strangulation.

Table - 7
Height of Suspension of Dead Bodies in Hanging :

	Partial Hanging	Complete Hanging	Total
Nos. of victims	15	217	232

Out of data available on 232 cases of hanging, 15 victims died due to partial hanging where some parts of victims were touching the ground where as 217 victims died due to complete hanging.

Table -8
Long drop Vs. Short drop suspension in hanging cases :

	Long drop suspension	Short drop suspension	Total
Nos. of victims	58	174	232

Out of data available on 232 cases of hanging, 58 (25%) victims had used long drop suspension i.e., greater than their body heights where as 174 (75%) victims had used short drop suspension.

Table-9
Types of hanging depending on the probable positions of the Knots :

	Typical Hanging	Atypical Hanging	Total
Nos. of victims	19	238	257

Out of total 257 cases of hanging, the typical hangings were 19 (7.39%) where the probable knot positions were on the occiputs where as there were 238 (92.6%) victims died due to atypical hanging where the knot positions were other than over the occiputs.

As the maximum constricting force acts diagonally just opposite the site of knot, the neck structures on the front of neck are compressed maximally in typical hanging than atypical hanging2.

Table-10
Incidence of Hyoid Bone Fracture :

	Hanging	Strangulation	Throttling
Fractured hyoid bone	0	3	4
Intact hyoid bone	257	4	1
Total	257	7	5

Out of 257 cases of hanging, there was not found a single victim having fracture of hyoid bone where as out of 7 cases of ligature strangulation, hyoid bone fracture found in 3 (42.87%) cases and out of 5 cases of throttling, hyoid bone fracture seen 4 (80%) cases.

DISCUSSION

Some times it becomes difficult to differentiate ligature strangulation from hanging especially in case of partial hanging where the ligature mark lies low in the neck, more or less in a horizontal manner. There fore, it is only the internal tissue damage as well as damage to the laryngeal cartilages and hyoid bone decides the actual manner of death. Similarly,, in case of grossly decomposed dead bodies where the neck skin are grossly discolored or lost, it is the internal damage to neck tissue and hyoid bone, which tells the actual

cause of death even months and years after death. So importance given to hyoid bone fracture is justifiable and will remain there where mechanical asphyxia is the mode of deaths.

Though percentage of hyoid bone fracture in manual or ligature strangulation cited by many authors are more or less equal and non-controversial, the percentage of hyoid bone fracture in hanging deaths vary greatly from 0% to 68% from author to author when we look into different text as:

1. Reutor (1901) - 60% in typical hanging, 30% in atypical hanging10.
2. Smith and Fiddes (1955) - Practically never fractured in hanging 11.
3. Wintraub (1961) - Seen in 27% cases of hanging 12.
4. Modi J.P. (1988) - Fracture is rare in hanging 3.
5. Mukherjee J.B. (1994) - Not found in 500 cases of hanging 4.
6. Betz, P. and Eisenmenger, W.(1996)-Throat skeleton fracture seen in 67% hanging1.
7. Apurba Nandi (2000) - Does not occur in more than 5-10% cases of hanging 5.
8. Reddy K.S.N.(2000) -Seen in15-20% cases of hanging but rare below 40 years of age 9.
9. Nikolic, S., Micic, J., Antanasijevic, T., Djokic, V. and Djonic, D.(2003)- Throat skeleton fracture seen in 68% hanging7.

The present author on his serial study of 257 cases of hanging, 7 cases of ligature strangulation and 5 cases of throttling which were directly dealt by him in a span of more than 7 years, efforts have been made to evaluate the actual percentage of hyoid bone fracture in those types of deaths taking all the factors responsible for it like age, sex, mode and manner of constriction, level of constriction, nature of constricting force or material etc.

Out of total 257 cases of different types of hanging including 4 cases of homicidal hanging, the present author did not found hyoid bone fracture in a single case. Though many authors claim that hyoid bone fracture increases with increasing age above 40 years, the present author did not get any hyoid bone fracture in the 18 cases of hanging victims over the age of 40 years. So incidence of hyoid bone in hanging can be taken as rare or very few as observed by authors like Smith, Sydney and Fiddes 11 , J.P.Modi 3 and J.B.Mukherjee 4. High incidence of hyoid bone fracture in hanging as claimed by some authors in this field are definitely due carrying forward the forensic mythology from time to time as a result of non-meticulous examination during autopsy and assigning joint mobility between body and greater cornu of hyoid as fracture in addition to improper handling and poor differentiation of post-mortem fracture.

On the other side, out of total 7 cases of ligature strangulation, the present author detected hyoid bone fracture in 3 (42%) cases where as out of total 5 cases of throttling, the present author detected hyoid bone fracture in almost all i.e., 4 (80%) cases, which is more or less same as noticed by most of the previous authors2-12 .

CONCLUSION

Taking the present study of ``Hyoid bone fracture in cases of asphyxial deaths resulting from constricting force round the neck`` it is concluded that incidence of hyoid bone fracture is almost nil or rare in cases of hanging where the constricting force act on the neck in a sliding or tangential manner. However,, increasing incidence of hyoid bone fracture after the age of 40 years can be concluded only after taking larger numbers of such cases, which need further continuous study in this regard.

Whenever a fracture of hyoid bone is observed in case of death due to hanging, then it is important to look for its ante-mortem character and site and at the same time he has to consider all the factors responsible for it otherwise should not give an opinion in haste other than hanging.

In cases of ligature strangulation, in some cases the hyoid bone got fracture as the constricting force applied here is greater in magnitude usually using hard ligature and acts in a vertical manner to the neck structures.

In cases of throttling, the hyoid bone is usually fractured, as the constricting force is greater in magnitude over a larger area mostly directly acting upon the hyoid bone itself

References

1. Betz P and Eisenmenger W. (1996) Frequency of Throat-Skeleton Fracture in Hanging. American Journal of Forensic Medicine & Pathology.17(3):191-193.
2. Knight B. (1996) Forensic Pathology, 2nd ed. p.361-389
3. Modi JP. (1988) Modi's Medical Jurisprudence and Toxicology, 21st ed. by Franklin, C.A.,p.192
4. Mukherjee JB. (1994) Textbook of Forensic Medicine & Toxicology, 2nd ed. Vol-1
5. Nandi A. (2000) Principle of Forensic Medicine, 2nd ed., p.318
6. Naik SK. (1998) Medicolegal Evaluation of Violent Asphyxial Deaths as a Result of Constricting Force Round the Neck, (M.D.Thesis, Utkal University)
7. Nikolic S, Micic J, Antanasijevic T, Djokic V, Djonic D. (2003) Analysis of Neck Injuries in Hanging. American Journal of Forensic Medicine & Pathology. 24(2):179-182
8. Polson CJ, Gee DJ, Knight B. (1985) The Essentials of Forensic Medicine 4th ed.,p.375-377
9. Reddy KSN. (2000) The Essential of Forensic Medicine & Toxicology, 19thed.,p.288
10. Reutor F. (1901) Ztsch.Heitk.,22.145-112
11. Smith, Sir Sydney and Fiddes FS. (1955) Forensic Medicine, 10th ed. ,p. 252.London: Churchi1
12. Weintraub CM. (1961) Med-leg.J. (Camb.), 21, 209-16

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CRANIO-CEREBRAL TRAUMA DEATHS A POSTMORTEM STUDY ON 0-15 YRS AGE GROUP

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ABSTRACT

A postmortem study was conducted on children between ages 0 - 15 years, who had died due to head injury. This study was conducted in two years period from January 1999 to December 2000. During this period 97 cases of head injury were brought for PM examination in this age group. The facts revealed after the study has left many questions to be answered.

Key words: Pediatric deaths, Head Injury, Domestic, Accidents.

INTRODUCTION

40% of India's total population belongs to children of 0 - 15 years age group. This age group alone constitutes major population of our country. Also this is the same age group, which has been defined as "child" under the Indian Factories Act, 1948.

Of all the regional injuries, those of head and neck are found to most common and most important. And of all the factors that have bearing on the types of injuries that occur, most important one is Age. Head injuries have been found to be the commonest cause of death between ages 1 - 15 (Morris et al, 1994). The newly born infant certainly faces the risk of head injury, either from being dropped or being battered. The risk of battering continues even as he grows older. Playgrounds and domestic environment are not safe and have their own hazards for children in 1 - 5 year age group. In next five years, as their range of activity increases (walking, climbing, sliding, riding etc.), the risk of head injury also increases. In another five years, same risks continue but danger from assaults and sporting injuries adds up. The risk of road traffic accidents is much higher in 5 - 15 years age group.

Incidence of head injuries is steadily rising all over the world. The burden is serious as majority of head injury victims belong to young and productive age group.

MATERIAL & METHODS

Between January 1999 and December 2000, 4177 cases were brought for postmortem examination in the mortuary of Government Medical College & New Civil Hospital, Surat. Out of these cases, 259 cases were of age group 0 - 15 years, taken for this study. Out of 259 cases of this series, 97 cases of head injury were brought for examination & they were analyzed with various parameters indepth, with the knowledge of other studies.

A proforma was made and followed. Various aspects pertaining to head injuries in this age group was studied.

OBSERVATIONS

Table 1
shows total postmortems & postmortems in pediatric age group.

Year	Total Postmortem	Postmortem (0-15yrs)(%)	Postmortem (0-15yrs)Head injury(%)
1999	2048	147 (7.17)	45 (30.61)
2000	2129	112 (5.26)	52 (46.42)
Total	4177	259(6.20)	97 (37.45)

The above table indicates that 37.45% cases of head injury were brought for examination during this period in the pediatric age group.

Table 2

Shows distribution of pediatric cases according to cause of death.

Year	Head injury (%)	Burns (%)	Asphyxia (%)	Multiple injuries (%)	Others (%)	Total (%)
1999	45	31	23	19	29	147
	(30.61)	(21.08)	(15.64)	(12.92)	(19.72)	(100)
2000	52	18	9	16	17	112
	(46.42)	(16.07)	(8.03)	(14.28)	(15.17)	(100)
Total	97	49	32	35	46	259
	(37.45)	(18.90)	(12.35)	(13.51)	(17.70)	(100)

The above table indicates that head injury out numbered the other cause of deaths.

Table 3

Shows sex wise distribution of all pediatric postmortems

Year	Male (%)	Female (%)	Total (%)
1999	88 (59.8)	59 (40.2)	147 (100)
2000	64 (57.1)	48 (42.9)	112 (100)
Total	152 (58.68)	107 (41.32)	259 (100)

It indicates that males out numbered the females.

Table 4

shows age wise distribution of all pediatric postmortems.

Year	0-5 yrs (%)	6-10 yrs (%)	11-15 yrs (%)	Total (%)
1999	45 (30.61)	34 (23.12)	68 (46.25)	147 (100)
2000	39 (34.82)	32 (28.57)	41 (36.60)	112 (100)
Total	84 (32.43)	66 (25.48)	108 (42.09)	259 (100)

The above table indicates that maximum cases (42.09%) belong to age group 11-15 years.

Table 5

Shows sex wise distribution of pediatric head injury cases.

Year	Male (%)	Female (%)	Total (%)
1999	26 (57.8)	19 (42.2)	45 (100)
2000	29 (55.8)	23 (44.2)	52 (100)
Total	55 (56.7)	42 (43.3)	97 (100)

Head injury is also common in males as observed in above table.

Table 6

Shows age wise distribution of pediatric head injury cases.

Year	0-5 yrs (%)	6-10 yrs (%)	11-15 yrs (%)	Total (%)
1999	16 (35.5)	12 (26.6)	17 (37.7)	45 (100)
2000	25 (48.1)	11 (21.1)	16 (30.8)	52 (100)
Total	41 (42.26)	23 (23.71)	33 (34.03)	97 (100)

In this series, head injury was found more common in the age group of 0-5 years.

Table 7

Shows sex wise distribution of pediatric head injury in various age groups.

Year	0-5 yrs		6-10 yrs		11-15 yrs	
	M	F	M	F	M	F
1999	6	10	6	6	14	3
2000	17	8	3	8	9	7
Total	23	18	9	14	23	10

Head injury in the females of age group 6-10 was more as compare to male.

Table 9

Shows month wise distribution of all pediatric cases.

Month	1999	2000	TOTAL
January	12	14	26
February	13	08	21
March	12	08	20
April	10	13	23
May	12	16	28
June	17	10	27
July	19	12	31
August	10	08	18
September	15	08	23
October	10	02	12
November	08	04	12
December	09	09	18
Total	147	112	259

Maximum numbers of cases were observed in the month of July followed by May.

TABLE 9
shows month wise distribution of pediatric head injury.

Month	1999	2000	Total
January	1	7	8
February	3	5	8
March	3	6	9
April	9	9	18
May	6	9	15
June	6	1	7
July	5	3	8
August	1	3	4
September	3	2	5
October	3	-	3
November	4	4	8
December	1	3	4
Total	45	52	97

Maximum numbers of head injury cases were observed in the month of April.

Table 10
shows nature of pediatric head injury.

Year	Accident (%)	Suicide (%)	Homicide (%)	Total (%)
1999	45 (100)	-	-	45 (100)
2000	49 (94.23)	-	3 (5.77)	52 (100)
Total	94 (96.9)	-	3 (3.1)	97 (100)

96.9% of cases were of accidental in nature. No suicidal case was observed.

Table 11
shows site of incident of pediatric head injury.

Year	Domestic (%)	Road Traffic (%)	Railways (%)	Others (%)
1999	21(46.7)	19 (42.2)	2 (4.4)	3
2000	34 (65.4)	12 (23.1)	5 (9.60	1
Total	55 (56.70)	31 (31.95)	7 (7.21)	4 (4.3)

Head injury was more in domestic environment as compare to road accidents.

Table 12

Shows fatality period of head injury.

Year	Instant (%)	< 1 day (%)	1-5 days (%)	> 5 days (%)
1999	20	18	4	3
2000	25	16	9	2
Total	45 (46.38)	34 (35.05)	13 (13.46)	5 (5.1)

Maximum number of cases died with in one day after receiving the injury.

Table 13

shows distribution of cases having scalp injury.

Type of injury	Number of cases	Percentage
Contusion/hematoma	91	93.8
Laceration	48	49.5
Contusion & laceration	44	45.4
Abrasion	02	2.1
Abrasion & contusion	02	02.1
Total	97	cases.

Table 14
Shows distribution of head injury cases having associated injuries.

Site of injury	Number of cases	Percentage
Limb	18	32.73
Abdominal	14	25.46
Face & Neck	13	23.63
Chest	10	18.18

Table 15
Shows distribution of cases having skull fractures.

Type of injury	Number of cases	Percentage
Linear/fissure	38	52.72
Multiple/Comminuted	19	26.38
Depressed	17	23.61
Base of skull (total)	08	11.11
Suture separation	06	08.33
Linear + depressed	02	02.77
Base of skull (alone)	01	01.38
Single fracture	45	62.5
Total	72 cases	(74.2%).

Table 16
shows distribution of cases having intra-cranial hemorrhages.

Type of hemorrhage	Number of cases	Percentage
Subdural hemorrhage (alone)	24	24.22
Subarachnoid hemorrhage (alone)	04	05.27
Extradural hemorrhage (alone)	02	02.10
EDH + SDH + SAH	33	34.73
SDH + SAH	32	33.68

Total 95 cases; 2 cases had no hemorrhage.

Table 17
shows distribution of cases having brain substance injury.

Type of injury	Number of cases	Percentage
Laceration	14	63.64
Contusion	04	18.18
Intra cerebral hemorrhage	04	18.18
Brain stem hemorrhage	0	0

Total 22 cases (23.91%); 75 cases had no injury over or in the brain substance.

Above data revealed the following facts:

Pediatric postmortems accounted for 6.2% proportion of total postmortems done during the period (259/4177). Out of these cases, maximum cases (97 cases; 37.54%) were children who died due to head injuries followed by deaths due to burns (49 cases; 18.9%). Male predominance was seen all over, ratio being 1.3:1 in deaths from head injury. Male: female ratio was found reversed in 6 - 10 years age group, being 1:1.5. Maximum deaths were seen in 0 -5 years age group (41 cases; 42.26%). Deaths occurred more in period between April to July, the summer vacation period in our country. 96.9% cases were accidental in nature (94 cases). Rests were homicidal. No suicidal case was recorded. Most deaths occurred in the domestic environment (55 cases, 56.71%), all being result of fall from height, followed by deaths from road traffic accidents (31 cases, 31.95%). Nearly half of the deaths were instantaneous (45 cases, 46.39%) whereas other 35% died within first 24 hours of sustaining the head injury. Considering injuries on the head, contusion and laceration were common in the scalp. Nearly 75% (72 cases) had had fractures of the skull, commonly being fissure fractures. Only 2 cases didn't have any type of intra-cranial hemorrhage; rest others having one type or more than one type. Nearly 35% (33 cases) had all the three types of meningeal hemorrhages, while singly subdural hemorrhage was found to be the commonest (22 cases, 24.22%). Laceration of brain substance was seen in 14 out of 22 cases that had brain substance injury. Apart from head injury, other associated injuries were seen in 56.7% (55 cases) deaths, where limb injuries predominated.

DISCUSSION

The findings seen in our study are more or less similar to the findings of the studies done by others in previous years. Over the years, trends haven't changed much. * In our study, commonest cause of death in pediatric age group is found to be head injury, similar to what was found by Goggler et al 1965, Devadiga et al 1969, Sieben et al 1971, Mayer t et al 1981, Brookes et al 1990, Chadwick et al 1991, Musemeche et al 1991 and Morris et al 1994.

* Male predominance continues similar to Sieben et al 1971, Pande et al 1979, Kraus et al 1990, Chadwick et al 1991, Musemeche et al 1991 and Behrman 2000.

* As with Sieben et al 1971, Chadwick et al 1991 and Behrman 2000 deaths from head injuries are highest in 0 - 5 years age group.

* Most deaths from head injuries were accidental in nature supported by Goggler et al 1965, Sieben et al 1971, Pande et al 1979, Musemeche et al 1991 and Behrman 2000.

* Behrman states that suicides are rare below 10 years of age. His statement is supported here as no case of suicide is seen.

* Most deaths occurred either instantaneously or within first 24 hours. Jenny et al 1999 also found the same.

* Chadwick et al 1991 found subdural hemorrhage maximum among the intra-cranial hemorrhages, which is the same in our study too.

* Due consideration was given to the surroundings

or the environment where these injuries occurred. Maximum of these occurred in the domestic set up followed by road traffic accidents. Behrman has supported this domestic predominance followed by road traffic accidents. Sieben et al 1971, Mayer t et al 1981, Chadwick et al 1991, Musemeche et al 1991 and National Pediatric Trauma Registry 1995 have studied the domestic environment and have found fall from height to be responsible for head injuries in the domestic environment. In our study too, all deaths from head injury occurring in the domestic setup were the result of fall from height.

CONCLUSION

Very little data is available regarding postmortem study of deaths from head injuries. An attempt is made to have an insight into various aspects related to deaths from head injury in 0 - 15 years age group, as it constitutes a major chunk of our population. The results are similar to the few studies done earlier. It has been found to be the commonest cause of death in this age group. Males predominate over females. This may be due to the fact that male population is increasing over the female population. Deaths were more in the months of summer vacation probably due to the fact that the child remains free in the house supporting the finding of maximum deaths in domestic atmosphere. So there appears to be a need for more attention to the children in the house, more so when nowadays both the parents prefer working and leave their children in the hands of housekeepers. Head injuries are dangerous and have a high mortality rate with deaths occurring mainly in the first 24-hour period most of them were accidental in nature. Accidents are preventable and so the deaths from head injury too; what we need is caution.

References

1. Behrman RE. Overview of Pediatrics. Nelson's Textbook of Pediatrics. 16th edition ; 2000 : 1.
2. Cartlidge & Shaw. Head Injury - Major problem in neurology. 10 in series.
3. Chadwick DL et al. Deaths from fall in children - How far is fatal?, Journal of Trauma. 31:10, 1991.
4. Devdiga KV, Jain SP. An analytical study of acute head injury. Ind. J. Surg. 31:197, 1969.
5. Devdiga KV, Jain SP. Mortality in head injury - A clinico-pathologic study. J. Ind. Med. Ass. 52:22,1969.
6. Gordon & Shapiro. Regional Injuries of Medico-legal Importance, Forensic Medicine. III edition. 1988, Churchill Livingstone.
7. Knight B. Head and Spinal Injuries. Forensic Pathology. II edition, 1996, Arnold.
8. Kraus JF et al. Brain injuries among infants, children, adolescents and young adults. Am. J. Dis. Child. 144:684, 1990.
9. Lambert DA et al. Deaths from falls. MMWR 1978 - 1984 ; 37:21, 1988.
10. Lewis WS et al. Jumpers Syndrome. The trauma of high free fall as seen at Harlem Hospital, J. Trauma. 5:812, 1965.
11. Mayer T et al. Causes of morbidity and mortality in severe pediatric trauma, JAMA. 245:719, 1981.
12. Mellel NL et al. Falls in urban children, Am. J. of Dis. Child. 141:1271, 1987.
13. Musemeche CA et al. Pediatric falls from heights, J. of Trauma. 31:10, 1991.
14. O'Neill JA et al. Trauma - Pediatric Surgery; 5th edition, 1998, 235.
15. Pande CD et al. Incidence of accidental cranio-cerebral trauma, Indian Journal of Forensic medicine. 1:2, 1979.
16. Sieben RL et al. Falls as childhood accidents - An increasing urban risk, Pediatric. 47:886, 1971.
17. Smith MD et al. Injuries in children sustained in free falls - An analysis of 66 cases, J. Trauma. 15:987, 1975.

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DOUBLE LOGARITHMIC, LINEAR RELATIONSHIP BETWEEN POSTMORTEM VITREOUS SODIUM/POTASSIUM ELECTROLYTES CONCENTRATION RATIO AND TIME SINCE DEATH IN SUBJECTS OF CHANDIGARH ZONE OF NORTHWEST INDIA.

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ABSTRACT

Present authors had recently demonstrated a highly significant double logarithmic linear relationship between time since death and serum sodium/potassium concentration ratio and also with the serum chloride concentration in humans. Consecutively the present study was carried out to substantiate this disposition in vitreous humour. The data on postmortem vitreous sodium/potassium electrolytes concentration ratio in 1026 subjects, revealed a highly significant relationship between logarithm of vitreous sodium/potassium electrolytes concentration ratio and logarithm of time since death upto 66 hrs. of death. Postmortem interval can be predicted from vitreous sodium/potassium electrolytes concentration ratio with standard error of estimate 0.1800 hrs. However, factors like environmental temperature, age & gender also influences it significantly.

Key Words: Time since death, postmortem interval, vitreous sodium/potassium ratio, double logarithmic relationship

INTRODUCTION

Mysteries particularly the homicidal have often created ripples in the history of forensic science, raising so many questions, most important being "time since death". Extensive work had been carried out to determine it from the various physical changes [1-3] as well as by quantation of biochemical changes [4-13] in different body fluids viz: blood, vitreous humour etc. In blood, concentration of sodium electrolyte was reported to be decreasing [4] and that of potassium electrolyte increasing [5] after death. Recently, present authors had demonstrated a highly significant double logarithmic correlation between time since death and serum Sodium/Potassium electrolytes concentration ratio [6] and also with serum chloride concentration[7]. In vitreous humour also postmortem rise of potassium electrolyte concentration proportional to postmortem interval [8-12] and fall of sodium electrolyte [13] has been reported. Nevertheless no efforts have been made so far to correlate their ratio with the time since death.

In the present study, an attempt has been made to determine time since death from postmortem vitreous sodium/potassium electrolytes concentration ratio in the subjects of Chandigarh zone of North- West India and also to evaluate the role of factors like seasonal variations, age, gender and cause of death over it.

MATERIAL AND METHODS

In accordance to the procedure described earlier9, 5 ml of vitreous humour was aspirated simultaneously from both the eyes of 1026 subjects (698 males, 328 females), who have died because of various medicolegal causes (trauma -634,burn 252, poisoning 140) at Nehru Hospital of Postgraduate Institute of Medical Education & Research, Chandigarh (India) and on whom postmortems were conducted by this Department.

Only those subjects in which time, mode, manner, cause of death and other demographic profile were precisely known, and the dead bodies kept at room temperature were taken in to consideration, in the present study. Subjects with significant antemortem electrolyte imbalance or on diuretics were excluded from the study. Only the crystal clear vitreous humour thus collected were immediately centrifuged for 10 minutes at 3000 rpm. Measurements of sodium and potassium electrolytes were carried out from the supernatant soon after centrifugation using the flame photometry.

In 775 subjects, vitreous humour was aspirated in the hot weather (April to September, mean room temperature = 38.1oC) and in 251 subjects in cold weather (October to March., mean room temperature = 14.1 oC) to observe the role of seasonal variations. To see the effect of age on sodium/potassium electrolytes concentration ratio, all the subjects were divided into four age groups i.e. <12 years, 12 to18 years, >18 to 60 years and > 60 years. Youngest subject from whom vitreous humour was aspirated was 10 years old boy and the eldest was 79 years female.

RESULTS

Mean vitreous sodium/potassium ratio was slightly more in left eye (13.50+ 5.27) then in right eye (13.48 + 4.95). However, this difference was found statistically insignificant (p>0.05) (Table I). Hence, for the further statistical analysis only the mean value of both eyes was taken into consideration.

Absolute values of the vitreous sodium, potassium electrolytes and their ratio

(Table -II)

Vitreous sodium and potassium electrolytes concentration varied in a reciprocal manner. Concentration of Vitreous sodium electrolyte first increased from mean value of 131.80 + 3.77 mEq/l at postmortem interval of < 3 hrs. to mean value of 134.54 + 4.22 mEq/l at postmortem interval of 3-6 hrs then gradually decreased to mean value of 102.50+ 11.05 mEq/l at postmortem interval of 60-66 hrs. whereas vitreous potassium electrolyte concentration increased from mean value of 5.92 + 1.91 mEq/l at postmortem interval of < 3 hrs. to mean value of 17.66 + 1.78 mEq/l at postmortem interval of 54-60 hrs. and then decreased to mean value of 15.52 + 3.63 mEq/l at postmortem interval of 60-66 hrs. Mean fall of vitreous sodium electrolyte concentration and rise of potassium electrolyte concentration was 0.74 mEq/l/hr and 0.29 mEq/l/hr. respectively.

The vitreous sodium/potassium electrolytes concentration ratio decreased rapidly from mean value of 24.22 + 7.59 at postmortem interval of < 3 hrs. to mean value of 14.93 + 4.47 at postmortem interval of 15-18 hrs. and then at a progressively slower rate to mean value of 6.95 + 1.88 at postmortem interval of 60-66 hrs.

Relationship between vitreous sodium/potassium concentration ratio and environmental temperature, gender, age & cause of death (Table III)

Mean vitreous sodium/potassium electrolytes concentration ratio was more in winter (mean value 15.54 + 5.66) then in summer (mean value 12.82 + 4.72). Similarly, it was more in males (mean value 13.78 + 5.20) then in females (mean value 12.85 + 4.86). This ratio was higher in extreme of ages i.e. < 12 years and > 60 years (mean value 15.14 + 6.38 and 15.69 + 7.03 respectively) then in 12-18 years (mean value 13.28 + 4.31) and > 18-60 years (mean value 13.26 + 4.88). Mean vitreous sodium/potassium electrolytes concentration ratio was more in death due to trauma (mean value 13.73 + 5.30) then in due to poison (mean value 13.60 + 5.21) and Burn (mean value 12.80 + 4.45).

Relationship of vitreous sodium/potassium electrolyte concentration ratio with environmental temperature, age, gender and cause of death was found statistically highly Significant (p<0.001).

Statistical Method (Fig-1)

Statistical software package (SPSS, version 11.0) and stat graphic (statistical graphics system, statistical graphics corporation) were used to

analyse the data. The least square linear regression analysis was performed and it was noticed that the relationship between time since death (dependent variable) and sodium/potassium electrolytes concentration ratio in vitreous humour (independent variable) was not exactly linear. The data was then analyzed by using the model y = a x b (or log y = log a +b log x), where log y was a dependent variable and log x was an independent variable.

All logarithms were used to the base 10 and log a represent the intercept and log b slope of the regression line, respectively. These constants have been estimated from the data and substituted in the equation to predict the value of dependent variable (time since death) from independent variable (vitreous sodium/potassium electrolytes concentration ratio). The actual predicted value of the time since death was obtained after taking the antilog.

From the data, the following equation was obtained:

log TSD = 2.535 - 1.102 log Na/K

Where TSD denote time since death in hours and Na/K (sodium/potassium) electrolytes concentration ratio in mEq/l.

Multiple R = 0.6929

SE of estimate = 0.1800

95% confidence interval for slope = (-1.173 to -1.039)

To test the validity of the model which relates time since death (dependent variable) with sodium/ potassium electrolytes concentration ratio (independent variable) on the double logarithmic scale, the analysis of variance table was computed and final variance ratio i.e. F value 945.867 was found significant at $p<0.0001$ level which means that this model was appropriate to describe the significant relationship between time since death and sodium/potassium electrolyte concentration ratio.

To further verify the extent of relationship between time since death and sodium/ potassium electrolytes concentration ratio, the testing of regression coefficient Ho: Beta= 0 against H1: Beta ? 0 was carried out by using t statistics. The t-value (t = 30.75), was found to be highly significant at $p<0.001$ level of significance and at 1024 degree of freedom. This showed that there was a highly significant inverse relationship between vitreous sodium/potassium concentration ratio and time since death.

DISCUSSION

The normal values of sodium and potassium electrolyte concentrations in vitreous humour in human are reported to be varying between 118 to 154 mEq/l(14) and 2.6 to 4.2 mEq/l(15) respectively. The equalization of concentration difference of ions due to cessation of active membrane transport and loss of selective membrane permeability, which began during and after supravital period (16) and

Table I

Relationship between Right & Left Eye Vitreous Sodium/Potassium electrolytes concentration and their ratio

No. subjects	Mean Time since death (hrs)	Mean Sodium Electrolyte concentration mEq/l	Mean fall of sodium Electrolyte concentration mEq/l/hr	Mean Potassium Electrolyte concentration mEq/l	Mean rise of potassium Electrolyte concentration mEq/l/hr	Mean sodium/potassium Electrolytes concentration ratio
512	24.20 ± 12.41	124.75 ± 10.97	0.75	10.27 ± 3.10	0.284	13.48 ± 4.95
514	24.26 ± 12.40	125.48 ± 11.50	0.72	10.43 ± 3.33	0.289	13.50 ± 5.27
1024	-0.08 ns	-1.04 ns		-0.79 ns		-0.08 ns

Table 2

Vitreous humour Sodium, Potassium electrolytes concentrations and their ratio at various postmortem intervals

Time since death (hrs)	No. of subjects	Mean Time since death (hrs)	Mean Sodium Electrolyte concentration (N =118-154 mEq/l)	Mean fall of sodium Electrolyte concentration mEq/l/hr	Mean Potassium Electrolyte concentration (N =2.6-4.2 mEq/l)	Mean rise of potassium Electrolyte concentration mEq/l/hr	Mean sodium/potassium Electrolytes concentration ratio
<3	5	2.38 ±0.41	131.80 ±3.77	4.70	5.92 ±1.91	1.06	24.22 ±7.59
3 - 6	37	5.34 ±0.80	134.54 ±4.22	1.58	6.27 ±1.40	0.53	22.40 ±4.58
6-9	52	7.65 ±0.71	133.00 ±5.76	1.31	6.82 ±1.75	0.46	20.66 ±4.85
9-12	76	10.92 ±0.77	130.21 ±9.35	1.17	7.96 ±2.09	0.41	17.55 ±4.98
12-15	72	13.82 ±0.90	130.47 ±5.01	0.91	8.89 ±1.83	0.40	15.27 ±3.04
15-18	98	16.63 ±0.92	129.60 ±7.46	0.81	9.32 ±2.44	0.36	14.93 ±4.47
18-21	119	19.40 ±0.95	126.08 ±10.12	0.87	9.52 ±2.21	0.32	14.10 ±4.14
21-24	126	22.73 ±0.91	124.59 ±8.50	0.81	10.38 ±2.32	0.31	12.56 ±2.77
24-30	189	26.69 ±1.71	123.04 ±11.85	0.75	11.25 ±2.47	0.29	11.49 ±2.93
30-36	68	33.55 ±1.87	122.88 ±12.64	0.60	11.60 ±3.26	0.24	11.68 ±5.28
36-42	76	38.94 ±1.87	120.97 ±8.85	0.57	12.82 ±2.90	0.24	9.94 ±2.44
42-48	58	44.99 ±1.91	117.45 ±16.11	0.57	12.78 ±3.00	0.21	9.75 ±3.00
48-54	26	50.79 ±1.41	111.08 ±9.55	0.63	14.28 ±3.13	0.21	8.08 ±1.65
54-60	14	56.00 ±1.52	113.79 ±4.66	0.52	17.66 ±1.78	0.25	6.63 ±0.80
60-66	10	62.85 ±1.54	102.50 ±11.05	0.64	15.52 ±3.63	0.19	6.95 ±1.88
Total	1026	24.23 ±12.39	125.11 ±11.23	0.74	10.34 ±3.21	0.29	13.48 ±5.11
Correlation coefficient with time since death			-0.476***		0.639***		-0.625***
t-value (M/F)		0.74 ns	0.46 ns		-2.88**		2.75**

** p<0.01, *** p<0.001, ns non significant

Table 3

Role of seasonal variation, gender, cause of death and age over the mean value and correlation of vitreous sodium potassium electrolytes concentrations, their ratio with time since death (T.S.D.)

		Variable(s)	subjects	Mean Time since death (hrs)	Mean Sodium Electrolyte concentration mEq/l	Mean fall of sodium Electrolyte concentration mEq/l/hr	Mean Potassium concentration mEq/l	Mean rise of potassium Electrolyte concentration mEq/l/hr	Mean sodium/potassium Electrolytes concentration ratio
Seasons	Summer (April to Sept. Mean room temp. 38.1^{0}C)	775	24.43 ± 12.24	24.43 ± 12.24	125.19 ± 11.87	0.74	10.76 ± 3.12	0.30	12.82 ± 4.72
	Correlation with T.S.D.				-0.500***		0.634***		-0.630***
	Winter (Oct. to March Mean room temp. 14.1ºC)	251	23.60 ± 12.82	23.60 ± 12.82	124.88 ± 8.96	0.77	9.07 ± 3.16	0.24	15.54 ± 5.66
	Correlation with T.S.D.				-0.407***		0.697***		-0.653***
	t-value		0.91 ns	0.91 ns	0.38 ns		7.40***		-7.51***
Gender	Male	698	24.03 ±12.47	24.03 ±12.47	125.22 ± 11.73	0.74	10.15 +3.19	0.28	13.78 ± 5.20
	Correlation with T.S.D.				-0.496***		0.640***		-0.648***
	Females	328	24.64 ± 12.23	24.64 ± 12.23	124.87 ± 10.10	0.74	10.76 ± 3.21	0.30	12.85 ± 4.86
	Correlation with T.S.D.				-0.430***		0.639***		-0.572***
	t-Value		-0.74 ns	-0.74 ns	0.46 ns		-2.88 **		2.75**
causes of death	Trauma	634	25.70 ± 12.44	25.70 ± 12.44	125.01 ± 12.07	0.70	10.16 ± 3.15	0.26	13.73 ± 5.30
	Correlation with T.S.D.				-0.495***		0.624***		-0.610***
	Burn	252	25.85 ± 12.57	25.85 ± 12.57	124.11 ± 9.63	0.73	10.71 ± 3.24	0.28	12.80 ± 4.45
	Correlation T.S.D.				-0.408***		0.637***		-0.637***
	Poison	140	23.68 ± 11.61	23.68 ± 11.61	127.36 ± 9.49	0.66	10.51 ± 3.34	0.30	13.60 ± 5.21
	Correlation with T.S.D.				-0.513***		0.708***		-0.676***
	t-value	Trauma : Burn			-1.06 ns		2.29*		-2.47*
		Burn : Poison			-3.21**		0.56 ns		-1.59 ns
		Trauma : Poison			-2.16*		-1.16 ns		0.28 ns
Age-groups (years)	<12	19	17.55 ± 8.87	17.55 ± 8.87	129.10 ± 7.28	0.79	9.81 ± 3.53	0.34	15.14 ± 6.38
	Correlation with T.S.D				-0.583***		0.716***		-0.708***
	12-18	74	21.13 ± 10.75	21.13 ± 10.75	126.24 ± 8.14	0.79	10.27 ± 2.68	0.32	13.28 ± 4.31
	Correlation with T.S.D				-0.446***		0.657***		0.666***
	>18-60	853	24.82 ± 12.58	24.82 ± 12.58	124.88 ± 11.64	0.73	10.46 ± 3.22	0.28	13.26 ± 4.88
	Correlation with T.S.D				-0.477***		0.643***		-0.643***
	>60	80	22.38 ± 11.62	22.38 ± 11.62	125.60 ± 9.83	0.77	9.28 ± 3.37	26	15.69 ± 7.03
	Correlation with T.S.D				-0.454***		0.596***		-0.526***
	t -value	<12, 12-18			1.39 ns		-0.63 ns		1.51 ns
		<12, 18-60			1.57 ns		-0.88 ns		1.64 ns
		<12, >60			1.46 ns		0.61 ns		-0.31 ns
		12-18, 18-60			0.99 ns		-0.50 ns		0.03 ns
		12-18, >60			0.44 ns		2.00*		-2.55 *
		18-60, >60			-0.53 ns		3.13**		-4.08 ***

* p<0.05, ** p<0.01, *** p<0.001, ns non-significant, T.S.D. Time since death

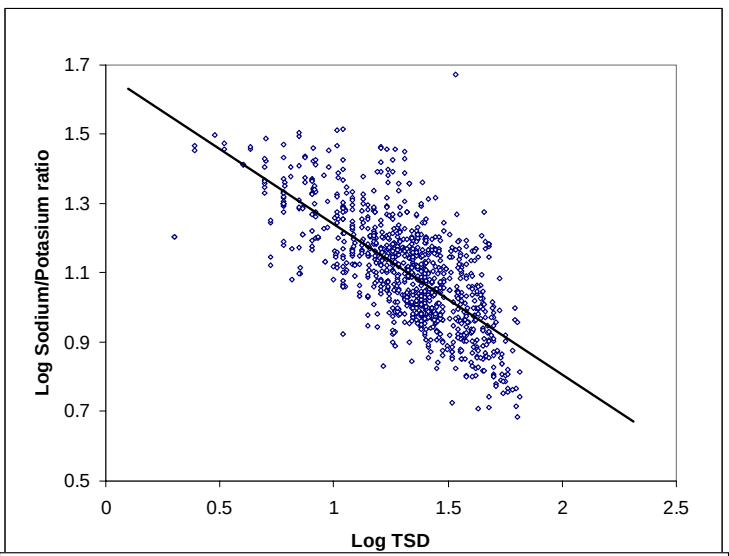

Fig-I double logarithmic relationship between time since death and sodium/potassium electrolyte concentration ratio in vitreous humour. Here the slope of the plotted regression line is negative and is significant at 0.001 level of significance, which means the increase in time since death results into decrease in sodium/potassium electrolyte concentration ratio

Abundant subcutaneous fatty tissues in females retains body heat for longer period which heighten the process of decomposition (19) thereby probably enhancing the process of diffusion of vitreous electrolytes and may be the rationale for gender variation in sodium/potassium ratio in the present study. The rise of vitreous potassium concentration upto 54-60 hrs of death in present study was in variance to longer time reported by others(8-13). It could be because of tropical climate of north-west India which causes the dead body to putrefy faster9 . Observation of present study regarding the difference in various electrolytes concentration in the vitreous humour aspirated simultaneously from both eyes were in good accordance with Stegmaier20 ,Madea et al [21] . Similarly seasonal variations, cause of death and age were the already established factors [18, 22-23] influencing the postmortem rise of vitreous potassium electrolyte concentration and thereby may be affecting the ratio between sodium and potassium electrolytes concentration in the present study.

In the present study equation for prediction of log time since death from log postmortem vitreous sodium/potassium electrolytes concentration ratio had been derived by which time since death can be estimated with S.E. of estimate 0.1800 hrs. upto 66 hours. The testing of regression coefficient of sodium/potassium electrolytes concentration ratio was carried out by testing t-test and 95% confidence interval for regression coefficient were obtained.

CONCLUSION

It can be concluded from the present study that there is a significant relationship between time since death and vitreous sodium/potassium electrolytes concentration ratio in humans but this relationship is equally modulated by the factors like seasonal variations, age, gender and cause of death of the deceased.

Reference

1. T. Marshall, F. Hoare, Estimating the time of death - the rectal cooling after death and its mathematical representation, J. Forensic Sci. 7 (1962) 56-81.
2. G. Dotzauer, Idiomuskuloser Wulst und post-mortale Blutung (German). Z. gericht. Med. 46 (1958) 761-771.
3. A. Klein, S. Klein, Die Todeszeitbestimmung am menschlichen Auge, Dresden University, MD Thesis, 1978.
4. J.I. Coe, Postmortem chemistry of blood, cerebrospinal fluid and vitreous humour, Legal Medicine Annual (wecht CH, ed), New York: Appleton -Century - Crofts, 1976 pp 53-91.
5. W.W. Jetter, Postmortem biochemical changes, J. Forensic Sci. 4 (1959) 330.
6. D. Singh, R. Prasad, C. Prakash, Y. S. Bansal, S.K. Sharma, A.N. Pandey, Linearization of relationship between serum sodium, potassium concentration, their ratio and time since death in chandigarh zone of north-west India, Forensic Sci. Int. (In Press)
7. D. Singh, R. Prasad, C. Prakash, S.K. Sharma, A.N. Pandey, Double logarithmic, Linear relationship between plasma chloride concentration and time since death in humans in Chandigarh zone of North-West India, Legal Med. (In press)
8. J.I. Coe, Postmortem Chemistries on vitreous humour, Am. J. Path. 51 (1969) 741-750.
9. D. Singh, R. Prasad, C. Parkash, Y.S. Bansal, S.K. Sharma, A.N. Pandey, Determination of time since death from vitreous potassium concentration in subjects of Chandigarh zone of north-west India, Int. J.of Med. Toxicol. Leg. Med. 4(1) (2001) 12-15.
10. G. Adjutantis, A. Coutselinis, Estimation of the time of death by potassium levels in the vitreous humour, Forensic Sci. Int. 1 (1972) 55-60.
11. M. Bray, The eye as a chemical indicator of environmental temperature at the time of death, J. Forensic Sci. 29 (1984) 396-403.
12. S. Komura, S. Oshiro, Potassium levels in the aqueous and vitreous humour after death, Tohoku J. Exp. Med. 122 (1977) 65-68.
13. B.A.W. Balasooriya, C.A. St. Hill, A.R. Williams, The biochemistry of vitreous humour. A comparative study of the potassium, sodium and urate concentrations in the eyes at identical time intervals after death, Forensic Sci. Int. 26 (1984) 85-91.

14. H.N. Nauman, Post-mortem chemistry of the vitreous body in man, A.M.A. Arch. Opthimol. 62 (1959) 356-363.

15. H. Davson, Physiology of the ocular and cerebrospinal fluids, J.Physiol. 129 (1955) 111.

16. B. Madea, C. Henssge, Eye changes after death. In: The Estimation of the Time Since Death in the Early Postmortem Period, Bernard Knight editor London, Arnold. 1995, pp.106-137.

17. B. Madea, C. Henssge, W. Honig, A. Gerbracht, References for determining the time of death by potassium in vitreous humour, Forensic Sci. Int. 8 (1989)231-243.

18. J.I. Coe, Vitreous potassium as a measure of the postmortem interval: an historical review and critical evaluation, Forensic Sci. Int. 42 (1989) 201-213.

19. A. Nandy, PRINCIPLES OF FORENSIC MEDICINE, Calcutta, New Central Book Agency (P) Ltd, 1996, pp 163-165.

20. K. Stegmaier, Untersuchungen uber die postmortale Kaliumkonzentration in Glaskorperinhalt und Kammerwasser und ihre Beziehung Zur Todeszeit, Marburg University, MD Thesis, 1971.

21. B. Madea, C. Henssge, M. Staak, Postmortaler Kaliumanstieg in Glaskorperflussigkeit, Welche Parameter Sind als Indikatoren einer Vitalen. agonalen Elektrolytdysregulation geeignet? Z Rechtsmed, 97(1986):259-268.

22. P. Schoning, A.C. Strafuss, Postmortem biochemical changes in canine vitreous humour, J. Forensic Sci. 25 (1980) 53-59.

23. L.Z. Bito, Intraocular fluid dynamics I: Steady state concentration gradients of magnesium, potassium and calcium in relation to the sites and mechanisms of ocular cation transport processes, Exp. Eye Res. 10 (1970) 102-16.

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AN EPIDEMIOLOGICAL STUDY OF ROAD TRAFFIC ACCIDENT VICTIMS IN MEDICOLEGAL AUTOPSIES

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ABSTRACT

Unnatural deaths of any kind i.e. suicidal, homicidal, accidental can cause severe emotional reactions to the near relative of the victim immediately after the event and later. Of all types of unnatural deaths road-traffic accidental death probably has the highest incidence worldwide.

Key Words: Unnatural deaths, Road Traffic.

INTRODUCTION

Accident is an event, occurring suddenly, unexpectedly and inadvertently under unforeseen circumstances. In developed countries, 'RTA is the most common cause of death below the age of 50 years. The pattern of injury, fatal and otherwise, varies considerably depending upon whether the victim is a vehicle occupant, a motorcyclist~ a pedal cyclist or a pedestrian.

In spite of recent advancement of technology and medical sciences death and deformities following road-traffic accident is yet to be controlled successfully rather incidences of R T A has been increasing at an alarming rate throughout the world. At the beginning of the study, it was felt that, it may be important of study the various aspects of R T A death victims autopsied in the dept of F .M. GMC, Guwahati. The results of this study could be useful for strategic planning in the control of road-traffic accidents.

In this paper we report the results of the study under taken by us in the dept of F .M. GMC, Guwahati, Assam for the benefit of society as well as the need for Justice.

Objectives of the study

1. To draw public attention and awareness towards RTA.
2. To find out the epidemiological factors involved in RTA.
3. To prevent/control RTA.

MATERIALS AND METHODS

The material of the study consisted of 1872 medico legal post-mortems performed in the dept of F .M, GMC, Guwahati, Assam during the period of 5 calendar years (from 1st January, 1999 to 31st December, 2003). Out of total 7852 medico legal post-mortems, 1872 were RTA victims consisting 23.84% of total autopsies.

Table -1

Year wise number of autopsies and RT A victims

Year	Number of autopsies	Number of RTA victims	Percentage
1999	1497	315	21.04
2000	1499	350	23.34
2001	1603	391	24.39
2002	1526	380	24.90
2003	1727	436	25.24
Total	7852	1872	23.84

This shows a growing percentage of RTA cases in ML Autopsies performed yearly.

Police papers like inquest report and dead body challan were studied and police officers were asked to provide necessary information as far as practicable for the study. Fact finding interviews of the relatives, friends, neighbours of the victims and eye witnesses were also taken separately to collect the epidemiological data such as place of occurrence, time of ocurrence type of vehicle

involved etc. In few cases adequate information could not be obtained and such cases were put under “Undetermined group”.

Thorough post-mortem examinations were done on all RTA victims and necessary investigations like toxicological analysis of viscera & body fluids and histopathological studies were carried out whenever felt necessary to find out the underlying cause of death and associated conditions.

The data were transferred to a data collection sheet (proforma) specially designed for the study identifying each victim’s record using number codes (PM. No) instead of names. By this process, the anonymity was ensured, there by maintaining confidentiality.

OBSERVATIONS & RESULTS

Observations and results of the study are shown in the following tables.

Table-2

SEXWISE DISTRIBUTION OF RTA CASES

Sex	1999	2000	2001	2002	2003	Total
Male	273	315	344	329	367	1628
Female	42	35	47	51	69	244

Table-II. shows number of male victims more than the 7/8th of the total cases, giving the ratio of male : female = 7:1

Table 3

AGEWISE DISTRIBUTION OF RT A VICTIMS

Age in Yrs.	1999	2000	2001	2002	2003	Total	Percentage
0-10	29	35	36	22	37	159	8.49
11-20	41	59	54	55	37	246	13.14
21-30	95	98	91	77	145	506	27.02
31-40	61	70	105	109	119	464	24.78
41-50	44	56	54	778	31	262	13.99
51- 60	28	25	41	29	43	166	8.36
Above 60	17	7	10	11	24	69	3.68

Table-III shows the age of RT A victims. Age group 21-30 years shows almost 1/3rd of total RTA victims followed by 31-40 years age group 24.78% If we considered age group 21-40 years, it shows more than half of total RTA victims (5 1.80%).

Table -4

Types of Vehicle Involved in RTA

Types of Vehicle	1999	2000	2001	2002	2003	Total	Percentage
2-wheeler	75	81	91	67	113	427	22.8
3-wheeler	10	7	19	85	-	121	6.46
4-wheeler	112	136	181	127	113	669	35.73
Above 4wheeler	112	122	90	95	206	623	33.27
Undetermined	6	4	10	8	4	32	1.7

Table IV shows the types of vehicle involved in RT A. It was observed that 4-wheeler vehicles (car ,jeep, van,minibus etc) involved more than 1/ 3rd of the total victims followed by above 4-wheeler vehicles 33.27% and 2-wheeler vehicles 22.80%. Three wheeler vehicles used for transportation was involved in 6.46%.

Table 5

Types of Road user Killed in RTA

Types of road user	1999	2000	2001	2002	2003	Total	Percentage
Pedestrian	165	178	181	174	182	880	47.00
Bicyclist	36	49	39	29	43	196	10.47
OccupantIPillion rider	94	109	116	101	97	517	27.61
Driver/Rider	20	14	51	76	105	266	14.20
Undetermined	-	-	4	-	9	13	0.69

Table- V shows the types of road user killed in RT A. It was observed that majority of the victims to be pedestrian, 47% followed by occupants/pillion riders comprising 27.61% and drivers/riders 14.20% Bicyclists involved in RTA were 10.47%.

Table -6

Time of Accident

Time	1999	2000	2001	2002	2003	Total	Percentage
12 Midnight-6Am	29	32	38	45	40	184	9.82
6AM-12Noon	II1	105	141	132	142	631	33.70
12Noon-6PM	96	84	116	119	III	526	28.09
6PM-12 Midnight	79	129	96	84	143	531	28.36

Table VI shows the time of accident. It was

observed that incidence of RTA were maximum within 6 AM to 12 Noon (33.70%) followed by 6 PM to 12 midnight 28.36% and 12 Noon to 6 PM 28.09%.

Table 7

Place Pf Accident

Place of Accident	1999	2000	2001	2002	2003	Total	Percentage
Rural	48	56	61	73	80	318	16.98
Semi-urban	132	144	164	149	152	741	39.58
Urban	1.35	1.50	1.66	1.58	204	813	43.42

Table VII shows the place of occurrence of RTA. It shows that frequency of RTA was more (43.42%) in the urban areas than semi urban (39.58%) and rural areas (16.98%).

Table 8

Place of death of RT A Victims

Place of death	1999	2000	2001	2002	2003	Total	Percentage
Spot	85	119	124	71	162	561	29.96
On the way to Hospital	65	56	72	19	72	284	15.17
At Hospital	165	175	195	290	202	1027	54.86

Table 9

Analytical Detection of Alcohol/Durgs in RTA Victims

Victims	1999	2000	2001	2002	2003	Total	Percentage
Pedestrian	13	12	17	11	12	65	30.80
Bicyclist	2	4	3	2	4	15	7.10
Occupants/ Pillion riders	8	6	11	9	9	43	20.37
Driver/Riders	12	9	22	23	22	88	41.70
Undetermined	-	-	-	-	-	-	

Table10

Causes of Death of RTA Victims

Causes of death	Number of victims	Percentage
Instantaneous	253	13.51
Immediate	917	48.99
Remote	702	37.50

N. B.

a Instantaneous death includes Crash injury over head & neack.

b Immediare inclus haemorrhage, reflex vagal inhitibton, shock, or injry to the vitial organs excluding crash injry over the head & neck.

c Remote (delayed) causes include infection, gangrene, crush syndrame, surgical operation superadded natural disease, thrombosis, embolism etc.

DISCUSSION

Involvement of maximum number of male in RTA deaths is due to the nature of works exposing the male in RTA. Similar results were reported by WHO (1976) in the States of USA, Tyagi A. K. et al (1986) Salgado M.S.L. et a[1] (1988) and Kumar A et al (1999).

Regarding the age ofRTA victims, 21 -30 years shows almost 1/3rd of total cases and if we considered age group 21 -40 years it shows more than half of total victims. Similar fIndings were reported by Chandra J (1979), Pillay V. V. (.1992), and Kumar A et al (1999).

Considering the types of vehicle involved in RTA, 4-wheeler is more than the other vehicles. It reveals the more use of 4 -wheeler vehicle by untrained persons. Similar findings were reported by Voret F (1993), Lan G et al (1998) and Dhattarwal S. K. (2004).

Regarding the type of road user, it is found that majority of the victims were pedestrian followed by occupants / pillion riders. This reflects the ignorance of traffic rules and speed of the vehicle by the pedestrians in this region. Similar findings were reported by the Chandra J. et al (.1979), Sharma A. K. (1986), Salgado M.S. et al (1988), Basu R et al (1992) and Kumar A et al (.1999).

Analyzing the time of R T A, it is found that, incidents were highest within 6 am -12 noon. It is also observed that incidents were more in urban areas than rural or semi-urban areas. This reveals the common out-door working time of the region.

Considering the place of death of the RTA victims, it is found that deaths in hospital is highest (54.86%) which is more than the half of the total victims. It reveals the inadequate provision ofmaliagement of RTA victims in this region. From the study it is also observed that, alcohol/drugs has a major roles in road traffic accidents.

Analyzing the cause of death of RTA victims, it is found that most of the victims died immediately

after RTA following haemorrhage, reflex vagal inhibition, shock or injury to the vital organs at hospital or on the way to hospital. Only few cases died at spot following crash injury over head and neck. Infections, gangrene, crush syndrome, surgical operation, superadded natural disease, thrombosis and embolism were responsible for death of 37.50% cases. It reveals the need of more Intensive Care Unit for R T A victims at Civil Hospital Level as well as Medical Colleges of this region.

CONCLUSION

Road traffic accidents continue to be a growing menace, incurring heavy loss of valuable man-power and human resources, along with a corresponding drain of potential economic growth and hence, as a conclusion, we would like to suggest some recommendations which are listed below:

1. The Results of this study suggest the need for large prospective studies that would assist various organizations to set & plan preventive Programmes.
2. Based on these observations, it is further recommended the need of separate ICU for management of complex life threatening conditions in an organized manner with provisions of intensive monitoring system and life sustaining therapies. Available committed and appropriate trained staff having knowledge of adequate skill & care of providing life-support and advanced life-support measures to the critically ill patients along with financial resources.

References

1. Basu R, Nandy A, Mukhopadhyay BB and Majumder BC. Some host factors and seasonal variation in the fatal road traffic accident occurring in old Coroner's Calcutta, -a scientific paper in the XIV Annual Conference of the Indian Association of Forensic Medicine. 1992.
2. Chandra L, Dogra TD, Dikshit PC. Pattern of cranio-intracranial injuries in fatal road traffic accidents in Delhi. 1966-76. Medical Science & Law. 1979; 19 (3) 186-94
3. Kumar A, Qureshi GU, Aggarwal A and Pandey DR. Profile of thoracic injuries 11-ith special reference to road traffic accidents in Agra,' Journal of Indian Association of Forensic Medicine. 1999 ; 21(4) : 104-109.
4. Pillay. Indian Academy of Forensic Medicine. Scientific article of IJV Annual Conference 1992, Jan 4th III.
5. Salgado MSL & Colombage SM. Analysis of fatalities in road accidents. Forensic Science International.1988; 36: 91-96
6. Tyagi AK, Sharma GK, Kumar B. Cranio-cerebral damage by blunt force impact. Journal of Indian Academy of Forensic Medicine. 1986 ; 1 : 24-39
7. Vorel F. Traffic injuries in the pedestrians. Journal of Czeck-S/ovac Forensic Medicine.1993 ; 38 (4): 32-36
8. WHO 'The Epidemiology of Road Traffic Accident' Report on a conference at Vienna 4th to 11th November, 1975, WHO regional publication European series No.2, 1976

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POLYNOMIAL REGRESSION MODEL TO ESTIMATE TIME SINCE DEATH IN ADULTS FROM RECTAL TEMPERATURE IN CHANDIGARH ZONE OF NORTHWEST INDIA

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ABSTRACT

Estimation of time since death from rectal cooling with the help of polynomial regression model is the subject of discussion in the present study. Though in literature various models are available but their complex modeling structure and calculation, restricted their application for real life situations, particularly in climatic conditions where the room temperature varies between 60.33o to 91.97 o F like of Chandigarh zone of India. The present study is an attempt to provide a suitable model for estimation of time since death in such conditions. Nonetheless, with the help of polynomial regression model, time since death can be estimated with SE estimate of 0.12947 hours and 0.410277 hours in summer and winter respectively. Moreover, this model has produced smaller confidence and prediction intervals.

Key Words: Postmortem interval, Time since death - Polynomial regression model, Rectal fall of temperature.

INTRODUCTION

Estimation of time since death is an essential ingredient of every medicolegal postmortem examination. Although the fact that corpses cool progressively after death has been noted since mellenia but it was only in the last about one fifty years that its medicolegal utility in estimation of postmortem interval has been carefully examined1. Since the first attempt to place algor mortis on a scientific basis by John Devay (cited by Barnard Knight) [1] and later on by Rainy,[2] numerous methods [3-9] mostly based on interval between two or more rectal temperatures taken at a specific gap of time or by transforming these values using log transformation have been provided. Marshall and Hoare [4] estimated time since death using complex exponential model, which took into account surface area of corpse, mass of corpse, rectal temperature and some other parameters. Based on this model, various researchers [5-9] have given their own methods and nomograms for estimation of time since death from rectal temperature, which was well evaluated by LenNokes [10].

As most of these studies were carried out in the environment (temperate) which was altogether different (tropical) from this part of the world and it was probably because of this reason, the time of death algorithms of these studies even of De Saram and Webester [3] and the nomogram prepared from the data of this widely quoted study of tropical climate by Henssge [7-9] is not effectively applicable to the subjects of this zone of north-west India. Present study is an attempt to provide a suitable (polynomial regression) model by which time since death could be estimated from the

cooling of the body with much greater accuracy (less standard error) and also with smaller confidence and prediction interval in subjects of Chandigarh zone of India.

MATERIAL AND METHODS

Rectal cooling of the body was studied in 418 normal adult subjects aged between 18-60 years who were admitted and died as a result of traffic accidents at Nehru Hospital of Post Graduate Institute of Medical Education and Research, Chandigarh (India) and on whom postmortems were conducted by the department of Forensic Medicine.

Only those subjects were included in the present study in which exact time, cause and mode of death and other demographic profile were accurately known. Soon after death, (mean time 15±5.3 minutes) with valid informed consent of legal heirs of the deceased rectal temperature was recorded with the help of LCD portable digital multi-stem thrmocouple temperature device (range: - 58o F ~+ 302 o F) by inserting its probe in the rectum upto 4 inches and keeping it there for five minutes. The temperature thus recorded was taken as the initial rectal temperature at death i.e. at 0 hour for statistical analysis. Environmental temperature was also recorded simultaneously with the help of room thermometer ranged from 20 o F to 140 o F. The body was then shifted from the ward to the adjoining room of the mortuary where it was stripped, weighed, measured and placed in a supine position on a metal stretcher covered with thick plastic sheet to minimise the body heat loss by conduction. The doors and windows were opened to provide an ideal room temperature. Rectal and environmental temperatures were recorded at every two- hour intervals, till the body attained the environmental temperature.

During the study period, mean room temperature fluctuated between 66.65 + 6.32 o F (winter, October to March) to 88.64 + 3.33 o F (summer, April to September) and to see the role of this varied room temperature on cooling of a dead body, rectal temperature as described above was recorded in 142 subjects in summer and in 276 subjects in winter. Correlation of rectal temperature with body surface area, body mass index, environmental temperature, weight and supine body length were computed separately for summer and winter seasons.

STATISTICAL ANALYSIS

Statistical analysis was carried out with the help of stat graphics package (stat graphics system, statistical graphics corporation, USA) version 11.0 and MINITAB (Introduction to the practice of statistics, Minitab Inc. USA). Analysis include solution of polynomial regression equation, analysis of variance table, correlation coefficient, descriptive statistics, methods of comparisons and graphical plots to estimate time since death from rectal fall of temperature. The advantage of using polynomial regression model over the other models in estimation of time since death is that it has not only produced smallest standard error but also resulted into smaller confidence and prediction intervals. The equation for this model was:

$$TSD = b0 + b1\,t + b2\,t2 + b3\,t3 + e$$

where TSD: time since death

t: rectal temperature

e : error term, assumed to be distributed normally with zero mean and constant variance

b0, b1, b2 and b3 were the unknown constants, which were estimated from the given data by using the method of least squares. Once these unknowns were estimated, time since death could be estimated for any given value of rectal temperature.

Because of significant variations in seasonal environmental temperature which is. having a small "within variations" but very large "between variations", polynomial regression analysis was carried out separately for both summer and winter season.

RESULTS

As expected, cooling of dead body had three distinct parts i.e. initial lag period, in which mean fall of rectal temperature was very slight (lasted for about 2 hours in both summer and winter season) followed by period of rapid fall of rectal temperature (lasted 2 to 12 hrs. and 2 to 22 hrs. of death in summer and winter respectively). This period was again succeeded by period of slow fall of rectal temperature in which rate of fall decreased further as the body temperature reaches towards the environmental temperature. This period lasted for

12-18 hrs. of death in summer and 22-26 hrs. in winter. Dead body attained environmental temperature in 18 hrs. in summer and 26 hrs. in winter. Correlation of fall of rectal temperature with environmental temperature was found statistically significant ($p < 0.001$). Body surface area, body mass index , supine body length and weight had statistically nonsignificant correlation ($p > 0.05$) with the fall of rectal temperature (Table I-II).

Polynomial Regression equations

As already mentioned, the period of rectal fall of temperature was observed at two hours interval till the body attained the environmental temperature which in summer was 18 hours (at 10 time point i.e. 0, 2, 4, ….. 18hours) and 26hours (at 14 time point i.e. 0, 2, 4, ….. 26 hours) in winter season. Using the principle of central limit theorem, the mean temperature at these points was taken for statistical analysis.

The results of Polynomial regression analysis along with ANOVA table for summer and winter are presented in Table III & IV.

From the given data, the equation obtained was:

$$TSD = 18283.2 - 575.177\, t + 6.04426\, t2 - 0.0212102\, t3 \quad .....(1)$$

R - squared = 99.89%

R - squared (adj. for degrees of freedom) = 99.83%

Standard error of estimate = s = 0.2467

Mean absolute error = 0.12947

For example, if we take rectal temperature t = 92o F, then from equation (1), estimated time since death (TSD) = 9.40 hours, which is in agreement with the observations of the present study (Table I).

It is evident from ANOVA table that time since death and rectal temperature were related strongly by third degree polynomial regression. However, we have also applied simple linear and quadrate equation models but the results were not as encouraging as with third degree polynomial regression. It is because of the fact at third degree level most of the variation smoothed out and also the existence of outliers is taken care of.

The R-squared statistic indicates that the fitted model explain high variability of dependent variable and the standard error of the estimate showed the standard deviation of the residuals to be 0.246658. This value can be used to construct confidence limits for the mean value of dependent variable and also prediction limits for individual value of the dependent variable. R-squared (adj. for degree of freedom) is some times required for comparison with other models. The mean absolute error (MAE) of 0.12947 in the average value of the residuals i.e. the difference between observed and expected values.

Table 1

Table 2

Time since death (hrs)	Mean & SD Rectal temp (98.75±0.91^{0}F)	Fall/2hours	Environmental temp. M=70.65±6.32^{o}F		Correlations with rectal fall of temperature at various time interval with Body mass Index M=21.36±3.61		body surface area M=16902.71±1907.71 cm^2		Weight M=58.06±12.0 Kgs		Supine body length M=164.49±8.39cms	
			Rectal temp	Fall/2hrs.	Rectal temp	Fall/2hrs.	Rectal temp	Fall/2hrs.	Rectal temp	Fall/2hrs.	Rectal temp	Fall/2hrs
2	98.04 ±1.55	0.71 ±1.08	0.60 ns	0.037 ns	0.124 ns	-0.051 ns	0.124 ns	-0.051 ns	0.121 ns	-0.048 ns	0.086 ns	-0.044 ns
4	95.07 ±2.08	3.68 ±1.80	0.225*	-0.216*	0.099 ns	-0.042 ns	0.099 ns	-0.042 ns	0.129 ns	-0.074 ns	0.012 ns	-0.032 ns
6	91.60 ±2.38	7.15 ±2.18	0.387**	-0.448**	0.143 ns	-0.095 ns	0.143 ns	-0.095 ns	0.180 ns	-0.133 ns	0.021 ns	-0.016 ns
8	88.28 ±2.67	10.47 ±2.54	0.570**	-0.623**	0.153 ns	-0.109 ns	0.153 ns	-0.109 ns	0.188 ns	-0.144 ns	0.025 ns	-0.007 ns
10	85.33 ±3.13	13.42 ±3.05	0.698**	-0.735**	0.135 ns	-0.094 ns	0.135 ns	-0.094 ns	0.165 ns	-0.126 ns	0.023 ns	-0.004 ns
12	82.60 ±3.67	16.15 ±3.64	0.778**	-0.800**	0.125 ns	-0.090 ns	0.125 ns	-0.090 ns	0.154 ns	-0.117 ns	0.024 ns	-0.001 ns
14	80.16 ±4.22	18.59 ±4.22	0.829**	-0.842**	0.108 ns	-0.076 ns	0.108 ns	-0.076 ns	0.132 ns	-0.100 ns	0.019 ns	-0.001 ns
16	77.96 ±4.72	20.78 ±4.76	0.864**	-0.868**	0.100 ns	-0.071 ns	0.100 ns	-0.071 ns	0.122 ns	-0.092 ns	0.018 ns	-0.001 ns
18	76.03 ±5.22	22.72 ±5.29	0.896**	-0.895**	0.104 ns	-0.077 ns	0.104 ns	-0.077 ns	0.127 ns	-0.100 ns	0.019 ns	-0.002 ns
20	74.39 ±5.62	24.35 ±5.70	0.912**	-0.909**	0.103 ns	-0.078 ns	0.103 ns	-0.078 ns	0.126 ns	-0.100 ns	0.022 ns	-0.007 ns
22	73.05 ±5.92	25.70 ±6.01	0.923**	-0.918**	0.102 ns	-0.079 ns	0.102 ns	-0.079 ns	0.126 ns	-0.101 ns	0.023 ns	-0.008 ns
24	72.05 ±6.06	26.69 ±6.16	0.930**	-0.923**	0.099 ns	-0.076 ns	0.099 ns	-0.076 ns	0.122 ns	-0.097 ns	0.021 ns	-0.007 ns
26	71.31 ±6.17	27.44 ±6.28	0.936**	-0.929**	0.101 ns	-0.078 ns	0.101 ns	-0.078 ns	0.124 ns	-0.099 ns	0.023 ns	0.009 n

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Table 3

ANOVA table for Polynomial Regression Summer Season Adults 18 to 60 years.

Source	Sum of squares	d. f.	Mean square	F-value	p-value
Model	329.635	3	109.878	1806.01	<. 0001
Residual	0.365042	6	0.0608403		
Total (Corr.)	330.0	9			

100(1- a)% confidence interval for the mean value of the dependant variable can be obtained by using the expression

Therefore, 95% confidence intervals for the mean value of dependent variable corresponding to will be. Also 95% prediction intervals for the individual value of the dependent variable corresponding to can be constructed by using the expression For our data 95% prediction intervals for individual value of dependent variable will be Similar results were obtained for winter season, presented below:

$$\left[T\hat{S}D \pm t_{\alpha/2},n-k \;\; s\sqrt{t_0'(T'T)^{-1}t_0}\right]$$

where

n = total no. of observations

k = no. of unknown parameters.

For summer season

$s = 0.246658$

$t_{.025}\ n\text{-}k = t_{.025}\ ,\ 6 = 1.943$

$$t_0' = \begin{bmatrix}1 & t_0 & t_0^{\,2} & t_0^{\,3}\end{bmatrix} = [\,1 \quad 92 \quad (92)^2 \quad (92)^3\,]$$

and

$$\begin{bmatrix}
1 & 98.95211 & 9791.521 & 968891.6\\
1 & 98.29718 & 9662.336 & 949780.4\\
1 & 96.44014 & 9300.701 & 896960.9\\
1 & 94.61831 & 8952.625 & 847082.2\\
1 & 93.01479 & 8651.751 & 804740.8\\
1 & 91.66338 & 8402.175 & 770171.8\\
1 & 90.63732 & 8215.124 & 744596.9\\
1 & 89.81479 & 8066.696 & 724508.6\\
1 & 89.12676 & 7943.579 & 707985.5\\
1 & 88.57324 & 7845.219 & 694876.4
\end{bmatrix}$$

Table 4

ANOVA table for Polynomial Regression; Winter Season Adults 18 to 60 years.

Source	Sum of squares	d.f.	Mean square	F-value	p-value
Model	908.317	3	302.772	1798.72	p<.0001
Residual	1.68327	10	0.168327		
Total(Corr.)	910.0	13			

TSD =1097.9 –35.8309 t + 0.398778 t^2 – 0.00150341 t^3

R – squared = 99.82%

R – squared (adj. for degrees of freedom) = 99.776%

Standard error of estimate = s = 0.410277

Mean absolute error = 0.288413

The result of winter season can also be interpreted in the same way as that of the summer season. For example, for $t = 86^oF$

Estimated time since death = $T\hat{S}D$ = 9.55 hours.

In this case $t_0' = [1 \quad 86 \quad (86)^2 \ (86)^3]$,

$t_{.025,}10 = 1.812$

and $t_0'(T'T)^{-1}t_0 = .216949$

$$T = \begin{bmatrix}1 & t_1 & t_1^2 & t_1^3\\ 1 & t_2 & t_2^2 & t_2^3\\ . & . & . & .\\ 1 & t_n & t_n^2 & t_n^3\end{bmatrix} =$$

$$\begin{bmatrix}
1 & 98.7471 & 9750.99 & 962882\\
1 & 98.04022 & 9611.884 & 942351.2\\
1 & 95.07101 & 9038.498 & 859299.2\\
1 & 91.60036 & 8390.626 & 768584.4\\
1 & 88.27536 & 7792.54 & 687889.3\\
1 & 85.33116 & 7281.407 & 621330.9\\
1 & 82.60072 & 6822.88 & 563574.8\\
1 & 80.16087 & 6425.765 & 515094.9\\
1 & 77.96268 & 6078.18 & 473871.2\\
1 & 76.03014 & 5780.583 & 439498.6\\
1 & 74.3942 & 5534.497 & 411734.5\\
1 & 73.05036 & 5336.355 & 389822.7\\
1 & 72.05217 & 5191.516 & 374060\\
1 & 71.31123 & 5085.292 & 362638.4
\end{bmatrix}$$

95% confidence intervals for the mean value of dependent variable corresponding to will be and 95% prediction intervals for the individual value of the dependent variable will be The line of "best fit" along with 95% prediction limits are presented in fig- 1 and fig- 2.

Fig. 1

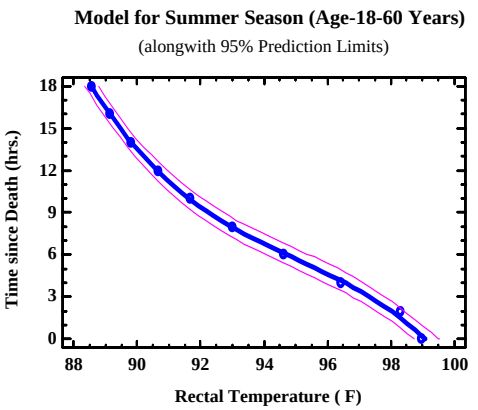
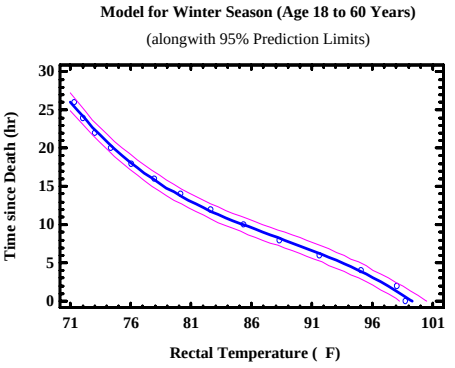


Fig. 2



It was observed that this model worked quite well where within temperature variation was very small, however, if within variation is large, one should adopt some other model or construct separate models for different segments of data having smaller variations. In this region, there are two main seasons, summer (April to September) and winter (October to March) where within variations were small but between variations are very large. Because of this reason, separate models were constructed for both the seasons.

DISCUSSION

In literature, various models1-7 are available for estimation of time since death, but their complex modeling structure and calculation restricted their applications to real life situations particularly in varied climatic conditions (varying from 60.330 to 91.970F) like of Chandigarh zone of India. To overcome it, in the present study with the help of polynomial regression model, a prediction equation has been derived by which time since death from rectal fall of temperature can be estimated with SE of estimate of 0.12947 hours in summer and 0.410277hrs in winter and it has also produced smaller confidence and prediction interval. Moreover, the line of "best-fit" along with 95% prediction limit as presented in fig -I, &II are so simplified that anybody can understand and same can be utilized for predicting the postmortem interval even at a scene of crime as it does not require any specialized training, mental taxing or an expensive device

CONCLUSION

From the present study it can be concluded that in Chandigarh zone of northwest India polynomial regression equation can be used to estimate time since death from rectal cooling with SE of estimate of 0.12947 hours in summer and 0.410277 hours in winter respectively and this model is found most effective where "within variations" are small. However, if "within variation" are large, construction of separate model for different segment of data having smaller variations is recommended

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References

1 B. Knight, Early work on temperature and time of death, In: C. Henssage, B. Knight, T. Krompecher, B. Medea, L. Nokes, The Estimation of the Time Since Death in the Early Postmortem Period, London, Edward Arnold, 1995, p 4

2 H. Rainy, On the cooling of dead bodies as indicating the length of time since death, Glasg. Med. J. 1 (1868) 323-30.

3 G. De Saram, G. Webster, N. Kathirgamatamby, Post-mortem temperature and the time of death, J. Crim. Law, Criminol. Police Sci. 1 (1955) 562-77.

4 T. Marshall, F. Hoare, Estimating the time of death - the rectal cooling after death and its mathematical representation, J. Forensic Sci. 7 (1962) 56-81.

5 M. Green, J. Wright, Post-mortem interval estimation from body temperature data only, Forensic Sci. Int. 28 (1985) 35-46.

6 L.M. Al-Alousi, R.A. Anderson, Microwave thermography in forensic medicine, Police Surg. 30 (1986) 30-42.

7 C. Henssge, Death time estimation in case work I. The rectal temperature time of death nomogram, Forensic Sci. Int. 38 (1988) 209-36.

8 C. Henssge, Rectal temperature time of death nomogram: dependence of corrective factors on the body weight under stronger thermic insulation conditions, Forensic Sci. Int. 54 (1992) 51-56.

9 C. Henssge, Temperature- based methods II, In: C. Henssage, B. Knight, T. Krompecher, B. Medea, L. Nokes, The Estimation of the Time Since Death in the Early Postmortem Period, London, Edward Arnold, 1995, p 46 - 105.

10 L. Nokes, Analysis of algorithms in actual cases, In: C. Henssage, B. Knight, T. Krompecher, B. Medea, L. Nokes, The Estimation of the Time Since Death in the Early Postmortem Period, London, Edward Arnold,1995, p 34-45.

11 A. Moritz, Pathology of Trauma, 2nd edn. Philadelphia: Lea & Febiger, 1954.

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MENTAL HEALTH ACT,1987 - AN ANALYSIS

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ABSTRACT

Health is defined as "the state of complete physical, mental and social well being and not merely an absence of disease or infirmity." 1 Out of three, the mental status is tricky to evaluate and is the one which actually determines other two health parameters.

In our country plenty of legal orders interact with mental disorders in order to protect the interests of mentally ill, society and the state. These legislations are enacted to protect the society from dangerous manifestations of mental illness. There are guidelines regarding restrain, admission and discharge, procedures of civil and criminal action with regard to mentally ill. But do these laws discuss about proper care and treatment? Are there provisions for post discharge care and rehabilitation?

In present study, an attempt has been made to discuss Mental Health Act, 1987 and suggestions to make them more fundamental.

Key words: Mental Health, Mentally ill, Mental Health Act.

HISTORY

Mental health act was drafted by parliament in 1987 but it came into effect in all the states and union territories of India in April 1993. This act replaces the Indian Lunacy act of 1912, which had earlier replaced the Indian Lunatic Asylum act of 1858.[2]

Definition of the act [3]

"An act to consolidate and amend the law relating to the treatment and care of mentally ill persons, to make better provision with respect to their property and affairs and for matters connected therewith or incidental thereto."

Salient features of the act [2]

Mental health act is divided into 10 chapters consisting of 98 sections.

Chapter I: Deals with preliminaries of the act, definitions and provides for change of offensive terminologies used in Indian Lunacy act 1912.

Chapter II: Deals with the procedures for establishment of mental health authorities at central and state levels.

Chapter III: It lays down the guidelines for establishment and maintenance of psychiatric hospitals and nursing homes. There is a provision for licensing authorities to process applications for license which have to be renewed every five years.

Chapter IV: It deals with the procedures of admission and detention of mentally ill in psychiatric hospitals.

Chapter V: It deals with the inspection, discharge, leaves of absence and removal of mentally ill persons.

Chapter VI: It deals with the judicial inquisition regarding alleged mentally ill persons possessing property and its management.

Chapter VII: It deals with the maintenance of mentally ill persons in a psychiatric hospital or psychiatric nursing homes.

Chapter VIII: It deals with the protection of human rights of mentally ill persons.

Chapter IX: It deals with the penalties and procedures for infringement of guidelines of the act.

Chapter X: It deals with miscellaneous matters not covered in other chapters of the act.

Terminologies used in the act [4]

New term	Outdated terms
Psychiatric hospital / Nursing home	Asylum
Mentally ill person	Lunatic
Mentally ill prisoner	Criminal lunatic

Other important terminologies used in the act

1. Reception order: Means an order for admission and detention of a mentally ill person in a psychiatric hospital or nursing home.
2. Psychiatric hospital or nursing home: It is a hospital for the mentally ill persons maintained by the government or private party with facilities for outpatient treatment and registered with appropriate licensing authority. Admitting a mentally ill to a general nursing home is an offence.
3. Medical officer: A registered medical practitioner.
4. Medical officer in-charge: Is a medical officer who is in-charge of a psychiatric hospital or nursing home.
5. Mentally ill person: Is a person suffering from mental disorder, other than mental retardation, needing treatment.
6. Mentally ill prisoner: Is a mentally ill person, ordered for detention in a psychiatric hospital, jail or other places of safe custody.

Objectives of the act [5]

1. To establish central and state authorities for licensing and supervising the psychiatric hospitals.
2. To establish such psychiatric hospitals and nursing homes.
3. To provide a check on working of these hospitals.
4. To provide for the custody of mentally ill persons who are unable to look after themselves and are dangerous for themselves and or, others.
5. To protect the society from dangerous manifestations of mentally ill.
6. To regulate procedure of admission and discharge of mentally ill persons to the psychiatric hospitals or nursing homes either on voluntary basis or on request.
7. To safeguard the rights of these detained individuals.
8. To protect citizens from being detained unnecessarily.
9. To provide for the maintenance charges of mentally ill persons undergoing treatment in such hospitals.
10. To provide legal aid to poor mentally ill criminals at state expenses
11. To change offensive terminologies of Indian Lunacy act to new soother ones.

Procedure for admission and discharge of mentally ill

A mentally ill person (not a minor) may make a request for admission as a voluntary patient; in case of minor his guardian may make such request. On such request, medical officer in-charge after enquiry within 24 hrs, if thinks necessary may admit such person. The medical officer shall discharge such patients on request by him or guardian as the case may be, unless he finds such discharge against patient's interests. Such cases will be referred to medical board, which if decides the same, then patient will be further admitted for a period not exceeding 90 days for treatment.

A mentally ill may be admitted as inpatient on a request by friends or relatives. Such request should be supported by medical certificates to the effect. In such cases medical officer in-charge may admit the patient if he thinks necessary. Request for admission may also be made by a police officer if such mentally ill person is dangerous to himself or others. Such persons will be discharged by magistrate on request by friends/relatives or after they are certified to be sane by the board of experts.

Most of the sections of the act are in accordance with mental health act 1959 and the mental health (amendment) act 1982 of England and mental health act 1960 of Scotland with minor differences.

Positive aspects of the act

1. Replacement of offensive terminologies of Indian Lunacy act 1912 by new soft and soothing terms. Thus upholding the dignity of mentally ill persons.
2. Establishment of licensing authorities to provide a check on licensing and working of mental health hospitals. This will help in improving standards of mental health care.

3. Provision for establishment of new hospitals.
4. Provision for out patient care thus avoiding unnecessary detention.
5. Simple procedures for admission and discharge of mentally ill persons to hospitals.
6. Appointment of guardians for maintaining property and person of mentally ill.
7. Provision for bearing the expenses of treatment by relatives and government.
8. Prohibition on any research on such subjects without proper consent.
9. Provision for separate places for children, addicts and convicted persons.

Criticism of the act

1. Change of older terminologies to newer ones might be good from theoretical aspects. But practically will it be helpful in removing the social stigma attached to the illness. This approach is just like a window dressing. This change should be implemented in practice and not on paper.
2. Licensing authorities do not have a doctor who may be in a better position to assess the facilities and services of these centers.
3. Concept of establishing new hospitals might appear good but in a developing country like ours this may be a costly affair. It will put extra burden on health budget.
4. No mention is made of incorporating General hospitals and centers in this act rather they are prohibited. Such hospitals if taken along may provide a better health care.
5. Much stress is laid on hospital admission and treatment. This again increases the cost of health care. No provisions are made for home treatment.
6. Although the act provides for a simpler discharge procedure but no provisions are made for after discharge care and rehabilitation, of patients.
7. In case no relative comes forward for discharge of patient, will that person be detained indefinitely in hospital. Who will bear the expenses in such case? If Govt. then for how long.
8. It is provided that research on such subjects can be carried out by consent of guardian. Is it not like treating them as inanimate objects? This provision violates human rights.
9. There are no provisions for punishing the relatives and officers requesting unnecessary detention of a person to such hospitals.
10. Once a person is admitted to mental hospital he is termed insane or mad by the society. There should be provisions in the act to educate the society against these misconceptions.
11. Act adopts different views for Govt. and private hospitals.

Suggestions for improvement of the act

1. Provisions for educating society about mental illness and treating it at par with physical illness should be incorporated.
2. Licensing process should be made simpler.
3. Provision should be there for checking the working of licensing authorities and powers vested in them to be limited.
4. Licensing authorities should appoint a doctor preferably a psychiatrist as inspecting officer.
5. Private Doctors and general nursing homes should be allowed to treat such patients at par with recognized centers. This will help in reducing the workload on the system and will provide much better health care to the patients. This provision can be withdrawn later, once there are adequate recognized hospitals with adequate staff.
6. Other than children and addicts even separate places are to be provided for elderly, destitute and women.
7. Adequate provisions to be provided for long-term treatment and expenses on treatment. If this is not possible, then community mental health centers should be opened to provide such care.
8. Provisions for rehabilitation centers are to be incorporated. Efforts should be there for post discharge care and rehabilitation.
9. Strict provisions should be there for punishing the individuals requesting unnecessary

detention and exploitation of mentally ill.

10. Stress should be on treatment of illness rather than the ill
11. Treatment should be based on concept of socialization and not on hospitalization.

Every law has its own advantages and disadvantages although existing law gives an excellent approach to the problems of mentally ill. But some of the provisions need a proper rethinking. No law once framed can be adapted forever. There should be proper amendments from time to time.

References

1. Park K. Park's textbook of Preventive and Social Medicine. 17th ed., Jabalpur. Banarsidas Bhanot Publisher. 2002. p.12.
2. Pillay VV.Textbook of Forensic Medicine and Toxicology. 14th ed., Hyderabad. Paras Medical Publishers. 2004. P.311-12.
3. Knight B. et al. Cox, Medical Jurisprudence and Toxicology. 6th ed., Allahabad: The Law Book Company Pvt. Ltd. 1990. p. 507-8,810.
4. Vij K.TextBook of Forensic Medicine. Principles and Practice. 1st ed., New Delhi. BI Churchill Livingstone. 2001. p. 788.
5. Mental Health Act, 1987.
6. Basu R. Fundamentals of Forensic Medicine and Toxicology. Kolkata. Book & Allied Pvt. Ltd., 2003. p. 236-7.

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REPRODUCTIVE CLONING-AN ACT OF HUMAN RIGHTS VIOLATION

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ABSTRACT

People have diverse and strongly held opinions regarding the morality of cloning humans. This debate is usually couched in religious and ethical terms. Theologians and ethicists use different arguments to arrive at the same conclusion. Religious arguments are based largely on the traditions and scriptures unique to each faith. Different religions have different attitudes towards cloning and within each faith there is diversity of opinion. Ethical arguments are based on more general guidelines for behavior that do not stem from any particular religion. Ethics usually vary more by culture than by religion. In general, society does not disagree on what is ethically wrong; rather society disagrees on how to weigh different ethical considerations. There is no consensus on the morality of human cloning, even within particular religious traditions. At the moment, science of human cloning is in the incipient stage; the risks associated with the technology are so great that virtually all people agree that there should be a blanket ban on human cloning.

Key words : Human cloning, Risks, Ethics, Religion

INTRODUCTION

Human cloning is the creation of a genetically identical copy of an existing human or growing cloned tissue from that individual. The term is generally used to refer to artificial human cloning; human clones in the form of identical twins are commonplace, with their cloning occurring during the natural process of reproduction. The word "clone" derives from the Greek term Klon, meaning, "sprout" or "twig". It refers to a method of reproduction apart from the parental sexual-mating process that is characteristic of most organisms. Cloning a human being would involve the following process :The cell nucleus of an adult person would be removed from an ordinary body cell e.g., a skin cell. Since the nucleus of each cell excepting RBC,s contains all of the genetic information in the form of DNA for a complete human being, a nucleus extracted from a donor would be transplanted into an unfertilized host egg cell whose nucleus had been removed. The resulting embryo at a later stage is implanted into the uterus. Finally, a baby clone will supposedly be born who would be an exact copy of the person who's original DNA provided the "Starter". Theoretically, hundreds of identical looking clones can be created by this method.

The Scientific and Moral Implications of Cloning

While there is no apparent ethical offence in cloning a carrot, or even a frog, such is not the case with people. Each person is unique by virtue of his unique genetic make-up barring naturally occurring identical twins. In 1997, there was much notoriety surrounding the cloning of Dolly, the Sheep in Scotland. This lead many people to believe that the same technology could be applied to clone human beings[1] . Mammalian cloning, through somatic-cell nuclear transfer process, has resulted in the birth of hundreds of organisms to date[2] . However, significantly more cloned animals and ruminants fail during pregnancy than would fail in sexual reproduction, and a substantial majority of cloned animals that have survived to birth have had significant birth defects. Opponents of human cloning cite diverse objections to cloning, some clearly defined, others more obscure and inherently tied into notions of humanity, morality

and ethics. The most common objection to cloning humans is that the current technology is unsafe. The animal clones that have survived after birth have a high chance of dying from heart and blood vessel problems, malformed arteries, diabetes, immune system deficiencies and physical deformities. There is no reason to believe that the outcome of attempted human cloning will be any different[3].

It is a well-known tenet of science that a single observation is not to be codified until confirmed by some one in some credence when well- controlled or of a unique nature, or both. It is the lack of any confirmation that provokes our skepticism.

By undertaking asexual reproduction, the gene pool will by narrowed and humanity's ability to over come disease will be constrained. As such, motives for human cloning are based on increasing personal notoriety rather than the greater good[4].

Cloning represents an unprecedented control over the genetic make-up of another individual. Indeed, this concept of control over the genetic make up of successive generations is evocative of practice of eugenics, science of altering human evolution so as to encourage desirable traits and discourage undesirable ones, which was rejected by the world community after the Second World War[5]. Opponents fear that wide spread practice of somatic cell nuclear transfer cloning will encourage a form of eugenics as people would be able to decide which traits are desirable. Over a period of time, cloning might become a preferred practice and parents who choose to play the lottery of old-fashioned reproduction would be considered irresponsible.

Cloning is said to breach a fundamental right to individuality. Uniqueness of identity and individuality are some of the most deep- felt and inherent signifiers of self. Just as a great artwork would lose its value in identical reproduction, so human beings can be said to lose their intrinsic inimitability in reproductions of themselves[6].

Cloning cannot be undone. We cannot destroy our mistakes or purge the world of any baby born via means we disagree with. Political and academic ostracization and even expelling of the cloners from the International Infertility Association would do little to deter them from their objectives. What we need is an unambiguous international law on human cloning. Till date, cloning laws and policies are far from uniform across the globe and the legal position in some countries remain uncertain. The Indian council of Medical Research has declared that research on cloning with intent to produce an identical human being, as of today, is prohibited but has not declared therapeutic cloning to be so prohibited[7]. Some scientists might take an undue advantage by creating an embryo for the purpose of obtaining stem cells, which could be used for a number of degenerative diseases like Parkinson's disease, Alzheimer's disease etc. Ultimately, it raises the moral status of an embryo, if any. A recommendation in favour of this idea was publically rejected by President Clinton in December 1994 [8]. An embryo has moral standing not so much for what it is (at conception or later) but because it is the result of procreative activity. People have a direct interest in the status and fate of every embryo formed from their gametes because such embryos carry their children. In this respect, the embryo is not only a symbol; it is real. Similarly, society has a direct interest in that embryo since society has an interest in how is members procreate and how families are created. To create embryos solely for research- or to sell them or to use them in toxicity testing - seems morally wrong because it seems to cheapen the act of procreation and turn embryos into commodities. Creating embryo specifically for research also puts women at risk as sources of ova for projects that provide them no benefit [9].

The human fertilization and embryology Act 1990 in U.K., contains a clear prohibition on replacing the nucleus of an embryonic cell with a nucleus taken from another human embryonic or adult cell. Section 3 (3) (d) status that a licence granted under the 1990 Act "cannot authorize replacing a nucleus of a cell of an embryo with a nucleus taken from a cell of any person, embryo or subsequent development of an embryo." Cell nucleus replacement (CNR), on the other hand, is not expressly prohibited by the 1990 act; nor is "embryo splitting", the process by which twinning occurs naturally and which can also be done in vitro to produce identical- cloned embryos[1]0. So far as CNR research within the UK was concerned, it was unregulated until 2001 when Human Reproductive Cloning Act and Human Fertilization and Embryology (Research Purposes) Regulations

were enacted [11]. The legislation now draws a line at the point of implantation by prohibiting the placing in a woman of "a human embryo, which has been created otherwise than by fertilization". As per the new legislation, the research involving CNR embryos will be lawful only when it is authorized by a licence granted by the Human Fertilisation and Embryology Authority (HFEA). In addition to the provisions contained in the 1990 act, the new legislation allows licences to be granted by the HFEA for three further purposes, namely

- Increasing knowledge about the development of embryos.
- Increasing knowledge about serious disease.
- Enabling any such knowledge to be applied in developing treatments for serious disease.

The lacunae with the new legislation are that the terms "disease" and "serious disease" have not been defined. Different people will interpret it differently to achieve their selfish ends.

The Council of Europe's additional protocol [12] to the convention for the protection of human rights and the dignity of the human being with regard to the application of biology and medicine, on the prohibition of cloning human beings, explicitly declares that "any intervention seeking to create a human being genetically identical to another human being, whether living or dead, is prohibited". Since "human being" is unlikely to be interpreted to include embryonic human life, the Netherlands, have added an interpretative statement stating that the term "Human beings" refers to a human individual that is, a human being who has been born.

The European Group on Ethics in Science and New Technologies (EGE) advised in is opinion that, at present, "the creation of embryos by somatic cell nuclear transfer for research on stem cell therapy would be premature" since there are alternative sources of human stem cells [13].

However, some organizations devoted to clone humans are very hard to control because of non-uniformity in the cloning laws across the world. These organizations might plan to shift their operations to other countries where no such ban on cloning exists.

CONCLUSION

The meaning of human cloning is often misunderstood. Although genes are recognized as influencing behaviour and cognition, "genetically identical" does not mean altogether identical because some important genes are also present in the mitochondria of the egg-cell. It could spell problems in stem-cell treatment for a good deal of diseases where compatibility is essential because of the risk of rejection. With additional experimentation on other animals we can enhance the accuracy of therapeutic cloning. The temptation to manipulate another human life is almost irresistible for some as the history is replete with practice of eugenics in some parts of the world. The genesis of the 21st century is a period of unequaled technological prowess combined with unparalleled moral vacuity. In order to curb the abuse of the technology, reproductive cloning should be banned internationally till the global community including the scientists, ethicist and theologians finds out answers to morality of human cloning thoroughly and satisfactorily.

References

1. Wilmut I, Schnieke AE, Mcwhir J et al. Viable offspring derived from fetal and adult mammalian cells. Nature. 1997; 385; 810-13
2. Cambell KHS, Mcwhir J, Ritchie WA et al Sheep cloned by nuclear transfer from a Cultured cell line. Nature. 1996; 380, 64-6
3. Jaenisch R, Wilmut I Don't clone humans. Science Magazine. 2001; 291, 2552-54
4. Watson J. Moving towards the clonal man. Atlantic Monthly. 1971; 227; 50-3
5. Kelves DJ. Eugenics and human rights. BMJ. 1999; 319, 435-38
6. Gogarty B. what exactly is an exact copy? And why it matters when trying to ban human reproductive cloning in Australia. J Med. Ethics. 2003; 29; 84-89
7. Indian Council of Medical Research. Ethical guidelines for biomedical research on human subject. 2000; New Delhi, p. 48.
8. Schwartz J, Devory A. Clinton to ban US funds for some embryo studies. Washington Post.1994; 3 December.

9. Healy BP, Berner LS. A position against federal funding for human embryo reseach: words of Caution for women, for science, and for society. J. Women's Health. 1995; 4; 609-12.

10. Human Fertilisation and Embryology Act. (1990). London. HMSO, 1990

11. Human Reproductive Cloning Act 2001. London. The Stationary Office ltd. 2001

12. Council of Europe (1997). Additional protocol to the Conventions for the protection of human rights and the dignity of the human being with regard to the application of biology and medicine, on the prohibition of cloning human beings. Strasbourg: Council of Europe.

13. EGE (2000). Ethical aspects of human stem cell research and use. Brussels. European Commission.

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SEX RELATED HOMICIDES AND OFFENDERS - A MEDICO-LEGALISTS VIEW

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ABSTRACT

The advances in criminalistics and forensic psychiatry in these present times and the combined studies of workers of the specialties of Forensic Medicine and Psychiatry has led to renewed interest in investigating and documenting sex crimes. The term offender is used for a person who actively takes part in an offence or goes blatantly against the law. The term can be simultaneously / interchangeably used for a criminal.

Sex related homicides include rape murders, serial murders, killings involving both of anal and oral sodomy and other acts of sexual perversions terminating in homicide.

In this paper a brief summarization of sex related crimes, their psychodynamics and offender profile is detailed with comparative comments vis-à-vis the Indian and Western scenarios.

Key Words; Psychiatry, Forensics.

INTRODUCTION

A homicide is classified as "sex related" when there is evidence of sexual activity observed at the crime scene or upon the body of the victim which may include:

1. Type of or lack of clothing on the victim.
2. Evidence of seminal fluid on, near or in the body.
3. Evidence of sexual injury/sexual mutilation.
4. Sexualized positioning of the body.
5. Evidence of substitute sexual activity i.e. fantasy, virtualism, symbolism and masturbation.
6. Multiple stabbings or cuttings to the body, (i.e. slicing wounds across the abdomen, throat slashing and over kill-type of injuries, suggestive of sexual motivation [1].

The victims of these crimes are usually women and young children though some homosexual killings are also reported. The homicide might have sexual implications even in the absence of an overt sexual actor observable sexual activity at the scene. The motive may also not be discernable or clear cut.

Practically, if the body is of a female and it is found nude / partially clothed, the medicolegal team should consider a "sex crime" first.

This paper will try to present salient features of a sexual homicide with profiles of victims and offenders and compare our reported sex crimes with that of the West.

DISCUSSION

The search of the sex homicide should obviously begin at the crime scene with the following objectives in mind:

1. Complete chain of events should be documented before any police procedures i.e. photography of body and scene.
2. Complete search for any forensic evidence which may provide clues to identity of the killer.

In a nutshell, full and complete crime scene investigation is mandatory as for any other type of homicide.

Human sexuality and sexual deviation

There are 3 components of the human sex drive

i.e. biological (instinctive), physiological (functional) and emotional (mental). According to various experts, the emotional aspect is the most important component, accounting for over 70% of the human sex drive. In other words, it can be stated that "the mind controls the act", i.e. the mind determines what is/is not sexually arousing to a person who is important in the analysis of the chain of events in a sex crime. The human sexuality is based on our psychosexual development through conditioning. Sex is also a sensory act that involves all five senses to various degrees. The sexual responses are appropriate as they are viewed as acceptable behaviour i.e. getting aroused on seeing nude/ scantily clad women; however persons who are sexually inhibited may develop unconventional forms of sexual expression. On seeing a scantily clad woman such a person could get obsessed with this type of behaviour in the form of compulsive voyeurism.

Sexual deviations (or sexual perversions as known in India) can be divided into two groups. The basic distinction between the two is based on social effect. According to Coleman et al 1984 "The sex drive is normally sufficiently powerful enough to override all but the most severe social sanctions. Thus we see variant sexual needs frequently erupting into variant sexual behaviours [2]. Coleman further states that sexual deviations are acts which involve non-consent or assault and those acts which can be described as problematic from the standpoint of welfare of the society.

The major sexual deviations are voyeurism, sexual sadism-masochism, pedophilia, exhibitionism etc [3].

Determining motivation

Another very important aspect of sex crime investigation is the determination of the 'motive'. In the present context, there are a lot of possibilities to consider. No one acts without motivation, however irrational it may seem.

According to Brussel [4] lithe motivations behind the act of a mad man possess their own logic. The psychotic murderer does not act wholly irrationally. There is a method to his madness, there is logic, a rationale, hidden behind what he does and how he does it.

The investigative challenge is to discover this seemingly irrational logic and apply this information to the case.

With a careful search for evidence of sexual activity at the crime scene, one may detect presence of sexual assault and paraphilic behaviour i.e. presence of seminal fluid in vagina, mouth or rectum or on clothing and surrounding objects. Pornographic material may be found.

Human behaviour is both unpredictable and repetitive i.e. the offender may repeat certain actions done in an entire sex crime later on also.

The reason/motivation for the crime is an extremely important consideration in establishing the investigations direction i.e. if the murder was the result of a lover's quarrel or due to interpersonal violence was it due to a rape/sodomy attempt, lastly is it the work of a sexual psychopath with sadistic or impulsive implications? To answer these questions one must go on to the type and personality of a sexual offender.

Organized and disorganized offenders

This dichotomy was devised by the FBI's Behavioural Science Unit.

Table 1: Personality type and classification of the sexual offender

What is the motive

If PsychopathicSadisticImpulsiveOrganized
PsychoticMotivelessBizarreDisorganized

Organized offender and his victim

He is usually above average in intelligence and is methodical and cunning i.e. he plans carefully his crime. The crime scene is away from his residence or place of work. He is mobile. His personality is based on fantasy and ritual. His victims are of the "right type" i.e. someone he can manipulate and control and are total strangers. He uses his verbal skills to gain control over them till they are in his "comfort zone". He follows news reports carefully and takes "souvenirs" from the victims body/clothes etc after the crime. He is excited by the cruelty of the act and may torture the victim. He often removes the body from the crime scene elsewhere.

Disorganised offender and his victim

Conversely, he is of below average intelligence, is a loner (i.e. does not mix well with others). He is socially inadequate.

He will act impulsively under stress and his victim will be from near his home. His mode of attack can be termed as a "blitz" (out of no where). This is a spontaneous act, in which the offender suddenly acts out his fantasy and has had no planning beforehand of the sex crime committed.

A very important feature in such an attack is that he depersonalizes his victim by disfigurement or removal of body parts. These acts are committed postmortem i.e. mutilation of the breasts, genitalia, buttocks etc.

Ressler et al [5] states that "there are significant differences between both types of offender, however there are no situations where the organized and disorganised offender are mutually exclusive, that is both types of murderers are capable of all types of behaviour.

Homosexual homicides

These are quite common and may involve both sexes either as victims or as offenders. These include serial murders, killings involving forced anal and/or oval sodomy and other types of sexual perversions.

The injuries are usually inflicted by sharp weapons and are found on the throat, chest and abdomen (The throat is a major target as it is significant sexually in homosexual lover making). These "Lovers' quarrels" between male homosexuals manifest an increased level of violence due to the fact that the parties involved in the emotional conflict are both sexual aggressors.

Homosexual homicides involving forced anal and/or oral sex are to some degree homologous to the rape-homicides.

Classifications of sex-related homicides

A) Interpersonal violence oriented disputes: This is the most common type of sex-related murders. These disputes involve husbands and wives, men and women, boy and girl friends and sometimes siblings (incestuous homicides). Sometimes love triangles may also be seen. The motive is such murders is hate anger, jealousy or revenge with the thought that "If I cannot have you, no one else can too" Depersonalization is a notable feature of such murders.

B) Rape and/or sodomy oriented assault: Here, the offenders' primary intent is to rape/sodomize the victim. These cases are very brutal and death results from the assailant overcoming the victim's resistance. The victim may be choked or strangled in the process or smothered / gagged to prevent her from screaming. Blunt force injuries may also be seen.

C) Deviant oriented assault: 'The Lust murder" This type of sex murder is committed by someone defined as a lust murderer who is oriented towards deviant and sexually sadistic assault and is easily differentiated from other types of sex-murderers by extensive mutilation of the body. These type of people do not indulge in penile penetration of the body and instead masturbate on the victim with displacement of breasts (Defeminization), postmortem attack on genitalia, evisceration, insertion of objects into body cavities and even anthropophagy (consumption of human flesh and blood). Lust murders are heterosexual (with certain exceptions). They act on the spur of the moment and are obsessed with some perverted fantasy. They are oblivious to the fact that they leave evidence behind and are mostly detected early.

D) The serial murder: It is defined as the killing of 3 or more separate victims with emotional time breaks between the killings.1 These time breaks or "cooling off" periods range from days to weeks to even months between victims.

In psychiatric terminology, a serial killer may be defined as either psychotic or psychopathic depending upon the information supplied during the examination. Most of such killers are psychopathic i.e. sexual psychopaths or psychopathic sexual sadists. They have a profound personality disorder and yet are keenly aware of their own criminality and are in touch with reality.

According to Ressler et al a psychopathic killer kills because he likes to do so; he has conscious, detailed plans for murder and each new experience gives the offender insight into the next crime.

SUMMARY AND CONCLUSION

As is discussed above, sexual homicide is rampant all over the world and has been a study material for a vast number of investigators. The concept of criminalistics would be incomplete without a discussion on sex related killings. The knowledge of pattern of sexual offences, the

offender's modus operandi, his and the victims profile and type(s) of sexual perversions in each sex crime are a important and integral part of the investigation and the detection of the murderer is dependent on these points. The Indian scene unfortunately lacks the promptness and dedication seen in the west. Financial and technical constraints coupled with political "finishing" of cases (both sexual and otherwise) lead to stacks and stacks of files pertaining to unfinished cases. Overzealous and promotion hungry police officials have been observed fabricating evidence and eliminating "false" killers. Still, the future is not all that bleak and with the passing years one hopes that the forensic expert, forensic psychiatrist and police will work in unison on such cases.

References

1. Geberth VJ. The investigation of sex related homicides. In: Practical Homicide Investigation tactics, procedures and Forensic Techniques, 2nd Edition, CRS Press Boca Raton, USA; 1993;295-330
2. Coleman JC, Butcher IN, Corson RC. Abnormal psychology and modern life. 7th ed., Texas: Scott Freshman and Co. 1984;457
3. American Psychiatric Association. Diagnostic and statistical manual of mental disorders, 3rd ed. Washington DC. 1980;267
4. Brussel JA. Case book of a crime psychiatrist. New York: Geis Publishing Co., 1968;xii
5. Ressler RK, Burgess AW, Douglas JE. Sexual killers and their victims. J Interpersonal Violence 1986;1:293

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POISONING BY GLORY LILY - A CASE REPORT

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ABSTRACT

People from rural areas who are less accessible to medical health care facilities or those who are ignorant of the facilities, sometimes prefer local hakims for treatment of common ailments. But due to their ignorance of the fact that such practitioners lack scientific expertise, they suffer dire consequences from such primitive therapies. This person who availed therapeutic services from a hakim, ended fatally as a result of overdoses of a root preparation obtained from Glory Lily plant. This paper also outlines the Clinico-Pathological aspects of poisoning by Glory Lily.

Key Words : Poisoning, Glory Lily, Gloriosa superba

INTRODUCTION

Old literature reveals that the root of this plant is used in traditional medicine therapy for treating colicky pain, bruises and also for anti-lice treatment.

The plant profile includes

1. It is a climbing hedge plant growing all over India.
2. Scientific name : Gloriosa superba L
3. Common names : Glory Lily, Morning Glory, Flame lily, Agnimukhi, etc.
4. Family Group : Liliacea.

All parts of this plant are poisonous and especially the roots are highly poisonous. The active principle constituents includes highly active alkaloids like Colchicine, Gloriosine, Superbrine (a glycoside), Chelidonic acid and Salicylic acid.

Circumstances of poisoning results due to overdoses from traditional medicine preparation used to treat ailments like sprain, bruises, colicky pain etc. It is also seen during its application to procure illegal abortion or deliberate ingestion for committing suicide.

Mode of poisonous action is attributed to its Anti-mitotic activity that arrests mitosis in metaphase. Cells with high turnover and high metabolic rate like Intestinal epithelium, hair follicle, bone marrow cells, etc are highly susceptible. Lethal dose is about 60 mg in adult and the Fatal period is about 12 - 72 hrs.

Clinical profile of poisoning includes appearance of acute manifestations within 2 - 6 hrs of ingestion with burning pain in mouth, nausea, intense vomiting, severe bloody diarrhea, delirium, loss of consciousness, convulsions followed by multi-organ failure with respiratory distress, coagulopathy, renal failure and progressive polyneuropathy within 12 - 36 hrs.

Fatal complications that leads to death includes hemorrhagic complications, Multi-organ failure and infective complications.

CASE HISTORY & AUTOPSY FINDINGS

A male person, aged 23 yrs was alleged to be suffering from stomach ailment for the past few days. As the history suggested by relatives, he had gone to a hakim for getting treatment, where he was advised to take a preparation made out of roots of a plant. He had presumably taken a higher dose than necessary to get prompt relief.

Following ingestion, within 7 - 8 hrs, he started having burning pain in stomach followed by severe vomiting and blood tinged diarrhea. He was shifted to the hospital and was admitted in a state of unconsciousness, hypovolemic shock, and subconjunctival hemorrhage, petechial hemorrhages over the chest and abdomen and oliguria.

Symptomatic and supportive treatment was given along with Gastric Lavage, but he developed multiple complications and died within 2 days, where clinical cause of death on record was due to DIC, Multi-organ failure and ARDS.

Autopsy findings include subconjunctival hemorrhage, petechial hemorrhage over the chest and abdomen externally. Internal findings include

inflammation of the stomach wall with punctate hemorrhagic points over posterior wall and lesser curvature, petechial hemorrhages over epicardial surface of heart, lower lobes of lungs and white matter of cerebral hemispheres.

Stomach contents along with other usual organs and gastric lavage fluid were sent for chemical examination that did not reveal any common poisons. On further enquiry and request to the police and relatives, the root along with the whole plant was produced which was identified to be 'Glory Lily'.

MANAGEMENT PROTOCOL

General principles

Hospitalize the patient immediately.

Constant and prolonged monitoring is essential. Ensure adequate ventilation.

Before instituting symptomatic and supportive therapy remove the plant material from gastrointestinal tract by emesis or gastric lavage without delay to minimize further absorption.

Give adequate intravenous fluids. Correct any electrolyte imbalance. Maintain a fluid balance chart.

Specific measures should also be taken for the management of shock. Cardiac monitoring is useful. Early forced diuresis may be of value.

Specific treatment

If respiratory depression is present assisted ventilation and oxygen may be necessary.

Renal failure with oliguria is a common feature. Maintain an adequate urine output with plenty of intravenous fluids. Established renal failure may require peritoneal or hemodialysis.

Fresh blood transfusions are necessary to correct leucopenia. If clotting time is abnormal, vitamin K and fresh frozen plasma should be given. Hemorrhagic manifestations should be treated with fresh blood transfusions.

Prophylactic antibiotic therapy is advisable.

DISCUSSION

Colchicine alkaloid is the key active ingredient that is responsible for the toxicity from this plant. The alkaloid has got very narrow therapeutic index and thereby a slight over dose results in acute poisoning. It is associated with high rate of morbidity and mortality and the potential seriousness of intoxication is often under estimated during clinical presentation.

Though it has got anti-mitotic activity, it does not account for the multi-organ failure in severe toxicity. They probably result from some less understood micro-tubular functions associated with intracellular transport network, extracellular secretion of hormones, neurotransmitters and cytoplasmic motility.

The early symptomatology can be mistaken for Gastro-enteritis, or acute abdomen, and the late manifestation can mimic hypovolemic, septic or cardiogenic shock. Thus a high degree of suspiciousness and accurate history is required to start the therapy along the right direction.

CONCLUSION

The key points to save the person from the toxic effects includes a high degree of suspicion of poisoning, accurate history and early recognition of potential severe toxicity. All patients require immediate hospitalization and prompt treatment with aggressive supportive therapy, is the need of the hour. People should be made more aware of not going for such dangerous, unregulated, non-tested remedies, and thus save themselves from the toxic effects.

References

1. Folpini A, Furfori P. Colchicine Toxicity - Clinical feature and treatment: Massive overdoses case report. Clin Toxicol. 1995 ; 33 :71-77.
2. Kuncl RW, Duncan G, Watson D et al. Colchicine myopathy & neuropathy. N Engl J. Med. 1987 ; 316 :1562-1568.
3. Lindsay M, Murray, Colchicine toxicity. Clin Toxicol. W.B. Saunders co. 2001; 32:285-288.
4. Mendis S. Colchicine cardiotoxicity following ingestion of Gloriosa superba tubers. Post Grad Med. J. 1989 ; 65 : 752-755.

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DEATHS DUE TO RAPID HIGH ALTITUDE CLIMBING (ASCEND)

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ABSTRACT

High altitude pulmonary edema develops in people who make a rapid ascend to a high altitude and the body is not able to acclimatize itself. We came across two such cases in the department of Forensic Medicine at I.G.M.C, Shimla.

Key Word: HAPE

INTRODUCTION

Anyone who has climbed even a moderate mountain has probably felt some altitude effects. People ascend to mountains during holidays for trekking and big multinational companies hold meetings away from cities so that their officers can relax and enjoy themselves besides working. If the ascent is fast and the body fails to adjust to the changed scenario a holiday can turn into a nightmare. Although air everywhere contains 21% oxygen, the atmospheric pressure decreases as altitude increases so less and less oxygen becomes available to human body due to fall of oxygen tension in inspired air as well as the alveolar air. Water vapours exert a tension of 47 mm Hg at all altitudes and carbon dioxide is continuously excreted from the body into respiratory alveoli. Because of this combination, the oxygen of the alveolar air falls at high altitude [1]. This usually happens when there is rapid ascent to altitude above 2500 meters or around 8000 feet [2]. The body uses many strategies to cope up with the lack of oxygen, without these strategies high altitude can prove to be fatal.

Since the reporting of HAPE by Dr. Charles Housten, the compensatory mechanisms adapted by the body were categorized into immediate and other little delayed. The first and most effective change is hyperventilation, which bring more fresh air deep into lungs and washes out carbon dioxide thus increasing the available oxygen. With each breath a climber losses fluid and becomes more easily dehydrated breathing dry air causes painful dry cough-high altitude hack which may be bad enough to crack a rib. Hypoxia also causes the heart to beat faster driving more blood throughout the body to hungry cells. The brain, which makes only 3% of total weight, uses 20% of oxygen; the brain is likely to suffer when the supply is short. Body tries to balance acid-base alterations by 2, 3 DPG. Further adjustments can be made by increased number of red cells produced by the marrow thus increasing the amount of oxygen blood can carry. Hypoxia increases blood pressure in arteries supplying the lung, if this increases too much fluid leaks from blood into lungs causing high altitude pulmonary edema, which can be rapidly fatal, drowning the victim in his own juices. The delayed effect is hypertrophy of right side of heart so that blood can be effectively pumped through the expanded capillary bed of lungs. Kidneys excrete alkaline urine, urea content is more and ammonium salts less.

If the mechanism fails there will be hypoxia induced endothelial dysfunction leading to vasoconstriction along with clinical signs of headache, light-headedness, weakness, trouble in sleeping, upset stomach, loss of appetite. The person becomes exhausted sits to rest and may not wake from fatal sleep of hypothermia.

The present cases, which have been presented, are in reference to high altitude pulmonary edema with history of rapid ascent to Shimla, which is to a height of 2159 meters, or 7400 feets. The highest point is Jakhu hill at a height of 2455 mts.

CASE - I

A 22 years old male came to Shimla from Tamil Nadu by train on 22-09-04 at 6.00 am. He along with his friends went to Potato Research Institute, Bemloi. On coming back, he decided to take rest before going for a walk to The Mall at 2 pm. At 2 pm, his friends went to call him and he was found unconscious. He was declared brought dead at I.G.M.C Shimla.

Post mortem finding: On examination froth in nose and mouth was present. On internal examination, cerebral edema was seen. On cut section of lungs, gross frothy discharge was present. Trachea and lungs contained froth besides congestion of liver, spleen and kidney.

CASE II

A 40-year-old man came to Shimla from Delhi on 28-10-04 night for making sweets at a local shop. On 31-10-04, he complained of chest pain and restlessness. He was found unconscious, brought to I.G.M.C Shimla, and was declared brought dead.

Post mortem findings: On external examination, no injuries were found on the body. Froth was present in Larynx and Trachea. Gross congestion and froth was present in both the lungs. Viscera analysis was negative for chemical examination.

DISCUSSION

Whenever there is a history of sudden death the foremost cause thought is the involvement of cardiovascular system. The incidence of the mentioned cases may be low but cannot be ignored. The try should be that the people should be aware of the symptoms.

To prevent high altitude illness one should take time travelling to high altitude. When one travels to high altitude body starts adjusting right away to the lower amount of oxygen in air, but it takes several days for the body to adjust completely. If one is healthy, one can probably go safely from sea level to high altitude. The closer one lives to sea level the more time body takes to get use to high altitude. One should not ascent faster than 1000 feet per day. If one skis at an elevation of 10000 feet during the day, he should sleep the night before and night after at an elevation of 8500 feet. There are studies to suggest that the allelic variants of adaptation and HAPE are on the same locus of genes. If the signs of headache, weakness, trouble sleeping appear stop ascending to high altitude or go back to low altitude until the symptoms go away. The more severe symptoms are difficulty even while resting, coughing, and inability to walk in straight line. The person should immediately go to a lower altitude and contact a doctor.

The active role of Nifedipine, Decadron, Acetazolamide helps in saving valuable lives (5). They are useful in preventing as well as in treating high altitude pulmonary edema. People can die of high altitude pulmonary edema if the symptoms are not recognized or are ignored.

The physical exertion during first 24 hrs is important factor, which add upto the problem (6). People with sickle cell anemia should not go to high altitudes and the parents should take care of small children who are being taken to high altitude as their bodies have hard time adjusting to low oxygen level. A high altitude is also dangerous for people with severe lung disease, such as chronic obstructive pulmonary disease or severe emphysema and for people with severe heart disease. Some experts recommend that pregnant women should not travel to an altitude above 8000 feet.

References

1) Chatterjee CC. Textbook of Physiology. 10th edition 1988. 42xxv

2) Hultgreen HN. High altitude pulmonary edema current concepts. Ann Rev Medicine 1996; 47: 267-84

3) Ahsan A, Charu R, Pasha MAU, et al. Enos alleve variants at the same locus associate with HAPE and adaptation theory. BMJ 2004; 59 ; 1000-1002.

4) American Academy of Family Physician. High altitude illness: How to avoid it and how to treat it.

5) Bhalwar R, Singh R, et al. Nested case control analysis of risk factors for high altitude Pulmonary edema. Medical Journal Armed Forces India 1995 ; 51(3): 189-93.

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FATAL GASTRO-INTESTINAL BLEEDING - A COMPLICATION FOLLOWING SPINAL INJURY

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ABSTRACT

On 30.08.2003, a 20-year-old boy met with a vehicular accident and sustained spinal injury and left upper limb fracture. He was immediately hospitalized and seemed to recover well after treatment for a period of 15 days, when just before discharge he suddenly had hematemesis and bleeding per rectum and succumbed within another 24 hours. The case is discussed in detail.

Key Words: Spinal injury, cervical spine, hematemesis, quadriparesis, gastro-intestinal bleeding, steroid therapy

CASE REPORT

On 15.09.2003, dead body of a 20-year-old boy was brought for post-mortem examination to the mortuary of Government Medical College, Surat.

History & Findings

The boy had a vehicular accident on 30.08.2003 while riding on a scooter and was immediately taken to hospital with complaints of quadriparesis and fracture of the left arm bone. There was no history of loss of consciousness or ENT bleeding. On examination, pulse was feeble and blood pressure was low. After stabilizing the blood pressure with blood transfusion, an abdominal ultrasound, MRI scan of the spinal cord and X-ray of the left upper limb was done on the same day which revealed:

· No abnormality in the abdominal ultrasound.

· Intervertebral disc protrusion at C3-C4 level with contusion and edema of spinal cord at C3-C4 level.

· Fracture of the shaft of humerus of the left side.

Treatment was started with methyl prednisolone for the cervical cord injury along with ranitidine, diclofenac sodium and cefotaxime.

Progress

Over the next two days, he had occasional chills with slightly elevated body temperature for which paracetamol and artesunate were given. Methyl prednisolone was replaced with dexamethasone (6mg iv qds).

After a week of treatment, weakness of the limbs continued. He developed loose motions that were brought under control by conservative management.

By the tenth day, he was continuing on antibiotic, dexamethasone (same dose), ranitidine and diclofenac sodium.

On the 11th day, the humerus fracture was reduced under general anaesthesia. Post-operative period was uneventful.

Subsequent MRI of cervical spine on 12th September 2003 showed the same findings as in the first MRI.

From the evening of 12th September, the boy started having loose motions and on the 14th of September, he had about 50-60 ml of fresh blood in his stools followed by malena, as well as fresh blood in the Ryle's tube aspirate.

Steroids and analgesic were omitted, packed cells were infused and a stomach wash done with cold water.

By the evening of 14th September, there was

no blood in the RT aspirate but he continued to have fresh bleeding per rectum. Bleeding time was 1 min 35 sec., Clotting time was 5 min 30 sec and Prothrombin time was 11 sec (control 10 sec)

By 15th September morning, he again had fresh hematemesis with his blood pressure falling and rising pulse rate. In spite of immediate infusion of two units of fresh frozen plasma, one unit of plasma expander (hemacael) and Inj. somatostatin, the blood pressure went unrecordable, the pulse was not palpable and the boy died.

Routine laboratory tests were within normal limits throughout the hospital stay. However, the behavior of the boy throughout was recorded as irritable.

Clinical Impression

1. Massive Gastro-intestinal tract hemorrhage from post-traumatic stress ulcerations
2. Disseminated intravascular coagulopathy
3. Mismatched blood transfusion
4. Fat embolism
5. Acute tubular necrosis.

Findings on Post-mortem examination

General: Examination was done 9 hours after death.

External findings: Rigor mortis was well developed all over the body. Postmortem lividity was of a bluish red color, was fixed and was present on the back of the body. Fresh blood was present at the nostrils and at the anus. Epidermal denudation had started at many places over the body. Healing abrasions with scabs falling off, contusions and injection marks were present over the body.

Internal findings: Brain was pale and weighed 1320 grams. Pleural cavity on either side contained 200 ml of light amber colored clear fluid. The tracheal lumen contained white froth and both lungs appeared pale and on cut section exuded white froth from the lower lobes. Multiple petechial hemorrhages were present on the surface of the heart over both ventricles.

The peritoneal cavity contained 800 ml of light amber colored clear fluid. Lower end of the esophagus contained clotted blood. However, the walls of the esophagus were normal. Stomach contained 200 ml of dark fluid blood and 400 gm of reddish brown clotted blood. Wall of the stomach was thinned out and hemorrhagic at places. No ulcerative lesion was evident to the naked eye. The small and large intestines contained dark red partly fluid and partly clotted blood and no ulcerative lesion was evident. Intestinal mucosa was stained red. Grossly multiple granular growths were seen projecting from the walls of the descending colon and rectum. Pancreas, spleen, suprarenals and kidneys were of normal size and appeared pale.

Vertebral column was exposed using the posterior approach. Extravasated blood was present in the muscles surrounding vertebral bodies C2-C5 and T4-T6. The intervertebral disc between C3 and C4 was found protruding inside the canal. Spinal cord appeared swollen at C2-C5 and the spinal canal dilated at C3-C4 level. The dura mater surrounding the cord at C3-C4 level was thickened and contused and the grey matter on the anterior aspect of the spinal cord at C3-C4 level showed contusion.

Viscera samples were taken from the body for histo-pathological and toxicological examination and specimens preserved for microbiological examination. The chemical analysis was negative for any poisonous substance or drug overdose. Splenic swab and swab from the peritoneal cavity taken with aseptic precautions were negative for any organism. Histo-pathological examination using the H & E staining technique revealed the following -

- Polymorph and mononuclear infiltration in the alveolar septal wall of the lungs
- Congestion and ballooning degeneration of the kidneys
- Mild congestion of the supra-renal glands
- Mild congestion with mononuclear cells in the mucosa of the wall of the stomach
- Polymorphic and lymphocytic infiltration in the mucosa of the ileum, lower descending colon, sigmoid colon and rectum along with edema and minimal hemorrhage in the muscular and serosal layers.
- No remarkable pathology in the heart, liver, spleen, pancreas and brain including cerebrum,

cerebellum and spinal cord upto C7 level.

The conclusion as to the cause of death was arrived as 'Bleeding from the gastro-intestinal tract following injury to the cervical (C2-C5) and thoracic (T4-T6) regions of the spinal column and injury to the cervical spinal cord.'

DISCUSSION

Stress ulcerations of the stomach with massive hemorrhage is a frequent companion of trauma, sepsis, shock, massive burns, traumatic/ surgical injury to the central nervous system and long use of NSAIDs and steroids. They are most common in the acid-secreting portion of the stomach. Foci of pallor and hyperemia appear in the proximal part of the body of the stomach within 24 hours of stress followed by petechiae and shallow erosions, which spread to the entire body except the antrum.

Although elevated gastric acid secretion may be noted in patients with stress ulceration after head trauma (Cushing's ulcer) and severe burns (Curling's ulcer), mucosal ischaemia and breakdown of the normal protective barriers of the stomach also play an important role in the pathogenesis. The basic mechanism producing the stress ulcerations is an episode of diminished mucosal blood flow. In quadriplegic individuals, however, the ulcer phenomenon may be due to unopposed vagal action as are ileus and hyper motility. Hyper secretion of gastric acid is postulated to be one of the causes of the stress ulcerations as a significant drop in bleeding is noted when acid inhibitors are used as a prophylactic measure for stress gastritis.

The ulcerations are usually silent with absence of the characteristic pain pattern of the chronic duodenal or gastric ulceration because of their superficial nature. Perforation, similarly, is extremely unusual.

The most common clinical finding is painless gastro-intestinal hemorrhage. Blood loss is usually minimal but may be substantial and life-threatening carrying mortality risk of 50%. When massive, the onset of bleeding is typically 2 - 3 days after the trauma.

Complications such as severe respiratory failure, massive wound sepsis and progressive ileus may develop before bleeding.

Treatment for the stress ulcerations varies from iced water gastric lavage to use of vasoconstrictor agents locally. The prognosis, however, is poor irrespective of the therapy. Once stress ulceration has produced significant hemorrhage, the mortality rate usually exceeds 50%. Pharmacological prophylaxis with intravenous H2-receptor antagonist therapy decreases bleeding, but it does not lower the mortality rate.

The present case, though not new, presents the typical findings seen in a case of post-traumatic (non-gastritis) stress related mucosal injury of the gastro-intestinal tract. Mortality in such cases depends on the quality of the intensive care available to the patients at risk. This case is one of the many examples of our country where precious lives can be saved by providing quality intensive care. In the unfortunate event of the death of the patient as in this case, meticulous autopsy after going through the antemortem treatment records helps in coming to a conclusion to the cause of death in such cases which otherwise would have been difficult and misleading.

References

1. John DV. Harrison's Principles of Internal Medicine, Diseases of Gastrointestinal System, Peptic ulcer and Gastritis.15th ed., McGraw-Hill.
2. Tedeschi CG. Forensic Medicine, Systemic Response to Trauma, Vol. I.
3. Kumar and Cotran. Robin's Basic Pathology, Gastrointestinal Tract, 5th ed., Saunders.
4. Reddy KSN. Legal Medicine for Doctors and Lawyers, Systemic Response to Trauma, 1st ed., 1998.

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MEDICAL NEGLIGENCE - MAJESTY OF LAW - DOCTORS

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ABSTRACT

In a land mark historical judgment the Hon,ble Supreme Court has ruled that doctors should not be held criminally responsible unless there is prime facie evidence before the Court in the form of a credible opinion from another competent doctor, preferably a Government doctor in the same field of medicine supporting the charges of a rash and negligent act. It is a laudable judgment in the light of criminal procedures filed against the medical professionals in trivial cases under Section 304-A and even 304 IPC where prima-facie there seems to be no neglect in these medical treatments.

Key Words: Negligence, damage, rashness, criminal law, mens rea, recklessness, res ipsa loquitur, Ex abundanti cautela, cognizance, harassment, Statuary, Bolam's test, misadventure.

INTRODUCTION

On August 05,2005 a Three Judge Bench of Supreme Court of India of Chief Justice R.C.Lahoti, Justice G.P.Mathur and Justice P.K.Balasubramanyam by order quashed prosecution of a medical professional under Section 304-A / 34 IPC and disposed of all the interlocutory applications that doctors should not be held criminally responsible unless there is a prima-facie evidence before the Court in the form of a credible opinion from another competent doctor, preferably a Government doctor in the same field of medicine supporting the charges of rash and negligent act. It was judiciary at its best. Taking upon themselves to define the borders of justice the learned judges applied healing touch to the healers [1]. The judgment with its salient features and opinion of medical professionals is being discussed [2] -

Conclusions of the judgment summed up:-

1. Negligence is the breach of a duty caused by omission to do some thing which reasonable man guided by those considerations which ordinarily regulate the conduct of human affairs would do, or doing something which a prudent and a reasonable man would not do. The definition of negligence as given in Law of Torts, Rattan Lal and Dhiraj Lal (edititede by Justice G.P.Singh), referred to herein above holds good. Negligence becomes actionable on account of injury resulting from the act or omission amounting to negligence attributable to the person, sued. The essential components of negligence are three: "duty", "breach" and "resulting damage"....

2. Negligence in the context of medical profession necessarily calls for a treatment with a difference. To infer rashness or negligence on the part of professional, in particular a doctor, additional considerations apply. A case of occupational negligence is different from one of professional negligence. A simple lack of care, an error of judgment or an accident, is not proof of negligence on the part of medical professional. So long as a doctor follows a practice acceptable to the medical profession of that day, he can not be held liable foe negligence merely because a better alternative course or method of treatment was also available or simply because a more skilled doctor would not have chosen to follow or resort to that practice or procedure which the accused followed. When it comes to the failure of taking precautions what has to be seen is whether those precautions were taken which the ordinary experience of men has found to be sufficient; a failure to use special or extraordinary precautions which might have prevented the particular happening cannot be the standard for judging the alleged negligence. So also, the standard of care, while assessing the practice as adopted, is judged in the light of knowledge available at the time of the incident, and not at the date of trial. Similarly, when the charge of negligence arises out of failure to use some particular equipment, the charge would fail if the equipment was not generally. available at that

particular time (that is the time of the incident) at which it is suggested it should have been used.

3. A professional may be held liable for negligence on one of the two findings: either he was not possessed of the requisite skill which he professed to have possessed, or, he did not exercise, with reasonable competence in the given case, the skill which he did possess. The standard to be applied for judging, whether the person charged has been negligent or not, would be that of an ordinary competent person exercising - ordinary skill in that profession. It is not possible for every professional to possess the highest level of expertise or skills in that branch which he practices. A highly skilled professional may be possessed of better qualities, but that can not be made the basis or the yardstick for judging the performance of the professional proceeded against on indictment of negligence.

4. The test for determining medical negligence as laid down in Bolam's case [1957] 1 W.L.R. 582, 586 holds good in its applicability in India.

5. The jurisprudential concept of negligence differs in civil and criminal law. What may be negligence in civil law may not necessarily be negligence in criminal law. For negligence to amount to an offence, the element of mens rea must be shown to exist. For an act to amount to criminal negligence, the degree of negligence should be much higher i.e. gross or of a very high degree. Negligence which is neither gross nor of a high degree may provide a ground for action in civil law but can not form the basis for prosecution.

6. The word "gross" has not been used in Section 304-A of IPC, yet it is settled that in criminal law negligence or recklessness, to be so held, must be of such a high degree as to be "gross". The expression 'rash or negligent act' as occurring in Section 304-A of the IPC has to be read as qualified by the word "grossly".

7. To prosecute a medical professional for negligence under criminal law, it must be shown that the accused did something or failed to do something 'which in the given facts and circumstances' no medical professional in his ordinary senses and prudence would have done or failed to do. The hazard taken by the accused doctor should be of such a nature that the injury which resulted was likely imminent.

8. Res ipsa louqitur is only a rule of evidence and operates in the domain of civil law specially in cases of torts and helps in determining the onus of proof in actions relating to negligence. It can not be pressed in service for determining per se the liability for negligence within the domain of criminal law. Res ipsa loquitur has, if at all, a limited application in trial on a charge of criminal negligence.

In view of the principles laid down hereinabove and the preceding discussion, we agree with the principles of law laid down in Dr. Suresh Gupta's case (2004) 6 SCC 422 and re-affirm the same. Ex abundanti cautela, we clarify that what we are affirming are the legal principles laid down and the law as stated in Dr. Suresh Gupta'case.We may not be understood as having expressed any opinion on the question whether on the facts of that case the accused could or could not have been held guilty of criminal negligence as that question is not before us. We also approve of the passage from Errors, Medicine and the Law by Alan Merry and Alexander McCall Smith which has been cited with approval in Dr. Suresh Gupta's case(noted vide para 27 0f the report).

GUIDELINES

Re: Prosecuting medical professionals

As we have noticed hereinabove that the case of doctors (surgeons and physicians) being subjected to criminal prosecution are on an increase. Sometime such prosecutions are filed by private complaints and sometimes by police on an FIR being lodged and cognizance taken. The investigating officer and the private complaint can not always supposed to have knowledge of medical science so as to determine whether the act of the medical professional amounts to rash or negligent act within the domain of criminal law under Section 304-A of IPC. The criminal process once initiated subjects the medical professional to serious embarrassment and sometimes harassment. He has to seek bail to escape arrest, which may or may not be granted to him. At the end he may be exonerated by acquittal or discharge but the loss he has suffered in his reputation cannot be compensated by any standards.

We may not understood as holding that the

doctor can never be prosecuted for an offence of which rashness or negligence is an essential component. All that we are doing is to emphasize the need for care and caution in the interest of society; for, the service which the medical profession renders to human beings is probably the noblest of all, and hence there is a need for protecting the doctors from frivolous or unjust prosecutions. Many a complaint prefers recourse to criminal process as a tool for pressuring the medical professional for extracting uncalled for or unjust compensation. Such malicious proceedings have to be guarded against Statuary Rules or Executive Instructions incorporating certain guidelines need to be framed and issued by the Government of India and / or State Governments in consultation with the Medical Council of India. So long as it is not done we propose to lay certain guidelines for the future which should govern the prosecution of doctors for offences of which criminal rashness or criminal negligence is an ingredient. A private complaint may not be entertained unless the complainant has produced prima facie evidence before the Court in the form of a credible opinion given by another competent doctor to support the charge of rashness or negligence on the part of accused doctor. The investigating officer, before proceeding against the doctor accused of rash or negligent act or omission, obtain an independent and competent medical opinion preferably from a doctor in government service qualified in that branch of medical practice who can normally be expected to give an impartial and unbiased opinion applying Bolam's test to the facts collected in the investigation. A doctor accused of rashness or negligence, may not be arrested in a routine manner (simply because a charge has been leveled against him). Unless his arrest is necessary for furthering the investigation or for collection evidence or unless the investigation officer feels satisfied that the doctor proceeded against would not make himself available to face the prosecution unless arrested, the arrest may be withheld.

Case at Hand

Reverting back to the facts of the case before us, we are satisfied that all the averments made in the complaint, even if held to be proved,donot make out a case of criminal rashness or negligence on the part of accused appellant. It is not the case of complainant that the accused appellant was not a doctor qualified to treat the patient whom he agreed to treat. It is a cause of non-availability of oxygen cylinder either because of the hospital having failed to keep available a gas cylinder or because of the gas cylinder being found empty. Then, probably the hospital may be liable in civil law (or may not be - we express no opinion thereon) but the accused appellant can not be proceeded against under Section 304-A of IPC on the parameters of Bolam's test.

RESULT

The appeals are allowed. The prosecution of the accused appellant under Section 304-A / 34 IPC is quashed.

All the interlocutory applications be treated as disposed of.

New Delhi: August 5, 2005.

DISCUSSION

Section 304-A IPC reads as "Causing death by negligence - Whoever causes the death of any person by doing any rash or negligent act not amounting to culpable homicide shall be punished with imprisonment of either description for a term which may extend to two years, or with fine, or with both [3].

Negligence can not be described in a dictionary form. In a particular situation a particular act, which is short of being described as a reasonable act, in that particular circumstance may be called a negligent act (Bolam Test). Negligence is the genus of which rashness is the species. Medical negligence is a complicated subject and the liability of doctor will always depend upon the circumstances of the particular case. The injury to the reputation of a member of the medical or dental profession resulting from the finding of negligence can be very serious indeed and this is appreciated by the Courts [4]. In the case of Roe and Wooley v. The Ministry of Health and an anesthetist, which went to the Court of Appeal, it was held that neither the anesthetist nor any other member of the hospital staff had been guilty of negligence and when delivering his judgment Lord Justice Denning said "It is so easy to be wise after the event and to

condemn as negligence that which was only a misadventure. We ought always to be on our guard against it, especially in cases against hospitals and doctors. Medical Science has conferred great benefits on mankind but these benefits are attended by unavoidable risks. Every surgical operation is attended by risks. We cannot take the benefits without taking the risks. Doctors, like the rest of us, have to learn by experience; and experience often teaches in a hard way [5]. In the case of Hunter v. Hanley, Lord President Clyde made the following observation: "The true test for establishing negligence in diagnosis or treatment on the part of the doctor is whether he has been proved to be guilty of such failure as no doctor of ordinary skill would have been guilty of, if acting with reasonable care" and this is concise and succinct definition of medical negligence [6]. In certain circumstances negligence may amount to a criminal offence and this goes beyond a mere matter of compensation. It involves an utter disregard to the life and safety of others and the conduct deserving of punishment; consequently, the degree of negligence is a material factor. The distinction between civil and criminal negligence was clearly drawn by Lord Hewart in the case of R.v. Bateman [7] The medical practice problem in America where the doctors are covered by commercial insurance, has become so acute that in1970 the President of the United States set up a special commission to consider the problem in all its aspects. Although doctors in Britain are only seldom charged with criminal negligence, the number of civil actions against doctors based upon an allegation of negligence has increased considerably during the past three decades. Throughout the civilsed world the public has become more and more compensation-minded and in recent years there has been a steady rise in the number of all classes of claims in which damages are sought for personal injuries whether they are sustained in road accidents, at work place or otherwise. The burden of proof in an action for negligence rests with the plaintiff and it follows thereafter that in medical practice it is for the patient or his relatives to establish his claim and not for the medical practitioner to prove that he acted with due skill and care. In certain types of cases the Court will accept that the nature of the occurrence complained of is that as to relieve the plaintiff from establishing that the nature of the occurrence complained of is such that as to relieve the plaintiff from establishing that there was negligence and to place on the defendant the burden of proving the absence of negligence. In such cases the legal maxim res ipsa loquitur applies. The British Courts are, however, somewhat reluctant to apply this doctrine in cases of alleged negligence in medical cases.

The Two Judges High Court Bench decision in Dr. Suresh Gupta Vs. Govt. of NCT of Delhi and Anr.(2004)6 scale 432 in Paragraph 12 & 19 reads as follows- the legal decision is almost firmly established that where a patient dies due to negligent medical treatment of the doctor, the doctor can be made liable in civil law for paying compensation and damages in tort and the same time, if the degree of negligence so gross and his act was reckless as to endanger the life of the patient, he would also be made criminally liable to offence under Section 304-A IPC. "Thus a doctor can not be held criminally responsible for patient's death unless his negligence or incompetence showed such disregard for life and safety of his patient as to amount to a crime against the State".

In the case of Dr.Jacob Mathew Vs. State of Punjab & Anr. The Hon'ble Court in Punjab opined against the judgment in Dr. Suresh Gupta Vs. Govt. of NCT of Delhi. Their contention was different. They questioned the adjective "gross" and opined that negligence is negligence and the doctor should not be treated on a different pedestal. All negligent acts causing death should be treated are par.

Section 304-A IPC was a sword hanging on the doctors working both in Govt. Hospital as well as private sector. Since long, this has been made a malady and the doctors were practicing defensive medicine so much so that even proper treatment / surgical procedures were being held back with the fear of untoward results because of which doctors could be sued for no fault of theirs. The Supreme Court of India has given a historic judgment describing the concept of negligence, in particular professional negligence and as to when and how it can call for an action under the criminal law. In the case of Dr. Suresh Gupta, the Hon'ble Judges had clarified that for ordinary negligence the doctors could not be held criminally responsible deserving criminal prosecution. It was only gross negligence

and recklessness where the doctors could be criminally held responsible. In this context, it is to be understood that Section 304-A IPC does not refer to the adjective "gross" in connection with negligence. This is why the Punjab High Court, in the case of Dr. Jacob Mathew Vs. State of Punjab &Anr. argued that the doctors could not be considered on different pedestal as for as 304-A is concerned. It is Punjab High Court which wanted a clarification on the word "negligence" in the case of doctors. This is how a Three Judge Bench in the Supreme Court was constituted and it deliberated on the issue for three days. This historic judgment has clearly defined the role of professionals, namely doctors and their involvement and liability towards Section 304-A IPC. In nutshell, the principle in Dr. Gupta's case was affirmed by the Supreme Court. This judgment practically absolves the medical professionals of the liability of Section 304-A. In case of Dr. Suresh Gupta, the court categorically held-"for this act of negligence he may be liable in tort, his carelessness or want of due attention and skill can not be described to be so RECKLESS OR GROSSLY NEGLIGENT as to make him criminally negligent"

Now from the above statement of the Hon'ble Judges, this is amply clear that Section 304-A IPC both can be made applicable to the doctors theoretically but the doctors can feel secure in doing usual medical practice without any fear or apprehension of being victimized on trivial grounds. The Supreme Court had gone through the details of the problems of the medical professionals due to the application of this Section on them. This historic decision will no longer distort the Doctor-Patient relationship and will benefit the patients in the long run. This will also free the doctors from undue anxiety in the conduct of their profession. While expectations from the professionals must be realistic and the expected standards attainable, this implies recognition of the nature of ordinary human error and human limitations in the performance of the complex tasks. In medical science the results are not constant and are subject to variation. Sometimes when the outcome is negative the doctors are blamed for no fault of theirs. The level of competence of the doctors should be maintained by continuous medical education. Incompetence, whether due to lack of knowledge or due to quackery should be actively discouraged by the regulating bodies, government and the medical associations. The decision will not only provide relief to the doctors, who had been considered as soft targets by the law enforcing agencies and stop their harassment by unsatisfied patients but would also increase the quality of service in emergency cases, which the doctors were fearing to attend because of the prevailing atmosphere of being charged by the relatives of the patient or mob and further by the police under section 304 and 304-A IPC. The centre and state governments while framing necessary guidelines for proving negligence against a doctor on a complaint, should include at least three government doctors in the board of doctors with two members of the board of same specialty i.e. of the doctor against whom the complaint has been lodged and one specialist of forensic medicine keeping in view the legal implications of the complaint.

Contrary to the appreciation of the judgment by representatives of various bodies of medical professionls, some organizations working for consumers' rights have expressed their views the other way on the judgment. According to Pushpa Girimaji, consumer rights activist, getting other doctors to come forward against peers won't be easy. This may make the process long-drawn and thus discourage even people with genuine grievances from coming forward. Another consumer activist, Joseph Pookkat commented that from the point of view of the consumers, this entire charade of getting another doctor to support the charges of negligence, does not work out. This peer adjudication never comes out strongly. And Dr. Kunal Saha President, People for Better Treatment said that the judgment has laid down the guidelines in order to, deal with negligent and delinquent doctors. Doctors are misinterpreting it and there is no reason for them to be so happy about.[8]

SUMMARY AND CONCLUSIONS

1.Concept of negligence is different in civil and criminal law.

2. Doctors and medical practice have to be treated differently.

3. The alleged negligence should be of gross nature to attract criminal liability.

4. Many a complaint prefer recourse to criminal

process as a tool for pressuring doctor for extracting unjust compensation.

5. A private complaint may not be entertained unless the complainant produces prima facie evidence.

6. The service done by doctor is the noblest of all. They have to be protected.

7. The loss of reputation suffered by a doctor can not be compensated by any standards.

8. A doctor should not be arrested in a routine manner.

9. Guidelines have been prescribed by apex court.

10. Statutory rules need to be framed by the Government of India and State governments in consultation with Medical Council of India.

References

1. Aggarwal V. IMA News, Vol. XXXVII, No. 4, June-July 2005 ; p.1
2. Mishra SN. IMA News, Vol. XXXVII, No. 4, June-July 2005 ; 2-6
3. Malik S. Criminal Manual : Indian Penal Code, 1860 ; p.78
4. Mant A. Keith. Taylor's Principles and practice of Medical Jurisprudence. 13th Edition; p. 39
5. Roe and Wooley v. The Ministry of Health and others (1954) 2 Q.B. 6, W.L.R.128; on appeal (1954) 2 All E.R. 131
6. Hunter v. Hanley
7. R.v. Bateman (1925) L.J. (K.B.) 792; T.L.R. 557;19 Cr. App. R8;94 L.J.X. 791
8. Times of India, August 7, 2005: Doctors welcome SC verdict.

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LIPOMA OF HEART - A RARE NEOPLASM SEEN ON AUTOPSY

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ABSTRACT

The most frequent primary tumour of the heart is myxoma, followed by lipoma, rhabdomyoma, haemangioma and lymphangioma. Primary tumors of the heart constitute 0.4% of autopsy specimens. We report a case of 40 years male who died suddenly and his heart was received in Pathology Department for examination. In the left ventricular wall, a well circumscribed yellowish mass was seen which on microscopy proved to be a lipoma.

Keywords: Lipoma, heart.

INTRODUCTION

Primary tumours of the heart are quite rare and constitute 0.4% of autopsy specimens. Lipomas account for approximately 10% of all neoplasms of the heart and represent 14% of the benign cardiac tumours. Symptoms may be nore often the

bendocardially, dium. This case

art of 40 years Department of Patiala to know the cause of sudden death. The deceased had complained of severe chest pain before death.

Fig. 1

Pathological findings

Gross examination - Specimen of heart weighing 380 gms was received which was without auricles and large blood vessels. On dissection, there was seen a well-defined yellowish white area in the wall of left ventricle, near the atrio-ventricular junction, it was 4 cms in diameter (Fig. 1).

Microscopic examination - revealed mature adipose tissue with no cellular atypia. Fine fibrous trabeculae traversing this adipose tissue were also seen. The surrounding muscle fibres were showing degenerative changes because of the compression by the tumour (Fig. 2).

DISCUSSION

Primary tumors of the heart are quite rare. The most frequent primary tumour of the heart is myxoma, followed by lipoma, rhabdomyoma,

Fig. 2

haemangioma and lymphangioma.

Lipomas can occur in subendocardium, subepicardium or within the myocardium. In the case, we are reporting, lipoma was involving the left ventricular myocardium. Srinivas et al (Pubmed) also reported a lipoma of left ventricle in a 36 years old female.

Lipomas of heart are usually asymptomatic or can create ball valve obstruction or produce arrhythmiasS. They are most often located in the left ventricle, right atrium or atrial septum (Robbin's Pathology 2000). In present case it was located in the left ventricular wall.

Recently the ready availability of echocardiography, CT and MRI have allowed easier diagnosis. Therefore, more cases have been reported in literature now a days. To date, 70 cases of lipomas have been described in literature (Bonamini et al 2000).

It can be concluded that large lipoma involving left ventricular wall with consequent disruption of myocardial fibers resulting sudden death of the patient.

References

1. Lynch M, 0Clements SD, Shanewise JS, Chen CC, Martin RP. Right - sided cardiac tumours detected by trans-oesophageal echocardiography and its usefulness in differentiating the benign from the malignant ones. Am Jr Cardiol. 1997 Mar 15; 79(6): 781-4.
2. Mohan H. The Heart In : Mohan H, Mohan P, Mohan T editors. Text book of Pathology. 4th ed. New Delhi: Jaypee Brothers; 2000 p324.
3. Mullen J, Schipper SA, Sett SS et al. Right atrial lipoma. Ann Thorac Surg 1995; 59: 1239-41.
4. Bonamini R, Pinneri F, Cirillo S, Rosettani E, Mangiardi L. A large false aneurysm of the Rt ventricle within a giant epicardial lipoma. Chest 2000; 117: 601-603.
5. Schoen FJ. The heart. In: Robbins Pathologic basis of disease. 6th ed. Singapore: WB Saunders Co; 2000 p 590.

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2. Mukherji JB. Forensic Medicine and Toxicology. 1st Ed. Calcutta: Academic Publishers; 1981. p.72.
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