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From Editor's Desk

JIAFM

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

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

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

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

I assure you about the quality of research papers and quality of printing in future issues. Your valuable suggestions are always encouraging me and I heartily welcome for future suggestions.

Professor [Dr.] Mukesh Yadav
Editor, JIAFM

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Editorial

SC on Eve-Teasing: Human Rights of Woman in India

How may “Nirbhya”, “Damini” and / or “Gudiya” we want to sacrifice before become sensitive to fundamental human rights of women given in Indian Constitution under Article 14, 15, and 21?

Very rapidly ever increasing statics of crime against women as per the official statics of National Crime Record Bureau of India may be called man-made disaster. It may be early manifestation of female feticide and not realisation of sex as natural desire and deterioration of moral values in the society.

How much our policy makers are serious on the issue for concern for every citizen, evident from the fact that recently on 3rd September 2012 Bill has been passed without any debate? No sincere effort has been made from any corner of India, including academia and intellectuals who are supposed to guide the next generation and protect the interest of the society in larger public interest in this largest democracy called India. To some extent Indian education system held responsible for such a scenario on flagrant violation of human rights of women.

Eve-Teasing is a euphemism, a conduct which attracts penal action but it is seen, only in one State, a Statute has been enacted, that is State of Tamil Nadu to contain the same, the consequence of which may at times drastic. Eve-teasing led to the death of a woman in the year 1998 in the State of Tamil Nadu which led the Government bringing an ordinance, namely, the Tamil Nadu Prohibition of Eve-Teasing Ordinance, 1998, which later became an Act, namely, the Tamil Nadu Prohibition of Eve-Teasing Act, 1998 [‘the Eve-Teasing Act’]. [Para 2]

Statement of Objects and Reasons of the Eve-Teasing Act:

The Statement of Objects and Reasons of the Eve-Teasing Act reads as follows:

“Eve-teasing in public places has been a perennial problem. Recently, incidents of eve-teasing leading to serious injuries to, and even death of a woman have come to the notice of the Government. The Government are of the view that eve-teasing is a menace to society as a whole and has to be eradicated. With this in view, the Government decided to prohibit eve-teasing in the State of Tamil Nadu.

Accordingly, the Tamil Nadu Prohibition of Eve-teasing Ordinance, 1998 (Tamil Nadu Ordinance No. 4 of 1998) was promulgated by the Governor and the same was published in the Tamil Nadu Government Gazette Extraordinary, dated the 30th July, 1998. [Para 3] The Bill seeks to replace the said Ordinance.”

Issue of Public Importance: Evil of Eve-Teasing no Uniformity of Law in India:

Supreme Court dealing with a case of ‘eve-teasing’ added about scenario, places and on legal aspect in the following words: “We may, in the facts and circumstances of this case, wish to add some aspects which are also of considerable public importance. We notice that there is no uniform law in this country to curb eve-teasing effectively in or within the precinct of educational institutions, places of worship, bus stands, metro-stations, railway stations, cinema theatres, parks, beaches, places of festival, public service vehicles or any other similar place. [Para 26]

Consequences of not curbing such a menace: Violation of Fundamental human Rights:

Eve-teasing generally occurs in public places which, with a little effort, can be effectively curbed. Consequences of not curbing such a menace, needless to say, at times become disastrous. There are many instances where girls of young age are being harassed, which sometimes may lead to serious psychological problems and even committing suicide. Every citizen in this country has right to live with dignity and honour which is a fundamental right guaranteed under **Article 21 of the Constitution of India. Sexual harassment like eve-teasing of women amounts to violation of rights guaranteed under Articles 14, 15 as well.** [Para 26]

Complaint registered under sections 294 / 509 IPC:

SC observed that we notice in the absence of effective legislation to contain eve-teasing, normally, complaints are registered under Section 294 or Section 509 IPC. [Para 26]

Section 294 IPC:

Section 294 says that “Whoever, to the annoyance of others: (a) does any obscene act in any public place, or (b) sings, recites or utters any obscene song; ballad or words, in or near any public place, shall be punished with imprisonment of either description for a term which may extend to three months, or with fine, or with both”. [Para 27]

Scope and Explanation: Burden of Proof:

It is for the prosecution to prove that the accused committed any obscene act or the accused sang, recited or uttered any obscene song; ballad or words and this was done in or near a public place, it was of obscene nature and that it had caused annoyance to others. Normally, it is very difficult to establish those facts and, seldom, complaints are being filed and criminal cases will take years and years and often people get away with no punishment and filing complaint and to undergo a criminal trial itself is an agony for the complainant, over and above, the extreme physical or mental agony already suffered. [Para 28]

Section 509 IPC:

Section 509 IPC says, "Whoever intending to insult the modesty of any woman, utters any word, makes any sound or gesture, or exhibits any object, intending, that such word or sound shall be heard, or that such gesture or object shall be seen, by such woman, or intrudes upon the privacy of such woman, shall be punished with simple imprisonment for a term which may extend to one year, or with fine or with both". [Para 29]

Burden of Proof:

The burden is on the prosecution to prove that the accused had uttered the words or made the sound or gesture and that such word, sound or gesture was intended by the accused to be heard or seen by some woman. [Para 30]

Normally, it is difficult to establish this and, seldom, woman files complaints and often the wrong doers are left unpunished even if complaint is filed since there is no effective mechanism to monitor and follow up such acts. **The necessity of a proper legislation to curb eve-teasing is of extreme importance, even the Tamil Nadu Legislation has no teeth.** [Para 30]

Types of Eve-Teasing:

Eve-teasing today has become pernicious, horrid and disgusting practice. The Indian Journal of Criminology and Criminalistics (January- June 1995 Edn.) has categorized eve teasing into five heads viz.:

- (1) Verbal eve teasing;
- (2) Physical eve teasing;
- (3) Psychological harassment;
- (4) Sexual harassment; and
- (5) Harassment through some objects.

Guidelines on Sexual Harassments:

In *Vishaka and Others v. State of Rajasthan*; (1977) 6 SCC 241, the Supreme Court has laid down certain guidelines on sexual harassments.

In *Rupan Deol Bajaj and Another v. K.P.S. Gill*; (1995) 6 SCC 194, the Supreme Court has explained the meaning of 'modesty' in relation to women. More and more girl students, women etc. go to educational institutions, work places etc. and their protection is of extreme importance to a civilized and cultured society. The experiences of women and girl children in over-crowded buses, metros, trains etc. are horrendous and a painful ordeal. [Para 31]

The Parliament is currently considering the Protection of Woman against Sexual Harassment at Workplace Bill, 2010, which is intended to protect female workers in most workplaces. **Provisions of that Bill are not sufficient to curb eve-teasing.** Before undertaking suitable legislation to curb eve-teasing, it is necessary to take at least some urgent measures so that it can be curtailed to some extent. In public interest, we are therefore inclined to give the following directions:

- 1) All the State Governments and Union Territories are directed to depute plain clothed female police officers in the precincts of bus-stands and stops, railway stations, metro stations, cinema theatres, shopping malls, parks, beaches, public service vehicles, places of worship etc. so as to monitor and supervise incidents of eve-teasing.
- 2) There will be a further direction to the State Government and Union Territories to install CCTV in strategic positions which itself would be a deterrent and if detected, the offender could be caught.
- 3) Persons in-charge of the educational institutions, places of worship, cinema theatres, railway stations, bus-stands have to take steps as they deem fit to prevent eve-teasing, within their precincts and, on a complaint being made, they must pass on the information to the nearest police station or the Women's Help Centre.
- 4) Where any incident of eve-teasing is committed in a public service vehicle either by the passengers or the persons in charge of the vehicle, the crew of such vehicle shall, on a complaint made by

the aggrieved person, take such vehicle to the nearest police station and give information to the police. Failure to do so should lead to cancellation of the permit to ply.

- 5) State Governments and Union Territories are directed to establish Women' Helpline in various cities and towns, so as to curb eve-teasing within three months.
- 6) Suitable boards cautioning such act of eve-teasing be exhibited in all public places including precincts of educational institutions, bus stands, railway stations, cinema theatres, parks, beaches, public service vehicles, places of worship etc.
- 7) Responsibility is also on the passers-by and on noticing such incident, they should also report the same to the nearest police station or to Women Helpline to save the victims from such crimes.
- 8) The State Governments and Union Territories of India would take adequate and effective measures by issuing suitable instructions to the concerned authorities including the District Collectors and the District Superintendent of Police so as to take effective and proper measures to curb such incidents of eve-teasing. [Para 32]

Summary and Conclusions:

We can only hope that these guidelines may be implemented in letter and spirit and may not see the fate of guidelines framed in Vishaka Judgment of 1997. If we will not become conscious to demands of society for protection of their creator mother we all have to pay the price for it.

Dr.Mukesh Yadav
Editor, JIAFM

Excerpts from Presidential Address XXXIV Annual National Conference of I. A. F. M. Mangalore (Karnataka)

It is a matter of great Pride, Privilege and Pleasure for me while addressing my dear Life members as a newly elected President of Indian Academy of Forensic Medicine. With a history of over 42 years of existence the Organisation has grown step by step to the Present stage of over 1000 member strong fraternity. Our Faculty Stalwarts like Dr. I. Bhooshan Rao, Dr. C. Ram Mohan, Dr. C. A. Franklin, Dr. Heeresh Choudra, Dr. Jagdish Chandra, Dr. V. B. Sahai, Dr (Late). Indrajeet Ray, Dr. B. V. Subhramanian, Dr. V. L. Deshpande, Dr.S. K. Roy Choudhary, Dr. Vasudha Apte, Dr. A. C. Mohanty and many more have contributed significantly to the growth, development and reputation of our Organisation. This is one part of the story.



The other part is a different situation. In spite of being an important and integral stake holder in the process of Crime investigation and Administration of Justice, the subject is greatly ignored and this is something which bothers me most. The Medical Council of India has reduced the faculty requirement. The matter of Curriculum and examination pattern is yet to be decided. There is no Uniformity in the standard Operative Protocols of Medico Legal work. The issue of Post Mortem Allowance is not taken up by many States. Few States have provided for this but the amount paid is not appropriate. There is no Unitary Control system in Medico Legal work. The setup is divided between Health, Home, Medical Education and Municipal administration Departments. The issue of faculty strength to cope up with the workload and safety of the faculty still remains unanswered. Modernisation of infrastructure still awaits nod of the Government. The funds for modernisation hardly reach to us. The Forensic Science bill has failed to bother for our genuine concerns.

Crime is a Social disease and it is detrimental to the individual, society and Country at large in terms of Health, Life and Loss of Productive human resource. The Medico Legal Expert plays an important role in the process of Crime Investigation and Administration of Justice. The conviction of criminal creates deterrence in minds of budding criminals in the Society and helps in the process Prevention of crime and also its eradication. This role, reputation and Sanctity of Medico Legal Expertise is not at all inferior to the role and reputation clinicians. So a time has come to Project this role and reputation of our Subject in front of concerned Government Agencies & Society as well.

Hence an in depth Analysis of Problems, Planned Strategy to acquire Autonomous Professional Status and Safety, Increasing teaching faculty requirement, Finalisation of adequate curriculum & Examination pattern, Modernisation of Infrastructure, Serious Membership drive and Strengthening the Corpus of Association will be my top Priority and off course our Agenda. I & **General Secretary Dr. C. B. Jani**, assure you on behalf of the Executive Council that we will try our level best in this regard.

With the guidance and help of my seniors like Dr. B.P. Dube, Dr. D. S. Badkur, Dr. B. D. Gupta, Dr. Shaik Khaja, Dr.G. Pradeepkumar, Dr. V. B Sahai, Dr. R. S. Prasad, Dr. Dalbir Singh, Dr. Sampath Kumar, Dr. Mahato and others, I am sure that I and my team will certainly perform to your expectations.

I am sincerely thankful to you all for electing me as President, giving me the best Team to work productively and bestowing all the trust which will give the Council great encouragement & strength in achieving the ultimate Goal of our Association in this decade heading to Golden jubilee.

Long Live IAFM!

With warm regards
Dr Sudhir Nanandkar
President, I.A.F.M.

Original Research Paper

Histopathological Study of Carotid Trauma In Strangulation Deaths

*Vinay Kumar M.S.

Abstract

In this modern era, even with advancement of technology, development of sophisticated weapons, deaths due to compression of neck by the application of ligature is still in vogue. Very often Forensic expert faces the challenge to differentiate between the cause of death due to the application of ligature material around neck or other forces such as manual compression. So it becomes very much essential to examine the structures of the neck both grossly and microscopically. The present study was conducted at Osmania General Hospital Mortuary from Nov 2008 to October 2010. Neck structures were dissected; carotid arteries were collected from both sides preserved in 10% formalin and was subjected to histopathological examination. Even though many cases were reported, selective identification of cases was done by the presence of in situ ligature material, presence of photographs at the crime scene and a total of 51 cases were studied. Majority of cases belonged to 3rd decade, with male preponderance. Hanging was more common compared to ligature and manual strangulation. Cloth was the preferred ligature material with the application of slip knot. Per vascular haemorrhages was most common finding followed by intimal haemorrhages. Bilateral effection was more common.

Key Words: Strangulation, Ligature Material, Type and position of knot, Histopathological changes

Introduction:

Deaths by ligation of Neck are in practice from the time immemorial and before advent of civilization. In uncivilized societies, the application of ligation for taking away the life of another person was one of the commonest practices which were successfully carried out into civilized societies. Earliest it was a homicidal method as suicide was considered as a heinous act. Moreover, the impression was ligation leads to wind pipe constriction for which manual violence is needed. But with progress of civilization, ligation has been adopted for self application also. For Forensic expert, cases of hanging by ligature are a common encounter.

The characteristic finding of ligature, its mark around the neck both in cases of ligature, strangulation and hanging will create a doubt in many cases regarding nature of application. The difficulty increases manifold when one has to differentiate ligature mark of suicidal hanging from ligature strangulation when associated with bodily injuries on both occasions.

Hanging is one of the commonest modes of deaths among suicidal cases and ligature strangulation and throttling are not uncommon among homicidal cases. Virtually all hanging cases are suicidal and ligature strangulation and throttling, homicidal in nature until unless proved otherwise. Accidental hanging and throttling are very rare. Homicidal hanging and suicidal throttling are uncommon. On many occasions, Forensic expert faces a challenge to come to a conclusion regarding cause of death i.e., whether it is a case of hanging, ligature strangulation or throttling.

The problem is more pronounced especially in the absence of external ligature mark in hanging, ligature strangulation cases and absence of external injuries in throttling cases. Furthermore, the ligature mark which is considered as a principle external sign in case of hanging and ligature strangulation is a post mortem phenomenon. So, it is very much necessary to examine the inner structures of neck both grossly and microscopically to come to a conclusion as they are not produced artificially in almost all the cases.

Materials and Methods:

The study was conducted at Osmania General Hospital, during the period November 2008 to October 2010. For the study I have selected 51 cases personally attended autopsy, dissected the neck structures, collected the

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segments of carotid vessels from both sides of neck below the ligature mark and subjected them to Histopathology with the help of Department of Pathology, Osmania General Hospital, Hyderabad. Even though a number of hanging cases were reported to the mortuary during my study period, but selective identification of cases have been made where the dead bodies are brought with in situ ligature material and photographs at the crime scene.

Observation & Result:

The maximum incidence in my study is from 3rd decade of life followed by first and fourth decade respectively. Only in six (6) cases, the age of deceased is more than 40 years. (Table 1) Even though it is not an analytical study the incidence of the present study follows the general trend of unnatural deaths with maximum incidence in the third decade of life where vulnerability is more from stress and strain of the life and ills of three W's – wine, women and wealth play their role.

There is preponderance of male sex to female sex. Though the vascular pathology is not influenced by sex, but the associated factors of death will definitely have some bearing on sex which in turn is reflective in vascular column. Out of 51 cases, the mode of strangulation is from Hanging in 47 cases, Ligature in 3 cases and Throttling in one case. (Table 1) As the present study is undertaken to differentiate ante-mortem hanging from post-mortem hanging, more number of deaths from hanging was selected and allegation of post-mortem strangulation by ligature or throttling virtually never arise.

Cloth is the most preferred ligature material, followed by rope. The nature and consistency of ligature material is one of the major direct contributing factors of carotid trauma underneath the ligature marks. (Table 1)

Present study shows that 25% of cases of strangulation deaths from hanging or ligature are showing positive findings of carotid trauma. In ligature strangulation of the 3 cases selected for this study, 2 cases showed positive results, whereas the single known case of throttling, the result is negative. (Table 2)

The traumatized carotids of the ligature strangulation clearly establish the direct effect of trauma, exerted in carotid. In our study carotid artery damage is positive in 1/4th of cases where slip knot is applied for ligature and in 1/3rd of cases where a fixed knot is used for hanging. In case of ligature strangulation, the damage is positive in 2/3rds of cases. (Table 3) Carotid damage is positive approximating in 5% of

cases where the knot is on right side, in 40% of cases where the knot is on left side and 50% of cases where the knot is over the back neck.

Surprisingly, no carotid damage was observed where knot is below the chin. In 50% of cases of hanging the carotid damage is of bilateral type, irrespective of position of knot. (Table 4) In our observations carotid damage is positive in 13% of cases where softies like cloth is used as ligature material whereas the percentage ranges from 50–100% cases knot is like rope or wire is used as ligature material. (Table 5)

The most common histopathological change observed in our study is perivascular and lymph node changes followed by intimal haemorrhages whereas medial splits is the least common change. (Table 6)

Discussion and Conclusion:

In the present study, the carotid arteries both in positive and negative cases have not shown any appreciable gross pathological findings like Intimal Tears or perivascular Haemorrhage or contusions. The pathological changes that the vessels have undergone exhibited through microscopic study only. Hence, the vascular changes are not a table side finding at the time of Autopsy unlike other tissue changes exhibited at the time of actual examination of the body.

The usual microscopic findings of carotid arteries and perivascular tissues in positive cases can be grouped under four headings,

- 1) Intimal Haemorrhages,
- 2) Subintimal Haemorrhages,
- 3) Medial splits with loosening of fibers and collection of interstitial fluid,
- 4) Adventitia fibro fatty tissue damage, perivascular sinusoidal haemorrhages of lymphatic tissue.

Both direct and indirect trauma in the form of crushing and traction force respectively can produce these changes in the vessels but subintimal haemorrhage and perivascular changes appears to be more due to direct trauma, whereas intimal haemorrhages and medial splitting are the result of traction forces.

This is evident from study of ligature strangulation cases which showed only sub intimal haemorrhages and perivascular haemorrhages which are the effects of direct trauma only. The traction changes like intimal haemorrhages or medial splits are absent. In partial hangings the compressive force is not enough to get carotids damaged, moreover, the neck is subjected for traction forces for most

time due to slow, and stretching of neck, the elasticity of vessels may overcome this slow stretching. Hence in partial hanging the positive findings are minimal or absent and if present are limited to perivascular tissue. As complete hanging is an ideal case for compression and traction forces the possibility of finding all the above changes in the vessels is more.

Tether to the commonest findings are intimal and perivascular haemorrhages when all the cases of strangulation are taken into account, perivascular haemorrhages are the commonest finding followed by intimal haemorrhages. The medial splitting is the rarest finding as the stretching in turn traction is overcome by the elasticity. In ligature strangulation the changes are bi-lateral as both the carotid arteries are subjected to equal force, whereas in hanging cases they are unilateral or bi-lateral as both the carotids are not subjected to equal forces.

With regard to type of strangulation, the carotid damage may occur in all types where neck is subjected to compressive force by a ligature but the possibility of damage is more than 50% in partial hanging and ligature strangulation whereas it is less than 25% in complete hanging. The ante-mortem duration of force and the amount of force are the two main factors for this variation. The partial hanging is considered as slow asphyxial death compared to complete hanging. In the same way the amount of force is more in ligature strangulation compared to complete hanging, this in addition to time subjection which is more when the victim offers resistance.

The consistency of the ligature material is also one of the factors in the outcome of the carotid trauma. Even though the traction forces are independent of ligature material, crushing or compression forces have a direct relationship with the hardness and width of the ligature material. Greater the hardness of ligature material more is the transfer of energy which in turn results in more tissue damage. It is vice-versa with the width of the ligature material. This is corroborated by present study where rope and wire constituted $\frac{1}{4}$ of the cases with positive carotid damage of 50% of total cases.

With regard to symmetrical distribution bilateral carotid damage is more or less a common feature but not always compulsory whenever it is present in strangulation cases. In ligature strangulation, bilateral carotid damage is a dictum, as the pulling force is applied through the midline either below chin or occiput.

In hanging cases even or uneven distribution of carotid trauma is seen. Even in

these cases the possibility of bilateral carotid damage is twice that of unilateral damage.

The type of the knot has no bearing in carotid artery trauma but the position of the knot has its effect on the symmetrical distribution. With the fixed knot the unilateral effect is more common. In fixed knot the side of the neck in touch with the knot escapes from the compressive forces of the ligature material and unequal stretching of the neck is more, whereas in slip knot tightening of the noose is seen around the neck and equal stretching of the neck is common below the level of ligature mark. Hence the traction strain plays a major role when the knot is fixed one, whereas compression strain comes into play when a slip knot is used.

The position of the knot exerts clear influence in carotid artery trauma. Positive carotid damage is seen when the position of the knot is anywhere on the neck except below the chin. Due to unequal anterior posterior dimensions of the length of the neck which is more anteriorly, the knot on the front side of the neck produces minimal stretching compare to knot below occiput.

Hence a negative carotid damage is the order with a subsymphyseal mental knot. The associated traumatic injury of cervical adnexa should have direct relationship with carotid damage. Because of the presence of associated injuries is a direct marker for the increased force over the neck, but in practice this is not the feature as carotid is subjected to dual type of forces.

Conclusions:

1. Carotid trauma is a feature where neck is subjected to violence by a ligature.
2. A possibility of incidence of carotid trauma is 50% in ligature strangulation where as 25% in hanging.
3. Carotid trauma is a result of both direct and indirect trauma.
4. In ligature strangulation direct traumatic features are more common, where as in hanging indirect traumatic forces are more from stretching forces.
5. In positive carotid trauma bilateral carotid effect is more common.
6. The most common histopathological finding is perivascular haemorrhages followed by traumatic intimal hemorrhage.
7. The carotid trauma is influenced by the nature of ligature material and is more common when hard ligature materials are used.

8. Histopathological study of carotid trauma is the best option to differentiate ante-mortem from postmortem hanging, as negative histopathological picture of ligature mark cannot exclude ante-mortem hanging.

Suggestions:

1. In controversial cases of hanging carotid vessels study should be made mandatory.
2. Sample should be collected directly from the areas subjected to compression.
3. Sample collection should be bilateral.
4. As vascular changes are affected lately compared to other soft tissues by putrefaction carotid study can be useful in advanced stages of decomposition.

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Table 2: Carotid Artery Damage V/s Type of Strangulation

Type of Strangulation	Carotid Artery damage (H.P)	
	Present (%)	Absent (%)
Partial hanging (2)	1(50)	1 (50%)
Complete Hanging (45)	10(22.2)	35 (77.7%)
Ligature strangulation (3)	2(66.6)	1 (33.3%)
Throttling(1)	--	1 (100%)
Total 51	13(25.4)	38 (74.6%)

Table 3: Type of Knot V/s Carotid Artery Damage

Type of Knot	Carotid Artery Damage	
	Present	Absent
Fixed (7)	3(42.8%)	4 (57.2%)
Slip (40)	8 (20%)	32 (80%)
Ligature strangulation (3)	2 (66.6%)	1 (33.3%)
Absent (1)	0(0%)	1 (100%)
Total 51	13(25.4%)	38 (74.6%)

Table 1: Socio-demographic Profile of Study Sample

Age Group. (yrs.)	NO. (%)
10-20	11(21.5)
21-30	23(45)
31-40	11(21.5)
>40	6(12)
SEX	
Male	34(66.66)
Female	17(33.33)
Type of Strangulation	
Partial Hanging	2(3.9)
Complete Hanging	45(88)
Ligature Strangulation	3(5.8)
Throttling	1(2)
Type of Ligature	
Cloth	38(74.5)
Rope	10(19.6)
Wire	1(2)
Others	0(0)
Type of Knot	
Fixed	7(22)
Slip	40(78)

Table 4: Position of Knot V/s Carotid Artery Damage

Position of knot	Carotid Artery Damage			
	Present			Absent
	Right	Left	Bilateral	
Right (19)	-	-	1 (5.2%)	18 (94.8%)
Left (21)	2(9.5%)	2(9.5%)	5(23.8%)	12 (57.2%)
Front (6)	-	-	-	6 (100%)
Back (2)	-	-	1 (50%)	1 (50%)
Not known (3)	-	-	2(66.6%)	1 (33.3%)
Total 51	13 (25.4%)			38 (74.6%)

Table 5: Carotid Artery Damage V/s Type of Ligature Material

Type of Ligature Material	Carotid Artery Damage	
	Present	Absent
Cloth (38)	5 (13.1%)	33 (86.9%)
Rope (10)	6 (60%)	4 (40%)
Wire (1)	1 (100%)	0 (0%)
Not known (1)	1 (100%)	0 (0%)
No ligature (1)	0 (0%)	1 (100%)
Total (n=51)	13 (25.4%)	38 (74.6%)

**Table 6
Type of Strangulation V/s Histopathological Change**

Type of Strangulation	Histopathological Change			
	Intimal Haemorrhages	Subintimal Edema	Medial Changes	Perivascular and Lymph Node Changes
Partial Hanging	-	-	-	1 (B/L)
Complete Hanging	8(4 U/L, 4 B/L)	2(B/L)	2(B/L)	7(4 U/L, 3 B/L)
Ligature Strangulation	-	1(B/L)	-	2(B/L)
Throttling	-	-	-	-
Total	8(4 U/L, 4 B/L)	3 (B/L)	2 (B/L)	10(4 U/L, 6 B/L)

Original Research Paper

Patterns of Cranio-intracranial injuries In Fatal Head Injury Cases

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Abstract

It is a prospective study of 50 fatal head injury cases whose medico legal autopsy was done in the Institute of Forensic Medicine, at the Madras Medical College and Government General Hospital, Chennai from December 2007 to June 2008. In the present study males victims (47 cases, 96%) outnumbered females victims (3 cases, 6%) with an approximate male female ratio of 16:1. Road traffic accidents (RTA) involving mainly pedestrians and two wheeler users were the most common cause for fatal head injury seen in 43 cases, 86%. Out of the total 50 cases of fatal head injury, brain stem injury was seen in 41 cases, 82%. Skull bone fracture was seen in 26 cases, 52%. Temporal and parietal bones were common site of fracture seen in 17 cases, 34%. The mean survival period was 73.42 hours, range being 6 hours to 600 hours.

Key Words: Head injury, Primary brain stem injury, Secondary brain stem injury, Road Traffic Accident

Introduction:

Cranio-cerebral injuries (also known as head injuries), one of the most important regional injuries, were known to human beings since time immemorial. [1] In the modern era also they are increasingly encountered worldwide day by day. Not only in developing countries like India but also in the developed Western countries, fatal head injuries are becoming the most common cause of death from trauma. It has a huge medical, social and economical bearing of the country as it involves especially younger age group population.

The present study was conducted in the Institute of Forensic Medicine of Madras Medical College, Chennai, Tamil Nadu. It is one of the largest and oldest medical colleges in India and it caters wide area of the most congested traffic area of the Chennai city. Because of heavy traffic congestion, the speed is limited and in majority of the incidents the anatomy of head is comparatively preserved though it is fatally damaged. Our main aim of the present study is to analyze this important regional injury in details and compare our findings with the previous studies.

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Material and Method:

The present study was conducted in the Institute of Forensic Medicine, at the Madras Medical College and Government General Hospital, Chennai from December 2007 to June 2008. We examined fifty cases of fatal Head injury that admitted and died in the hospital. Other brought dead cases of fatal head injury were excluded from the present study because we wanted to include CT Scan findings.

After reflecting the scalp tissues, the vault of the skull and meninges were dissected to expose the brain by following the routine autopsy techniques. Detail information such as post mortem number, name, age, sex, date and time of injury, mode of injury, site of impact and other relevant data were noted. Other relevant information was also collected from the hospital records, police papers and relatives. These data were tabulated for easy study and comparison with the previous available studies.

Observation:

In our study the ages ranged from 4–87 years (the mean age being 53.5 yrs). There was only one case below 10 years of age. (Table 1)

Road Traffic Accidents (RTA) is the single most common cause of fatal head injury, 43 cases (86%). (Table 2) Out of 41 cases that had brainstem injury, 38 patients were males (92.68%). Only 3 female patients had brainstem injury and among these, 2 cases had secondary brainstem injury and one patient had primary brainstem injury. (Table 3) In present study Fatal

head injury was more common with lateral i.e. side to side force, 36 cases. (Table 4)

Out of the 50 cases we observed skull bone fracture in 26 cases. Only in one case, 2% there was fracture of occipital bone. (Table 5)

Discussion:

In the present study males victims (94%) outnumbered females victims (6%) with an approximate male female ratio of 16:1. Similar findings were reported by various researchers. [2-6] It is attributed to the fact that males are more exposed to the outer world than females. Male preponderance was observed in all age groups, most common affected age range being 21 to 50 years which consistent with the works of other authors. [4, 6-9].

RTA emerged as the single most common cause for fatal head injury, 43 cases (86%). Most of the victims were two wheelers or pedestrians in the age group of 20 plus to 50 years. In this respect our findings were consistent with the works of others. [3, 4, 6, 10] However, in the western countries the majority of people injured in road traffic accidents are car occupants. [11-13] In most of the circumstances the manner of head injury was accidental in nature, 49 cases, 98% and there was 1 case, 2% of assault. In this study, those patients who had head injury due to fall (5 cases, 10%), the majority of the incidents occurred at the construction site. Two young patients were injured due to fall from the first floor (20 feet height) while playing.

Out of the total 50 cases of fatal head injury, brain stem injury was seen in 41 cases, 82%. In the present study 87.5% of primary brainstem injury and 84% of secondary brainstem injury were due to RTA. Similar finding was also observed in other studies. [5, 14] Gross hemorrhagic lesions were seen in 19 cases of which 6 were primary brainstem injury and 13 were secondary brainstem injury.

Hemorrhagic contusions were seen in midbrain in 6 cases, pons in 12 cases and medulla in one case. In those 6 cases of primary brainstem injuries, hemorrhagic lesions were seen in dorsal and dorsolateral aspect of midbrain and dorsal aspect of upper pons. In those 13 cases of secondary brainstem injuries, hemorrhagic lesions were found in the midline and paramedian aspect of tegmentum of the midbrain and the pons. Present findings agreed more or less with the works of Ella FT. [15]

In majority of cases the direction of force was lateral i.e. side to side, 36 cases (72%). In this study those cases who had lateral impact also sustained secondary brainstem injury due

to associated supratentorial traumatic mass lesions with the midline shift. The second most common direction of force was from front to back direction, 11 cases (22%).

Skull bone fracture was seen in 26 cases, 52%. Temporal and parietal bones were common site of fracture seen in 17 cases, 34%. More or less similar observation was also reported by others. [16-18] In the skull base fracture, the involvement of the middle cranial fossa was the maximum and similar observation was also reported by other authors. [14, 19, 20] In these 11 cases of primary brainstem injury that had skull fracture, 4 cases had skull base fracture, 2 cases had frontal bone fracture, 3 cases had temporal bone fracture, one patient had parietal bone fracture and one patient had occipital bone fracture.

In those 15 cases of secondary brainstem injury, 6 cases had parietal bone fracture, 7 cases had temporal bone fracture, one patient had skull base fracture and one patient had frontal bone fracture. Skull base fracture was seen more with the primary brainstem injury and the temporo-parietal skull fractures were seen more with secondary brainstem injury in this study. We did not find any literature regarding this brain stem injury relationship with skull bone fracture except this present study.

The mean survival of the patients was 73.42 hours (range 6 hours to 600 hours). The mean survival of primary brainstem injury was 41.55 hours and the mean survival of secondary brainstem injury was 103.2 hours. Primary brainstem injury was associated with shorter survival in this study which is consistent with the findings of other authors. [5, 21, 22]

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Table 2: According to Mode of Injury

Mode of Injury	Total	%
RTA	43	86
Fall from height	06	12
Assault	01	2
Total	50	100

Table 1: According to Age & Sex

Age in Years	Male	Female	Total	%
0-10	-	1	1	2
11-20	5	-	5	10
21-30	6	-	6	12
31-40	9	-	9	18
41-50	11	2	13	26
51-60	9	-	9	18
61-70	4	-	4	8
71-80	1	-	1	2
Above 80	2	-	2	4
Total	47	3	50	100

Table 3: According to Brain Stem Hematoma

Site	Primary Brain Stem Injury	Secondary Brain Stem Injury	Total	%
Midbrain	02	02	4	8
Pons	05	07	12	24
Medulla	01	02	3	6

Table 4: According to Direction of Impact

Direction of Impact	Cases	%
Antero posterior	11	22
Lateral	36	72
Vertex	1	2
Unknown	2	4
Total	50	100

Table 5: According to Skull Bone Fracture

Bone Involved	Cases	%
Frontal	03	6
Parietal	07	14
Temporal	10	20
Occipital	01	2
Base	05	10
No fracture	24	48
Total	50	100

Original Research Paper

Biometric Finger Print Identification Is It a Reliable Tool or Not?

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Abstract

Compared to a visual comparison of signatures or photo ID's, biometric identification is more accurate and less time consuming. This has resulted in application of biometric identification in diverse field from preparation of nationwide databases to daily attendance taking of employees of governmental and non governmental institutions. The present study is based of employee database registering attendance through biometric means. An important conclusion of the study is that biometric identification is not infallible and is prone to non correctable errors. Wearing down of fingerprint pattern was found to be a major source of errors in registering biometric fingerprint attendance. In agrarian rural economies like India where hard manual labour may be the only means of subsistence for a large population, this inaccuracy can be a source of avoidable problem for poor and hardworking people. This becomes especially significant when biometric identification based "Adhaar" cards are made a prerequisite for getting wages from government sponsored schemes developed for benefit of poor unemployed strata of Indian population. Databases developed by such methods are prone to limitations which have to be thoughtfully corrected before the system is fully institutionalized.

Key Words: Biometric identification, Databases, Rural Economies, Adhaar cards

Introduction:

"Biometric identification" is a general term for technologies that permit matches between a "live" digital image of a part of the body and a previously recorded image of the same part, usually indexed to personal or financial information. [1] Biometric identifiers include digital fingerprints, retinal scans, hand geometry, facial characteristics, and vocal patterns. Biometric scanning systems typically do not record the entire imprint of a physical feature but only that portion, or "template" that should be time-invariant within some statistical limit. Since the body changes over time, the statistical algorithm must be elastic enough to match a stored image with a later live scan from the same person, without normally matching two similar individuals.

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This creates limitations on the uniqueness of the images, which are overcome by using multiple images from one person, or a biometric image plus other information.

In some applications identities can be verified within a population of millions. Compared to a visual comparison of signatures or photo ID's, biometric identification is less fallible and potentially much faster. This has prompted the use of biometrics for noncriminal governmental and commercial applications. [2]

Material and Methods:

The study was undertaken on the employees and students of a University undergoing biometric verification for purpose of attendance. A total of 3250 staff and non staff members of this University campus were taking biometric identification for daily attendances were analyzed for this study. 1250 people belonged to teaching staff (38.46%), 1400 were from non-teaching category (43.07%) and 600 belonged to intern/house physician/post graduate student group (18.46%). (Table 1)

Out of 3250 subjects 25 (0.769%) had problems registering their attendance. These 25 subjects were divided into three categories namely Elderly >60 years age; Manual labourers; Females. Careful examination of fingerprints was done using high power magnifying glass as aid.

The biometric capture device model A 10 is an optical image capture solid state charge coupled device with piezoelectric ultrasonic transducer mechanism for live scan capture. (Fig.1, 2)

Observations and Results:

It was observed that out of total 3250 employees 25 people had problems registering their attendance through biometric means (0.769%). Out of these 25 people two belonged to elderly staff category (> 60 years) (8%); 19 were manual workers belonging to various departments like plumbing, landscaping, sanitation, engineering etc.(76%); 4 were females who belonged to teaching staff and were also doing various household chores (16%). (Table 3)

In majority of cases the most probable cause for non registering of attendance by biometric machines was loss of finger print pattern by wear and tear (80%), age (8%), physical injuries to fingers (8%), poor body built with anemia (4%). (Table 4) As is evident excessive use of digits over prolonged time intervals results in wearing down of finger print pattern and is clearly seen on close examination of fingers. Age also plays a role due to loss of elasticity of skin. Physical injuries damaging deeper dermis also cause error in biometric readings. Among the 4 females studied two had worn out fingerprint ridge pattern; one had an old healed injury on finger and in one case none of the above mentioned causes could be found to cause error in biometric attendance.

This case was of a young, 30years female who was poorly built with hemoglobin score of 8.9 gm% only. As per history this lady was unable to register her attendance especially on cold morning days in winters. The most probable cause may be due to non registering of capillary circulatory parameters of hands essential for "live scan" biometric identification.

Discussion:

There is difference in fingerprint image quality across age groups, although most pronounced deterioration is found in > 60 age group. Error rate in biometric identification significantly increases with increase in age group. Aging results in loss of collagen; compared to younger skin, aging skin is loose and dry. (Fig.4) Decreased skin firmness directly affects the quality of fingerprints acquired by sensors. Body shows numerous age related changes overtime, therefore a statistical algorithm must be developed that should have enough pliability to match a stored image with a later live scan from the same person, without

normally matching two similar individuals. [3, 4]This results in creating limitations on exclusivity of images, which may be overcome by using multiple images from one person, or biometric image plus other information.

Compared to a visual comparison of signatures or photo ID's, biometric identification is less fallible and potentially much faster. This has prompted the use of biometrics for noncriminal governmental and commercial applications. Manual work has never been good for the hands, but now it seems it could get a person in trouble with authorities.

Labourers and builders could find their fingerprints are not recognized by new high-tech equipment, an internal report for the government has reportedly warned. They are not alone; typists, pianists, violinists and guitarists also face inaccurate readings. The problem is that fingerprints can be severely worn down, particularly among people who work with abrasive materials. (Fig. 3)

"The ridges that make up fingerprints are like a ploughed field," says fingerprint expert Raymond Broadstock. "Work such as labouring and typing wears down those ridges and affects the smoothness of the skin. It can make fingerprints very hard to read. Certain vitamin deficiencies can also do the same."

The damage is not permanent as the skin rejuvenates within days. But for those who work in such professions there is little chance for their fingers to get a long enough rest for the ridges to rebuild. "Prisoners have been known to rub their hands against the rough walls of prison cells to try and wear away the ridges," says Mr. Broadstock. Government's trials are said to have suggested that worn away fingerprints along with problems with face and iris scans could identify one in 1,000 people as someone else. [5] Criminals have a long history of tampering with their finger prints.

Famous criminals like John Dillinger have used corrosives like acids to obliterate fingerprints. Other methods involving use of specific materials to cause finger print erosion have been in practice since long time. [6, 7] Coventry and Johnson were of opinion that individuals problem with biometric system e.g.; wearing down of ridge pattern in fingerprints accounts for errors that are difficult to solve. [8]

The UIDAI's Biometric Standards Committee headed by Director General NIC (National Informatics Centre), published a report in December 2009 and advised that a biometric system based only on fingerprint might present challenges in India due to a large number of people engaged in manual labour and urged the

UIDAI to consider the use of Iris in addition to fingerprints in order to improve inclusiveness and accuracy of the system. [9]

The Unique Identification Authority of India (UIDAI) conducted a Proof-of-Concept (PoC) study of biometric enrolment from March 2010 to June 2010 in the predominantly rural areas of Andhra Pradesh, Karnataka, and Bihar. One of the objectives of the study was to measure the biometric quality that could be achieved in rural Indian conditions. The study that involved 135,000 biometric enrolments found out that Older people took longer (20% longer enrollment time) to enroll than younger people, and enrollees whose employment involved manual work took longer to enroll than the rest of the PoC population. [10]

In January 2012 UIDAI published a report on the biometric technology of the UID project for the purposes of UID enrollment. It goes into the proof of concept studies conducted in India, analysis of the study results, design decisions on biometric modes necessary in the Indian context, implementation of client and server side systems for enrollment and finally concludes with the accuracy and performance achieved by the UID biometric system using 8.4 crore real enrolments.

This report also concludes with the finding that those involved in physical labour having more wear on their fingerprints took more capture time than other groups e.g.; agricultural labourers took about one third longer to register their compared with public/private sector employees and other white collar workers. [11]

One of the conclusions that the Parliament's Standing Committee on Finance (SCoF), which examined the National Identification Authority of India Bill, 2010 came to was that the full or near full coverage of marginalized sections for issuing Aadhaar numbers could not be achieved as the estimated failure of biometrics is expected to be as high as 15% due to a large chunk of population being dependent on manual labour. [12, 13]

Conclusion:

Biometric technology as means of reliable identification has certain lacunae's. This is especially significant in countries like India where a large part of population lives in a rural environment with agriculture and hard physical labour as means of subsistence. This kind of environment leads to certain physical limitations that can result in uncorrectable errors in biometric identification systems. In Indian system therefore excessive reliability on such systems needs to be re-evaluated and possible

corrections should be made in technology to address these problems.

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Fig. 1: Biometric Attendance in Hospital



Fig. 2: Biometric Fingerprint Capture Device



Fig. 3: Worn Out Fingerprint due to Manual Labour



Fig. 4A: Damaged finger prints due to age related or injury related events unsuitable for biometric identification



Fig. 4B



Table 2: Grouped Sample Size

S.N.	Category	Number	(%)
1.	Teaching staff	1250	38.46
2.	Non teaching staff	1400	43.07
3.	Master roll students interns/ house physicians/postgraduates	600	18.46
	Total	3250	100

Table 3: Categories having problems with Biometric Attendance

S.N.	Category	Number	(%)
1.	Elderly Staff > 60 Years	2	8
2.	Manual Labourers	19	76
3.	Females	4	16
	Total	25	100

Table 4: Main Reasons for non-registering of Attendance by Biometric devices

S.N.	Category	Number	(%)
1.	Wear and tear	20	80
2.	Age	2	8
3.	Physical injuries to fingers	2	8
4.	Poor body built with anemia	1	4
	Total	25	100

Table 1
Total Sample Size of Study

Teaching Staff	Non Teaching Staff	Master roll Students Undergraduate/Postgraduate	Total
1250	1400	600	3250

Original Research Paper

Study of Epiphyseal Union around the Wrist Joint & Extended Hand in Males of Himalayan Area

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Abstract

Estimation of age of a living person is of utmost importance in connection with medico-legal cases to help both civil & criminal court to solve problems connected with determination of age of the subject & administration of justice in such critical situations. Epiphyseal union of wrist joint & extended hand was studied retrospectively on 100 males between the age group of 15 – 19 years to determine the age roentographically. To study the age estimation of people from this area we go through a standard reference chart prepared separately for the people living in such altitude & climatic condition as well as different life style & dietary habits. Result of study was also compared to Galstaun & different other studies conducted in different parts of India. Regression formula with the standard errors was derived. The present study establishes a reference population for age determination of males from epiphyseal union of wrist joint in Northern Hilly Region.

Key Words: Roentographic, Age determination, Epiphyseal union, Regression formula

Introduction:

In our country genuine records of date of birth are not available in most of the cases. Thus the correct estimation of age of a living person is of utmost importance in connection with medico-legal cases to help both civil & criminal court to solve problems connected with determination of age of the subject & administration of justice in such critical situations.

Questions of juvenility are often a question that has to be answered correctly in connection with criminals of younger age group. Attainment of majority to achieve full civil & property rights and responsibilities, of action, right to make a valid will etc often need a strong base on the estimation of one's correct age. In cases where biological study of maturity of a child has to be performed to access the development of a child, estimation of age is of paramount importance. Age determination is essential to establish the identity of a person at the time of admission in school/college/ institute, sports meet, employment & marriage.

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Age can be established by roentgenography of skeleton from the time of its appearance about the 20 week of gestation until early adulthood with considerable accuracy. As we all know that earliest centers of ossification appear at the end of 2nd month of pregnancy.

At the 11th intra-uterine week there are 806 centers of bone growth which is reduced to 450 centres at birth & ultimately an adult has a total of 206 bones. The epiphyseal union during age periods is remarkably constant for particular epiphyses. [2] Estimation of skeletal age from radiographs is a matter of everyday occurrence in every part of the world. The present study has been carried out retrospectively to explore the pattern of epiphyseal union in the bones of wrist joint & extended hand in growing population of Northern hilly region.

Materials & Methods:

100 male subjects of 15-19 year age group referred to our department by Sports Authority of India, Namchi, Sikkim with valid birth certificates were X rayed at the wrist joint with extended hand. Study period was from March 2011 to June 2011. (Total duration: 3 months).

All the subjects in our study belonged to Himalayan areas where environmental temperature is 4 -18 °C in winter & 15 -25° C in summer. Even their lifestyle is different from people living in plain areas. A complete history of past & present illnesses was taken & general physical examination was done meticulously to assess any disease or deformity which may affect the epiphyseal union. Dietary &

economical parameters were also noted. X ray of wrist joint was taken in AP view.

Staging of the Degree of Fusion:

Stage I: NO UNION. Complete gap or space between the epiphyses & shaft of the bone.

Stage II: PARTIAL UNION. Partial closure of gap or space

Stage III: RECENT UNION. Closure of the gap or space but a thin line visible at the epiphyseo – diaphyseal junction

Stage IV: COMPLETE UNION. Epiphyseal space is bony in architecture and indistinguishable from either epiphyses or diaphyses.

Result & Observation:

1. Fusion of Distal End of Radius with the Shaft:

At 15 years: 80 % of the cases showed stage I whereas the rest 20 % belonged to stage II of union. At 16 years more than half of the cases belonged to stage II & about one –third of the cases showed stage I whereas only 9.1% of cases showed stage III of fusion.

At 17 years About two- third of the cases showed stage II whereas 23.1% & 11.5% of cases showed stage III & stage IV of union respectively. At 18 years half of the cases belonged to stage III & 41.7% showed stage IV whereas only minor cases showed stage II of fusion. At 19 years 100% of cases showed stage IV of union. (Table 1)

2. Fusion of Distal End of Ulna with the Shaft:

At 15 years 90% of the cases showed stage I union, whereas the rest 10% belonged to stage II of union. At 16 years Slight more than half of the cases belonged to stage II & somewhat less than half of the cases showed stage I of fusion. At 17 years 61.5% of the cases showed stage II whereas 26.9% of cases showed stage III & a minor contributed to stage I & IV of union. At 18 years: More than 60 % of the cases belonged to stage III & about one – fifth of the cases showed stage IV whereas 16.7% of cases showed stage II of fusion. At 19 years: Out of the total 8 cases, all showed stage IV of union except one. (Table 2)

3. Fusion of Base of First Metacarpal:

At 15 years 75 % of the cases showed stage I, 20 % belonged to stage II of union & only one case out of the total 20 belonged to stage III of union. At 16 years More than half of the cases belonged to stage II & about one third of the cases showed stage I whereas only 13.6 % of cases showed stage III of fusion. At 17 years slightly less than half of the cases showed stage II, slightly less than one third of cases

showed stage III & slightly less than one fourth of cases showed stage IV of union. At 18 years more than half of the cases belonged to stage IV & 41.7% showed stage III whereas only one case out of the total 24 cases showed stage II of fusion. At 19 years 100% of cases showed stage IV of union. (Table 3)

Discussion:

1. Fusion of the Distal End of Radius with the Shaft:

Galstaun G [1] from his study on Bengalese males opined that the complete union occurred at 16 years which is about 1-2 years earlier with the results of this study. Apurba Nandy [6] recorded the latest time of fusion as 15 -16 years which are at least 2 years earlier than this study. As per Sharma [2], the age of fusion is 18-19 years in U.P. males which are about one year later than this study. Bajaj [3] recorded the age of fusion to be 16.4 years in Delhi males which is slightly comparable to the present study. Hepworth [4] opined that the age of fusion in Punjabi males is 16 -17 years which are on an average one year earlier than the present study. (Table 4)

2. Fusion of Distal End of Ulna with the Shaft:

Galstaun G [1] & Apurba Nandy [6] from his study on Bengalese males opined that the complete union occurred at 18 years which is somewhat comparable to the present study. As per Sharma,[2] the age of fusion is 18- 19 years in U.P. males which are consistent with the result of this study. Mishra [5] recorded the age of fusion in Orissa males to be 17-18 years which is on an average one year earlier than the present study. Hepworth [4] opined that the age of fusion in Punjabi males at 16-17 years which is on an average 2 year earlier than the present study. (Table 5)

3. Fusion of base of first Metacarpal:

Galstaun G [1] from his study on Bengalese males opined that the complete union occurred at 16 -18 years which is slightly comparable to the result of the present study. Apurba Nandy [6] recorded the latest time of fusion as 15 -17 years which are at least 2 years earlier than this study. Mishra [5] recorded the age of fusion in Orissa males to be 17 years which is somewhat comparable to the result of present study.

Regression Equation:

The regression equation for 15-19 years age group at the wrist joint to predict ages with given degrees of union is where Y is the dependent variable (age) & X is an independent

variable (degree of union). (Table 7) Data analysis is done by SPSS 12 version software.

Standard Errors:

The standard errors of wrist joint are shown in the table below which corresponds to the different regression equations. (Table 8)

Table 7: Regression Equation

Epiphyseal Union	Regression Equation
Lower end of Radius	$Y = 14.467 + 0.972(X)$
Lower end of Ulna	$Y = 14.502 + 1.026(X)$
Base of First Metacarpal	$Y = 14.467 + 0.911(X)$

Table 8: Standard Errors

Epiphyseal Union	Standard of Error
Lower end of Radius	.064
Lower end of Ulna	.066
Base of First Metacarpal	.065

Conclusion:

At the wrist joint the distal end of radius united with the shaft in the age group of 17–18 yrs. Distal end of ulna unites with the shaft in the age group 18–19 yrs & base of the first metacarpal united with the shaft in the age group 17–18 yrs. There is no appreciable difference in

the age of complete union of the epiphyses on both right & left side of the body.

At the wrist joint the complete union of epiphyses is seen at the age of 19 years. All the epiphyseal fusion takes place at least one year later on as compared to Galstaun & different other studies conducted in different parts of India. To study the age estimation of people from this area we go through a standard reference chart prepared separately for the people living in such altitude & climatic condition as well as different life style & dietary habits.

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Table 1
Fusion of Distal End of Radius with the Shaft

Age (years)	Total Cases	Stage I	Stage II	Stage III	Stage IV
15 years	20	16 (80%)	4 (20%)	0	0
16 years	22	8 (36.4%)	12 (54.5%)	2 (9.1%)	0
17 years	26	0	17 (65.4%)	6 (23.1%)	3 (11.5%)
18 years	24	0	2 (8.33%)	12 (50%)	10 (41.7%)
19 years	8	0	0	0	8 (100%)

Table 2
Fusion of Distal End of Ulna with the Shaft

Age (years)	Total Cases	Stage I	Stage II	Stage III	Stage IV
15 years	20	18 (90%)	2 (10%)	0	0
16 years	22	10 (45.5%)	12 (54.5%)	0	0
17 years	26	1 (3.8%)	16 (61.5%)	7 (26.9%)	2 (7.7%)
18 years	24	0	4 (16.7%)	15 (62.5%)	5 (20.8%)
19 years	8	0	0	1 (12.5%)	7 (87.5%)

Table 3
Fusion of Base of First Metacarpal

Age (years)	Total Cases	Stage I	Stage II	Stage III	Stage IV
15 years	20	15 (75%)	4 (20%)	1 (5%)	0
16 years	22	7 (31.8%)	12 (54.5%)	3 (13.6%)	0
17 years	26	0	12 (46.2%)	8 (30.8%)	6 (23%)
18 years	24	0	1 (4.2%)	10 (41.7%)	13 (54.2%)
19 years	8	0	0	0	8 (100%)

Table 4
Fusion at Distal End of Radius as observed in the Present Work & Reported by others

Males	Galstaun (1937) West Bengal	A. Nandi (1995) West Bengal	Sharma (1962) UP	Bajaj et al (1967) Delhi	Hepworth (1927) Punjabi	Present Work (2011) Himalayan
Age (years)	16	15 – 16	18 – 19	16.4	16 – 17	17 – 18

Table 5
Fusion at Distal End of Ulna as observed in the Present Work & Reported by others

Males	Galstaun (1937) West Bengal	A. Nandi (1995) West Bengal	Sharma (1962) UP	Mishra (1966) Orissa	Hepworth (1927) Punjabi	Present Work (2011) Himalayan
Age (years)	18	18	18 – 19	17 – 18	16 – 17	18 – 19

Table 6
Fusion at Base of First Metacarpal as observed in the Present Work & Reported by others

Males	Galstaun (1937) West Bengal	A. Nandi (1995) West Bengal	Gupta (1961) Uttar Pradesh	Mishra (1966) Orissa	Present Work (2011) Himalayan
Age (years)	16 – 18	15 – 17	16 – 17	17	17 – 18

Original Research Paper

Pattern of Ocular Trauma in Tertiary Care Hospital of Kumaon Region, Uttarakhand

*Govind Singh Titiyal, **Chandra Prakash, *** Swati Gupta, ***Vijay Joshi

Abstract

Ocular trauma is an important public health hazard. The objective of the study was to determine the pattern of ocular trauma among patients presenting in Dr. Sushila Tiwari Government Hospital, Haldwani. One year retrospective review of records of 165 patients with ocular trauma seen from 1st Feb 2011 to 31st Jan 2012 was done using a structured format. Association between variables were checked by Chi square test and significance was considered when $p < 0.05$. Ocular trauma accounted for 165(1.03%) of the 15,970 ocular patients seen at OPD and Emergency. Of the studied 165 cases, 93 patients were below 30 years of age. M: F ratio was 10:1. 21(12.7%) patients presented to hospital within 2-7 days of injury. Duration of presentation has significant association with the presence of infection & other complication ($p < 0.05$). The cause of injury were road traffic accidents, sports playing & recreational activities and occupational in 54(32.7%), 42(25.5%) and 33(20%) respectively. Closed globe injuries accounted for 54(32.7%) and open globe for 75(45.4%) and adenexal injuries constituted 36(21.8%). Delay in presentation was associated with complications.

Key Words: Ocular Trauma, Blindness, Open globe injury, Close globe injury

Introduction:

Trauma to the eye and its surrounding structures remains a leading cause of visual morbidity and blindness. Many ocular traumas are an avoidable cause of blindness and visual impairment. [1] Worldwide there are approximately 6 million people blind from eye injuries, 2.3 million bilaterally visually impaired and 19 million with unilateral visual loss; these facts make ocular trauma the most common cause of unilateral blindness. [2] The age distribution for the occurrences of serious ocular trauma is bimodal with the maximum incidence in young adults and a second peak in elderly. [3, 4] Even though, ocular trauma has been described as a neglected issue [5], it was highlighted as a major cause of visual morbidity more recently. According to estimates by WHO, about 55 million eye injuries restricting activities for more than one day occur each year, 750,000 cases requiring hospitalization which includes 200,000 open globe injuries. [4]

Worldwide the typical male to female ratio is 4:1 [6-8] and Open globe injury is said to be more common. [10-13] Recognition of the public health importance of ocular trauma has sparked growing interest in studies on eye injuries. [15] Ocular injuries can assume unusual social and economic importance involving a huge cost in human unhappiness, economic inefficiency and monetary loss.

However, no studies had been carried out on patterns of ocular trauma in the study area. So, in view of public health importance, this study will provide information on magnitude and pattern of ocular injuries at Dr. Susheela Tiwari Government Hospital, Haldwani, Uttarakhand. It will serve as the basis for designing and implementing preventive measures to be undertaken by respective authorities.

Methods and Materials:

A one year retrospective study was conducted on patients of ocular trauma in Department of Ophthalmology, Dr. Susheela Tiwari Government Hospital, Haldwani, Uttarakhand from 1st Feb 2011 to 31st Jan 2012. Ocular trauma accounted for 165(1.03%) of the 15,970 ocular patients seen at OPD and emergency in the aforementioned one year period. Every patient was selected for the study. Data were collected from the clinical records using a structured data collection format. It was edited, cleaned, checked for completeness and

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cross checked for accuracy to ensure quality and was analyzed using SPSS for Windows version 16.0. Associations between variables were checked by Chi-Square test and significance was considered when $p < 0.05$. The patients' records were kept confidential.

Operational definitions were according to World Health Organization (WHO) and Birmingham Eye Trauma Terminology System (BETTS). [6]

Blindness: Visual acuity $< 3/60$

Eye Wall: Cornea and Sclera

Closed Globe Injury: No full thickness wound of the eye wall

- Contusions: no full thickness wound, direct energy delivery (e.g. choroidal rupture) or due to change in shape of the globe (e.g. angle recession)
- Lamellar laceration: partial thickness wound of the eye wall

Open Globe Injury: full thickness wound of the eye wall

- Laceration: full thickness wound at the impact site of a sharp object by outside- in mechanism
- Penetrating: entrance wound only
- Perforating: entrance plus exit wound
- Intra- ocular foreign body: technically a penetrating injury, but grouped separately because of different clinical implications
- Rupture: Full thickness wound by blunt object by inside out mechanism due to increased intraocular pressure
- Adenexal injuries: Eyelid and/or conjunctiva injuries

Results:

It was found that the ocular trauma accounted for 165 patients (1.03%) of the 15,970 ocular patients seen at OPD and Emergency in the time period from 1st Feb. 2011 to 31st Jan 2012. Of the studied 165 cases, 93 (56.5%) patients were below 30 years with mean age of 28.8(SD± 17.1) years. Male to female ratio was 10:1. (Table 1)

In our study 123 (74.5%) presented within 2 days, 21(12.7%) presented in 2-7 days while 21(12.7%) after 7 days of injury. 30 patients who presented after 2 days of injury were associated with complications with significant association($p=0.001$). Right eye was involved in 72(43.6%) patients, left eye was involved in 84(50.9%) patients. 9 patients had bilateral injury. Among the causes of injury, road traffic accidents accounted for maximum number of cases, i.e., 54(32.7%), followed by sports, playing and recreational activities which accounted for 42(25.5%) patients and

occupation related 33(20%) and others like domestic accidents, violence related were other identified causes. (Table 2)

Regarding the material of injury the commonest material accounting for trauma was wooden stick in 27 (16.7%) patients, followed by stone in 18(10.9 %), followed by finger nail trauma, fall from height and playing with ball in 6 cases each. Other miscellaneous mode of injury included fire cracker injury, injury with hot oil, blunt trauma, iron rod.

Open globe injuries were found to be more common accounting for 75(45.5%) patients than closed globe injuries which accounted for 54(31.9%) patients. Adenexal injuries were present in 36(21.8%) patients. Complications such as traumatic cataract, endophthalmitis, hyphaema, raised intraocular pressure, hypopyon were present in 72(43.6%) patients. Out of these, only 30(32.2%) patients presented within 24 hours. Presence of complications was found to have significant association with the duration of presentation (p value = 0.001).

Coming to the visual acuity at presentation, 54(32.7%) had visual acuity of 6/6-6/18 while 93(56.5%) patients were blind at presentation i.e., visual acuity $< 3/60$. Visual acuity was NPL in 24(14.5%) cases. Final visual outcome (1 week after treatment) was difficult to analyze as in 21(12.7%) cases, it was not documented and 9 (5.6%) were not cooperative. Out of the remaining 135 cases, 66(40%) cases had visual outcome of 6/6 – 6/18, but 51(30.9%) patients were documented to have a blinding outcome i.e., visual acuity of $< 3/60$, in spite of the best operative procedures and management which could be given to the patients.

Discussion:

The magnitude of ocular trauma was found to be 1.03% out of total ocular patients seen in the outpatient department. This figure is significantly lower as compared to a study done at JUDO, south west Ethiopia [13], where it was found to be 6.9%. It was found in this study that 63.8% patients were below 30 years of age with mean age of 25.5 (SD±15.6) years and male to female ratio of 3.2:1. In our study we found 93 (56.5%) patients were below 30 years with mean age of 28.8(SD± 17.1) years with male to female ratio was 10:1. The explanation for this could be the greater risky, occupation and stimulus to aggressiveness given to males in almost all societies and better access to health services.

In the JUDO study 31.6 % patients presented within 48 hours whereas 28.6% arrived one week or later. [13] According to our study, 123 (74.5%) presented within 2 days,

21(12.7%) presented in 2-7 days while 21(12.7%) after 7 days of injury. Our study did not show significant association between involvements of either eye. Right eye was involved in 72(43.6%) patients, left eye was involved in 84(50.9%) patients. 9 patients had bilateral injury. The slight predominance of the left eye injuries may be explained by the fact that most people are right handed and the left eye of the victim is the one which is more vulnerable to an attack from a right handed person.

Among the causes of injury, road traffic accidents accounted for maximum number of cases, i.e., 54(32.7%), followed by sports, playing and recreational activities which accounted for 42(25.5%) patients and occupation related 33(20%) and others like domestic accidents, violence related were other identified causes. Study of JUDO showed commonest causes of injury were violence related 37.2% of the documented causes. [13]

But commenting on the comparability of these results is difficult as 54.9% of cases were not documented in the study. GC Menelik II hospital study showed assault was the commonest cause accounting for 32.5% cases. [14] Of the documented ones, in the JUDO study, wood is the commonest material accounting 40.9% followed by metal 18.1% and stone 13.3%. [13] Regarding the material of injury the commonest material accounting for trauma was wooden stick in 27 (16.7%) patients, followed by stone, in our study.

In this study open globe injuries were found to be more common accounting for 75(45.5%) patients than closed globe injuries which accounted for 54(31.9%) patients, as according to studies conducted worldwide. Adenexal injuries were present in 36(21.8%) patients. But study at JUDO showed closed globe injuries (45.4%) were encountered more than open globe injuries (22.7%). [13]

Our study showed a significant association between duration of presentation and presence of complication at presentation (Chi square value = 18.2, degree of freedom = 3, p value = 0.001) which may affect the final visual outcome. Final visual outcome (1 week after treatment) was difficult to analyze as in 21(12.7%) cases, it was not documented and 9 (5.6%) were not cooperative. Out of the remaining 135 cases, 66(40%) cases had visual outcome of 6/6 – 6/18, but 51(30.9%) patients were documented to have a blinding outcome i.e., visual acuity of <3/60. Study of JUDO showed 21.1% of the ocular injuries were documented to have a blinding outcome i.e., visual acuity < 3/60. [13]

According to a study conducted in Haryana, males (76.01%) were more frequently affected than females (23.99%). Among non-occupational injuries (61.74%), those occurring due to playing and sports among children were the main etiological factor (33.67%). In occupational injuries (38.26%), those occurring during agricultural activities (19.9%), were most common followed by industrial accidents (12.24%). Cornea was the most affected part of eyeball (47.6%) followed by iris injury (32.64%). [15]

Direct comparison of this study with the data from some of the studies reviewed was difficult in some aspects, due to different classification, definition and methods of reporting used in these studies. However, it is possible to conclude from this study that delay in presentation, has a significant association with presence of complications which may have a detrimental visual outcome.

This study also has shown that road traffic accidents are the commonest causes of ocular injuries followed by recreational activities and occupational accidents. Thus it is recommended preventive measures advocated by health workers to emphasize the importance of early health seeking behaviour and follow up of patients with ocular trauma. Simple safety procedures like wearing seat belts in driving, protective goggles in welding, supervising children while playing, etc. should be advocated using mass media.

It is further recommended that our hospital should design an urgent referral system for emergency care services for ocular trauma patients. It should improve its documentation system by designing a structured and standardized format to be used when clerking, treating and following up of ocular trauma patients which will help in doing more researches on the area which in turn are fundamental in planning its emergency care services.

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Table 1: Age Group and Sex Distribution of Ocular Trauma Patients

Age (yrs)	Male (%)	Female (%)	Total (%)
<5	6(66.7)	3(33.3)	9(5.5)
5-14	18(85.7)	3(14.3)	21(12.7)
15-24	36(100)	0	36(21.8)
25-34	36(92.3)	3(7.7)	39(23.6)
35-44	27(90)	3(10)	30(18.2)
45-54	15(83.3)	3(16.7)	18(10.9)
55-64	3(100)	0	3(1.8)
>=65	9(100)	0	9(5.5)
Total	150(90.9)	15(9.1)	165(100)

Table 2: Cause of injury and sex distribution of ocular trauma Cases

Cause of injury	Male (%)	Female (%)	Total (%)
Violence related	12(8)	0	12(7.3)
Occupation related	30(20)	3(20)	33(20)
Domestic accidents (fall...)	12(8)	3(20)	15(9.1)
Sports, playing, recreational	36(24)	6(40)	42(25.5)
Road traffic accidents	51(34)	3(20)	54(32.7)
Others	9(6)	0	9(5.5)
TOTAL	150(90.9)	15(9.1)	165(100)

Table 4: Association of Duration of Presentation & Presence of Complications

Duration of presentation	Presence of Complications		Total No. (%)
	Yes No. (%)	Not No. (%)	
<24 hrs	30(32.3)	63(67.7)	93(56.4)
24-48 hrs	12(40.0)	18(60)	30(18.2)
>48 hrs – 1wk	15(71.4)	6(28.6)	21(12.7)
>1wk	15(71.4)	6(28.6)	21(12.7)
TOTAL	72(43.6)	93(56.4)	165(100)

**Table 3
Type of Injury and Final Visual Outcome**

Type of injury	Final Visual Outcome, VA					Total No. (%)
	6/6-6/18, (%)	<6/18-3/60, (%)	<3/60 – NPL, (%)	Not documented, (%)	Not cooperative (%)	
CLOSED GLOBE						
Lamellar laceration	6(40)	3(20)	0	3(20)	3(20)	15(9.1)
Contusion	24(61.5)	3(7.7)	3(7.7)	9(23.1)	0	39(23.6)
OPEN GLOBE						
Penetrating	0	12(17.4)	45(65.2)	9(13.1)	3(4.3)	69(41.8)
Perforating	0	0	0	0	0	0
IOFB	3(50)	0	3(50)	0	0	6(3.6)
RUPTURE	0	0	0	0	0	0
ADENEXAL	33(91.7)	0	0	0	3(8.8)	36(21.8)
TOTAL	66(40)	18(10.9)	51(30.9)	21(12.7)	9(5.6)	165(100)

P – value = 0.001

Original Research Paper

A study of Acute Poisoning Cases Excluding Animal Bites at Civil Hospital, Ahmedabad

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Abstract

The present study is a prospective study of poisoning cases (excluding animal bites) brought to the Civil Hospital Ahmedabad, from 1st October 2006 to 30th September 2007. Total 366 cases of acute poisoning were recorded over a period of one year. Of these 70.8% were males and 29.2% female. The majority (45.08%) cases were from age group of 21-30 years. 71.6% cases were from rural area. Commonest type of poison was pesticide in 33.9% cases, followed by household chemicals 26.8%, in 74.6% cases cause of poisoning was intentional. Fatality in pesticide poisoning was 25.8%. Our data supports the other study from India regarding Age and Sex distribution. However, compared to data reported from poison information centre, NIOH, Ahmedabad, Household chemicals were encountered as the 2nd most common cause of poisoning. Of these Acid Ingestion accounted for 55.10% cases of household chemical cases. The prevention and treatment of poisoning due to pesticide and household poisoning should merit high priority and need for identifying unknown substance in the health care of Gujarat population.

Key Words: Poisoning, Pesticide, Household Chemicals, Rural area

Introduction:

The growing incidence of poisoning from accidental, occupational or intentional exposure to chemicals has drawn worldwide attention. While global incidence of poisoning is not known, it is estimated that up to half a million people die each year as a result of poisonings, due to pesticides and natural toxins.

WHO conservatively estimated that though developing countries account for only 15% of the worldwide use of pesticides, about 50% of pesticide poisonings occur in these countries, especially through misuse of chemicals? The exact magnitude of the problem is not known due to inadequate epidemiological data from the Region. However, hospital-based studies and public health surveillance reports clearly indicate increasing incidence and mortality due to chemicals, particularly pesticides. [3, 5]

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A number of hospital-based retrospective studies in India have shown an increasing incidence of pesticide poisoning during the last decade. Organophosphates, aluminium phosphide and rodenticide are most often involved in such poisonings. Plant poisonings, snake envenomation and accidental kerosene poisoning in children are also common. [5]

Pesticides comprise a wide range of compounds including insecticides, herbicides, fungicides and others. Thus, far more than 1,000 active substances have been incorporated in approximately 35,000 preparations of pesticides used in agriculture. Organophosphate compounds (OPCs), are most commonly used among them and are gradually increasing cause of accidental and suicidal poisoning, with high morbidity and mortality rates, especially in developing countries. OPCs may be taken via the oral, respiratory, or trans-dermal routes (Poojara et al., 2003; Bardin et al., 1994). Organo-phosphorus (OP) pesticide self-poisoning is estimated to kill around 200,000 people each year, largely in the Asia-Pacific region and the mortality rate varies from 10-20%. [3, 5]

Clinical and toxicological diagnostic and treatment facilities are often inadequate due to the lack of trained personnel thus requiring strengthening of national capabilities for prevention, diagnosis and treatment. Further,

the lack of information on the ingredients of various products available make it difficult to plan and develop national poison policies and control programmes and to provide timely and reliable source of information to doctors and other medical personnel and first responders on the appropriate treatment. [5, 6]

Material & Method:

The present study is a prospective study of poisoning cases (excluding animal bites) brought to the Emergency Department Civil Hospital Ahmadabad, Gujarat, India from 1st October 2006 to 30th September 2007. Socio-demographic details, Type of Poison, Route of Exposure, Period of hospitalization and outcome were recorded in a pre designed questionnaire.

Observation & Results:

Total 366 cases of acute poisoning were recorded over a period of one year. These did not include snake bites. Of these 70.8% were males and 29.2% female. The majority (45.08%) cases were from age group of 21-30 years. (Table 3) 71.6% cases were from rural area and 28.4% cases from urban area. The most common type of poison was pesticide in 33.9% cases, followed by household chemicals 26.8% cases. (Table 6), in 74.6% cases cause of poisoning was intentional. (Table 2) 81.4% cases recovered fully or partially, whereas case fatality rate was 18.6%. (Graph 1) Fatality in pesticide poisoning was 25.8%. In 23.7% of cases the agent could not be identified. (Table 6).

Discussion:

Our study shows important of patterns of poisoning brought to emergency department in Gujarat state, India. OP Poisoning is common in India, as ours is an agriculturally based society and as the OP compounds are easily available at a cheap rate. Organophosphates are the commonest class of pesticides which have been implicated in cases of poisoning. [1, 2, 4, 5, 9] But our study also shows higher rate in household poisoning which is around 26.8% which is different from other study.

In present study 70.8% were males and 29.2% were females. The majority (45.08%) cases were in the age group of 21-30 years which shows that this age group has more chances to have poisoning casualty as they may be very aggressive, having social, mental, economical stress in their life. [2, 4, 5]

Present study showed that 71.6% cases were from rural area and 28.4% cases from urban area which again shows that farmers are on high risk of poisoning as they may have easy access to pesticide in their surroundings. In our

study 74.6% cases cause of poisoning was intentional, 81.4% cases recovered fully or partially, whereas case fatality rate was 18.6%. Fatality in house hold poisoning (19.38%) was more than pesticide poisoning (17.7%) which is very important result as sometimes emergency physicians consider household chemical as mild compound but we must have to consider proper emergency measures in household poisoning also.

In this study 31.6% of cases the agent could not be identified. So that is really important aspect of poisoning when we are not able to identify the compound. There is need of some advance laboratory support which can identify this type of unknown substance which can help in emergency management of patient.

Conclusion:

Our data supports other studies from India regarding Age and Sex distribution. [6-8,10] However, compared to data reported from Poison information centre, NIOH, Ahmedabad, Household chemicals were encountered as the 2nd most common cause of poisoning. Of these Acid Ingestion accounted for 55.10% cases of household chemical cases. The prevention and treatment of poisoning due to pesticide and household poisoning should merit high priority in the health care of Gujarat population and also in other parts of India. There is also need for identifying unknown substances.

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Table 1: Type of Poison

Poison	Frequency	%
Drugs	56	15.3
Household chemical	98	26.8*
Industrial chemical	11	3.0
Pesticide	124	33.9*
Plant	1	0.3
Unknown	76	20.8
Total	366	100.0

Table 2: Reason for Poisoning

Reason	Frequency	%
Accidental	69	18.9
Criminal	18	4.9
Intentional	273	74.6
Unknown	6	1.6
Total	366	100.0

Table 3: Age group distribution

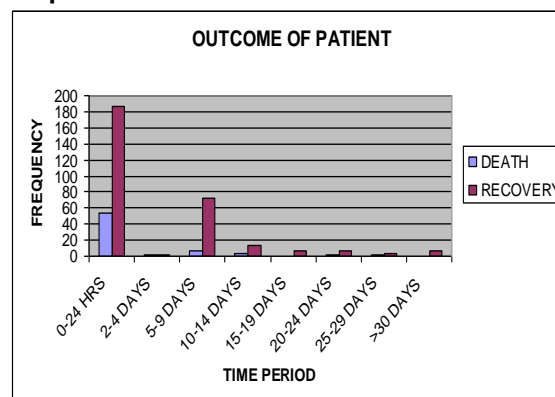
Age group	Number of patients	Percentage
1-10	29	7.92
10-20	71	19.39
21-30	165	45.08*
31-40	68	18.57
>40	33	9.00
Total	366	100.00

Table 5: Treatment given before Hospital Admission

	Frequency	%
At PHC	78	21.3
At private hospital	16	4.4
NO	272	74.3*
Total	366	100.0

Table 4: Present Occupation

Occupation	Frequency	%
Farm laborer	12	3.3
General labour work	12	3.3
Government service	1	.3
Housewife	73	19.9
Unknown	17	4.6
Prisoner	3	.8
Private service	161	44.0*
Student	27	7.4
Unemployed	60	16.4
Total	366	100.0

Graph 1: Outcome of Patients**Table 6**

Products incriminated in acute poisoning at CHA, Gujarat, India from 1st October 2006 to 30th September 2007 (n=366)

		No. of admissions	No. of deaths	No. of recovery	Case fatality (%)
Pesticide	Monocrotophos	5	3	2	60
	Chlorpyrifos	5	3	2	60
	Phorate	4	3	1	75
	Insecticide stick	10	1	9	10
	Other OP*	100	12	88	12
Total		124	22	102	17.7
Drugs	Alprazolam	10	0	10	0
	Anti tuberculosis	1	0	1	0
	Anti psychotic	20	2	18	10
	Chloroquine	3	0	3	0
	Diazepam	11	0	11	0
	Narcotics	2	0	2	0
	Paracetamol	3	0	3	0
	Anti hypertensive	2	0	2	0
	Analgesic	2	0	2	0
	Ointment	2	0	2	0
Total		56	2	54	3.57
Household chemical	Acid	53	13	40	25
	Kerosene	12	1	11	8.33
	Mosquito coil	4	0	0	0
	Others	30	5	25	16.66
Total		98	19	79	19.38
Industrial chemical		11	1	10	9.09
Plant		1	0	0	0
Unknown		76	24	52	31.6

Original Research Paper

Mortality Profile of Burn Injuries: A Postmortem Study in Lady Hardinge Medical College, New Delhi

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Abstract

Burn is a major cause of death in all medico-legal cases. Developing countries have a high incidence of burn injuries, creating a formidable public health problem. Our objective of the present study is to measure the magnitude and epidemiology of death due to burns in Central Delhi. A 5 years (from 1st January 2006 to 31st December 2010) autopsies based retrospective study where total 2773 medico-legal autopsies were conducted during this period, out of those 207 (7.46%) were due to burn; 117(56.52%) were males and 90 (43.47%) were females. Maximum 88 (42.51%) of the cases were in the 21-30 years of age group in both gender. The most common manner of the burn was accidental (72.94%), followed by suicidal (17.39%) and homicidal (9.66%). Almost all male deaths were accidental in nature. Smell of kerosene was present in 35 (38.88%) of females bodies. The cause of deaths in 97 (46.85%) was shock followed by 110 (53.14%) septicaemia. The history regarding whether they were killed or ablaze herself was not clear by history records but findings were suggestive of killing of bride in demand of dowry could not be ruled out.

Key Words: Burn, Accidental, Suicide, Homicide, Shock, Autopsy

Introduction:

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

The World Health Organization (WHO) estimates that each year over 300000 people die from flame or fire-related burn injuries. [1] Burns, as is the case for most causes of injuries, are disproportionately concentrated in low and middle income strata of society. In 2001, the rates of fire mortality in low and middle-income strata were 4 per 100000 persons and 7 per 100000 persons for males and females, respectively. Overall, these rates were around 9 times higher than for high-income countries (4.53 compared to 0.51 per 100 000). [2]

Fire-related mortality rates are especially high in South East Asia (11.6 deaths per 100000); in the Eastern Mediterranean (6.4 per 100 000) and Africa (6.1 per 100000). [1]

The aim of this study was to provide an analysis of burn mortality across all ages, dead bodies brought in the morgue of LHMC, especially from Central district of Delhi. It investigates how burn mortality is distributed across age groups, sex and population groups and also what the typical circumstances of burn mortality occurrence are.

Developing countries have a high incidence of burn injuries, creating a formidable public health problem. Moreover, high population density, illiteracy and poverty are the main demographic factors associated with a high risk of burn injury. In India, with a population of over 1 billion, there are 700000 to 800000 burn admissions annually [3]

Material and Method:

This is a 5 years retrospective study, based on autopsy reports analysis conducted in the Department of Forensic Medicine & Toxicology, Lady Hardinge Medical College, New Delhi, during 1st January 2006 to 31st December 2010. In this period total 2773 autopsies were conducted, out of that 207 dead bodies were brought with the alleged history of burn injuries. These autopsy reports are studied in detail including age, sex, time of death, period

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of survival, percentage of burn injuries, use of any inflammable agent etc. history was recorded from the police, relatives of deceased and friends. All findings are depicted in tabular form and inference is extracted.

Results:

In this study period total 2773 medico-legal autopsies were conducted, out of total deaths, 207(7.46%) cases brought with the alleged cause of death as burns. 117(56.52%) were males and 90(43.47%) were females. Male and female ratio was 1.3:1. (Table 2) 88 (42.51%) of the cases were in the 21-30 years of age group in both gender. (Table 1)

The most common manner of the burn was accidental (72.94%), followed by suicidal (17.39%) and homicidal (9.66%) causes. (Table 6) Almost all male deaths due to burn were in accidental in nature and in females 35 cases smell of kerosene was present which 38.88% of total female deaths. (Table 5)

The history regarding whether they were killed or ablaze herself was not clear by history records but findings were suggestive of killing of bride in demand of dowry could not be ruled out. 97 (46.85%), 110 (53.14%) victims died of shock and septicemia respectively. (Table 4)

The most of the burn cases were of flame burn (97.10%) and only few cases (2.89%) were of scalds. 150(72.46%) cases of burns were died in hospital after admission during course treatment while 57(27.53%) cases died on the spot and declared brought dead in hospital. (Table 7)

In 42 cases (20.28%) period of survival after sustaining burn injury was between 7 to 15 days followed by 39 (18.84%) cases where 3 to 7 day survival period was. The maximum period of survival was 59 days in a single case. (Table 8) Social factors are the main drive, leading to an unacceptably high rate of burn injuries in our societies.

Prevention programmes should be directed at behavioural and environmental changes which can be easily adopted into the lifestyle. The maximum burn incidence occurred between 6 pm to 12 midnight which is constituted 80 (38.64%) cases followed by 51 (34.63%) cases between 12 noon to 6 pm. In 96 (46.37%) cases total body surface area of burn was between 90 to 100% followed by 80-90% in 29 (14.00%) cases. (Table 10)

Discussion:

In the present study, there is a predominance of female victims than males in burn cases and a majority of them were in the reproductive age group 21-30 years. The most

common manner of the burn was accidental (72.94%), followed by suicidal, (17.39%) and homicidal (9.66%) types. Similarly, in an earlier study from Chandigarh (India), it was observed that most burn deaths occurred in the age group of 21-40 years (67%), with female preponderance (61%) in all age groups. [4]

In another study from Chennai (India) on 555 burn cases in the age group of 0-18 years, scalds were observed to be the most common type of burn cases among children under 4 years of age, and flame burns predominated in the older age group. [2] In a study from Zimbabwe, burn injuries were caused by flame in 51% of the cases and hot liquids in 47%, and all patients with burns larger than 65% of the total body surface area, died. [5] In the present study, in 42 cases (20.28%) period of survival after sustaining burn injury was between 7 to 15 days followed by 39 (18.84%) cases where 3 to 7 day survival period.

In our study, it was observed that 97 (46.85%), 110 (53.14%) victims died of shock, and septicemia respectively. Similarly, another study reported a majority of deaths due to burns within one week (77%) of the incident, with septicemia as the major cause of death (55%). [2]. In a study from Egypt on 533 cases, the mean length of hospital stay was found to be 15.5 +/- 21.6 days and the mortality rate was found to be 33%. [6]

In a study from Hong Kong, out of 286 major burn patients treated, 25 patients died from their injuries, yielding a mortality rate of 8.7%. [7] In another study on 352 patients in an Asian National Burn Centre, 16 deaths occurred and the final causes of death were septicaemic shock in 10 patients, extensive burns in four patients, adverse drug reaction in one patient and bleeding peptic ulcer in one patient. [8] In Cape Town burn mortality is concentrated amongst males aged between 25 and 50 years.

These deaths are above all accidental, occurring most often in the home and in the early hours of the morning. They commonly take place over the weekend and other recreational periods across the year, with the expected concentration in the cold and wet months. Alcohol intoxication is a common denominator of the cases selected for testing. There is a smaller concentration of mortality amongst very young black children.

This is consistent with burn morbidity studies in Cape Town [9, 10] and mortality findings further afield. [11] The overall Cape Town burn mortality rate of 7.9 per 100 000 person years is higher than the world average of 5.0 per 100 000 and even the African Region

one of 6.1 per 100 000. [12] Despite its growing economy, the city remains beset by geographical pockets of poor housing conditions and impoverishment, closely associated in previous studies with child burn morbidity. [10] The adverse housing conditions are particularly related to the flammable materials used in the construction of the many informal homes or 'shacks' [13, 15], the widespread use of portable kerosene stoves [13,14], and the storage of fossil fuels for heating and lighting, all individually associated with either greater burn hospitalization or mortality. [14]

The greater exposure for males observed for Cape Town may be due or exacerbated by the elevated levels of alcohol consumption reported. [15] In combination with smoking, a high level of alcohol consumption is associated with a greater occurrence of flame mortality and linked for example to 73% of fire deaths in the United States.

The deaths in the current study occur in the early hours of the morning or during the late evening hours, when intoxicated drinkers would be the least easy to mobilize in terms of rapidly spreading house fires. Other reports indicate that cigarette-ignited fires often result in a period of smoldering before taking flame which then rapidly spreads, with resultant deaths typically reported between midnight and 06h00.

The use in the home of kerosene, for kerosene or open flame heaters, would however result in especially rapid and devastating conflagrations. [14, 15]

Dhiraj Buchade et al [16] reports, female victims were most commonly affected as compared to male victims. The age group of 21-30 years 97 (40.93%) was most commonly affected followed by age group 31-40 years 54 (22.79%). The thermal burns 184 (77.63%) was most commonly noted followed by electrical burns 23(9.71%). Married females 114 (76.51%) most common victims and most of victims survived for a period of 12 to 24 Hours 61 (25.74%). Head, face & neck 206 (86.91%) region of body was most commonly affected followed by Chest 174 (73.41%) region of body. The most of victims sustained 51 to 75% burns 133 (56.12%) and most common manner of death was accidental burns 147(62.02%).

Further, Rahul Chawla, et al [17] reported that most of the burns were domestic, with cooking being the most prevalent activity. The maximum incidence of burn injuries in males were noted in the age group of 21-30 years. 56% cases who suffered burns were housewives. 26% females had 91-100% burns.

Smell of kerosene was present in 4% cases. Maximum burns were of 3rd degree with 28% males and 54% females. Head & neck were involved in 94% cases Extremities were involved in all cases.

Memchoubi et al [18] contrary reported regarding the gender distribution, slight male preponderance was observed, 50.76% and 49.23% in males and females respectively. The age group most involved was 21-30yrs with an incidence of 38.46%, which was more in females. Most of the victims i.e., 53.84% belonged to lower socio-economic strata.

50.76% died in the hospital whereas 49.23% at the site of occurrence. The cause of death was burn shock in 67.69% cases. 49.23% died within an hour of sustaining the burns, 21.53% cases survived for more than 1 week. Taking the body surface area involved into consideration it was observed that in about 73.84%, >80% body surface area was involved. Most of the cases were accidental, 35.38%, followed by homicidal, 29.23% and suicidal, 24.61%.

Conclusion:

In the present study, there was female predominance, with a majority of the burn cases between 15-45 years of age. Flames and accidental burns were the most common modes of burn injuries involved. Most of the burn injuries are caused by domestic accidents and are therefore, preventable. Our study also clearly indicated a decreased survival related to an increased percentage of burn and septicemia, shock, as major cause of death. Social factors are the main drive, leading to an unacceptably high rate of burn injuries in our societies. Prevention programmes should be directed at behavioural and social changes which can be easily adopted into the lifestyle.

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Table 1: Distribution of Burn Injuries According to Age Groups and Years

Age	2006	2007	2008	2009	2010	Total
0-10	1	4	5	3	3	16(7.72%)
11-20	7	6	7	4	16	40 (19.32%)
21-30	13	20	22	18	15	88 (42.51%)
31-40	2	6	4	6	3	21 (10.14%)
41-50	5	6	3	0	11	25 (12.07%)
>51	2	3	4	3	5	17 (8.21%)
Total	30	45	45	34	53	207 (100%)
%	14.49	21.73	21.73	16.42	25.60	100

Table 2: Gender-Wise Distribution of Burn Injuries

Year	Male	Female	Total	%
2006	12	18	30	14.49
2007	31	14	45	21.73
2008	30	15	45	21.73
2009	16	18	34	16.42
2010	28	25	53	25.60
Total	117(56.52%)	90(43.47%)	207(100%)	100

Table 3: Burn Deaths According to Either Brought Dead or Died In Hospital

Year	Brought dead	Hospital death	Total	%
2006	6	24	30	14.49
2007	15	30	45	21.73
2008	12	33	45	21.73
2009	8	26	34	16.42
2010	16	37	53	25.60
Total	57 (27.53%)	150 (72.46%)	207 (100%)	100

Table 7: Type of Burns

Types of Burns	Cases
Flame Burns	201 (97.10%)
Scalds Burns	6 (2.89%)
Total	207 (100%)

Table 4: Burn Deaths According to Cause of Death

Year	Shock	Septicaemia	Total	%
2006	7	23	30	14.49
2007	18	27	45	21.73
2008	22	23	45	21.73
2009	20	14	34	16.42
2010	30	23	53	25.60
Total	97(46.85%)	110(53.14%)	207(100%)	100

Table 5: Smell of Kerosene Noticed In Burn Deaths

Year	Kerosene smell	No smell	Total	%
2006	4	26	30	14.49
2007	7	38	45	21.73
2008	9	36	45	21.73
2009	8	26	34	16.42
2010	7	46	53	25.60
Total	35 (16.90%)	172 (83.09%)	207 (100%)	100

Table 6: Burn Deaths According to Manner of Death

Manner of death	Male	Female	Total	%
Accidental	114	37	151	72.94
Suicidal	3	33	36	17.39
Homicidal	0	20	20	9.66
Total	117 (56.5%)	90 (43.47%)	207 (100%)	100

Table 8: Survival Period in Case of Burn Deaths

Period Of Survival	Cases
Spot death	57 (27.53%)
Up to 6 hrs	4 (1.93%)
6 to 12 hrs	3 (1.44%)
12 to 24 hrs	27 (13.04%)
24 to 36 hrs	6 (2.89%)
36 to 72 hrs	9 (4.34%)
3 to 7 days	39 (18.84%)
7 to 15 days	42 (20.28%)
>15 days	20 (9.66%)
Total	207 (100%)

Table 9: Time of Incidence of Burn Deaths

Time of Incidence	Cases
0-3 am	19 (9.17%)
3 am-6 am	18 (8.69%)
6 am-9 am	19 (9.17%)
9 am-12 noon	20 (9.66%)
12 pm-3 pm	17 (8.21%)
3 pm-6 pm	34 (16.42%)
6 pm-9 pm	41 (19.80%)
9 pm-12 midnight	39 (18.84%)
Total	207 (100%)

Table 10: Percentage of Body Surface Area Involved in Burn Injuries

Body surface area involved (%)	Cases
20-30%	7 (3.38%)
30-50%	23 (11.11%)
50-60%	12 (5.79%)
60-70%	21 (10.14%)
70-80%	19 (9.17%)
80-90%	29 (14.00%)
90-100%	96 (46.37%)
Total	207 (100%)

Original Research Paper

Epidemiology of Unnatural Deaths In Newly Married Females in Kanpur, UP

*Praveen Arora, **A. K. Srivastava

Abstract

Even in the present era of women empowerment and liberalization, a rapid increase in crimes against women is a matter of great social concern. Women are victims of iniquity not only outside but inside home too. In this study epidemiology of deaths among newly married females was explored. Most of the victims were young adults in their early married years. Most of them were housewives of joint Hindu families of middle socio-economic class, where husbands were addicted to one or the other inebriant. Educated and employed women were least affected.

Ill treatment by in-laws, rash and negligent behaviour of husbands led to stressful married lives and ill mental health of wives, though most of the victims were otherwise mentally normal. All except one incidents occurred in arranged marriage. Dowry and infidelity were the most common reasons behind such deaths.

Key Words: Newly married females, Unnatural death, Dowry, Crime against women

Introduction:

In present day era, when we talk of women empowerment and liberalization, the rapidly increasing crimes against women especially among newly married females, in their new homes, many a times leading to their death [1, 3], discredit the noble tradition of marriage in our culture. Marriages were arranged to know the background of the families, so that the newly married couple should have least frictions. But the association of heinous tradition of dowry in such marriages belies the nobility of marriage in Indian culture.

Incidence of such deaths is quite high at 5% of all medico-legal autopsies. Harassment of newlywed females by their in-laws and husbands for dowry, ill treatment by new family members, rash and negligent behaviour and extra marital affairs of husbands, maladjustment, and infertility are the most common reasons behind such deaths. [4, 11] Poor ladies are either abetted for suicide or killed, wherein hanging and burning are the most common methods used respectively. [5]

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Although Law has made provisions against dowry practice, the necessary steps to nip off this heinous social evil are still lacking. [3] The present study explores the epidemiological factors behind such deaths.

Materials and Methods:

Material for the present study comprised all the cases of 'unnatural deaths of females died within seven years of their marriage' brought to the District Mortuary of Kanpur district between Feb 2003 and Jan 2004. To stress upon unnatural deaths in newly married females, cases of death after 7 years of marriage, unidentified bodies, natural deaths, deaths occurred in mass casualties and road traffic accidents were excluded.

The various epidemiological data were gathered from perusal of police papers, interrogation of police officers, relatives, neighbours, friends and other accompanying. Local newspapers and hospital records were also searched through. Findings of post-mortem examination were also recorded.

Observations and Results:

Total numbers of cases autopsied were 2889, out of which 143 cases were of newly married females i.e. 4.95% of all autopsies done from Feb 2003 to Jan 2004.

More than 60% (86) of the newlyweds were victimized within 3 years of the marriage, and almost 80% (114) met their unfortunate end within 5 years of the marriage. (Table 1) Most of the victims were very young, within their early

20s. Almost 60% (86) victims were between 18-22 years of age, and another 31% (45) between 23-26 years. (Table 2) Most of the cases were amongst Hindus 94.41% (135) and only 5.59% (8) amongst Muslims, even though Kanpur district is highly populated by Muslim community. Sikh and Christian communities were fair enough with no cases at all in our study. In our study more than 91% (131) incidents happened in lower middle (Class IV) and middle (Class V) socio-economic class. (Table 3) Maximum number of patients belonged to Rural 55.94% (80) and Suburban 30.77% (44) areas. Literacy of the victims showed a high co-relation to unnatural deaths. Whereas 25% (37) cases occurred among illiterate females, 67% (96) incidents happened among up to high-school literate females. (Table 4)

None of the incident happened amongst working married females. 96.5% (138) incidents occurred among house-wives, while only 3.5% (5) among labourers. (Table 5) Personal habits of the victims did not show any correlation except that only 13.99% (20) were tobacco addicted in one or the other form. Most of them were vegetarian and not addicted to any inebriants or drugs. (Table 6)

Most of the victims 91.61% (131) had normal mental status before marriage, while only 8.39% (12) had some kind of psychiatric illness. (Table 7) Husband's behaviour towards wife was found to have significant correlation with unnatural deaths among newly married females.

A loving husband was the least risk 13.29% (19) in such cases, whereas in most other cases the relation was either neutral or unhealthy. (Table 8) Husband's habits seem to have correlation with the misery and death of young married women.

More than 50% (73) were tobacco chewer and almost two thirds were either smoker 35.66% (51) or alcoholic 32.17% (46). 7 (4.89%) were drug addicts. (Table 9) Unfortunately, all of the cases except one, happened among arrange married couples, 142 out of 143 (99.30%). (Table 10)

Even among arranged married couples, those living in joint families 105 (73.43%), where couple was living with husband's parents and/or other relatives, were affected about three times more than those living in nuclear families 38 (26.57%), where couple was living alone and/or with their young ones. (Table 11)

The most common reasons behind the unhappy married lives of young victims were dowry, ill-treatment by in-laws, rash and negligent behaviour of husbands and extra-

marital affairs of husbands, making up a total of 86 cases (60.13%). (Table 12)

Discussion:

Most of the newlywed females, whose married life saw an early dreadful end, were young Hindu females who were married in their early adulthood. [5-7] Young females, who come to their husband's house with fancy dreams of marriage, get shockers of being physically and mentally tortured [1, 3] and shattered dreams, leading to maximum number of deaths among these young ladies. [3, 5, 8] No wonder such cases are seen mostly in lower middle and middle classes [3, 11].

Ill educated housewives were mostly victimized [5], though another study [9] found lesser number (10%) of illiterate wives in their study. These young females are low on knowledge and self confidence and fear of 'what' society will say, and are mostly harassed. Deaths were less in well educated [10] and late married females [6] of Hindu families. This may be because they were more aware of their rights and ways to handle such situations.

Not many victims were addicted to inebriants, though a few were habitual tobacco users, that was due to stress of unhappy marriage life in some cases and others were villagers. But habits of husband's pose a significant impact on the incidence of bridal deaths. Addictions leading to frictions in marriage; or mental stress due to pressure from parents for dowry and inability to withstand demands of new relationship and responsibilities may be some causes leading to addiction and marital disharmony.

Many a times, it is claimed by husbands and in-laws of such women suffering from some kind of pre-existing mental illness, to save their skin; though it was not seen in our study, where most of the young brides had normal mental condition before marriage. Though studies show that ill-treatment, physical and mental torture and marital disharmony may lead to ill mental health. [12] Husband's behaviour towards wife was an important finding in the study and was much relevant. In 65.03% (93) cases husband's behaviour was rash, negligent or unhappy.

That must be the reason why unnatural deaths among newlywed females were not seen in love marriage; only one case was recorded and that too was due to accidental death. Joint Hindu families of mentioned social strata were mostly affected. Though this is against findings of some studies [5, 13] but Kulshreshta P et al found more number of suicidal cases in joint families. Dowry, ill treatment by in-laws, rash

and negligent behaviour of husbands and infidelity were the most common reasons for unhappy married lives in all such cases. [9, 11]

The prevalence of heinous tradition of dowry, even after Laws have been there to prevent it, seems to be the basic evil behind such deaths. Such mishaps may be prevented by more stringent laws and fast-track courts dedicated for such cases. There is need to have high suspicion in cases of accidental deaths of newlywed females, as many cases of homicide make to look like 'kitchen-accidents'. [3]

Conclusions:

- There is high incidence ($\approx 5\%$) of deaths among newlywed females of all unnatural deaths.
- Most victims are young females in early twenties and within 3 years of the marriage.
- Most incidents happened in Hindu families (94.4%) of lower-middle (IV) and middle (V) SE class (91%), where ladies were poorly educated housewives.
- In $>91\%$ of cases, premarital mental status of women were normal, though rash and negligent behaviour of the husbands and in-laws may have led to unhealthy mental condition.
- Most of the husbands were addicted to either any form of tobacco and/or alcohol.
- Almost all cases occurred in cases of arranged marriage and mostly where couple was living in joint families (73%).
- Excessive demands for dowry, ill-treatment by in-laws, rash and negligent behaviour of husbands, which may be influence by orthodox mentality of older members in joint families, were the most common reasons behind unhappy married lives of young couple.
- Infidelity on the part of husbands was also an important factor, besides drunkenness, mal-adjustment and poverty.

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Table1: Duration of Marriage

Duration (Yrs.)	Cases	%
<1	26	18.18
1-2	39	27.27
2-3	21	14.69
3-4	10	6.99
4-5	18	12.59
5-6	8	5.59
6-7	21	14.69
Total	143	100.00

Table 2: Age at Death

Age Grps (Yrs.)	Cases	%
18-20	38	26.57
21-22	48	33.57
23-24	16	11.19
25-26	29	20.28
27-28	7	4.89
29-30	5	3.50
Total	143	100.00

Table3: Socio-Economic Status

SE Class	Cases	%
Lower (V)	8	5.59
Lower Middle (IV)	79	55.25
Middle (III)	52	36.36
Upper Middle (II)	4	2.80
Upper (I)	-	-
Total	143	100.00

Table 4: Educational Status of Victims

Edu. Status	Cases	%
Illiterate	37	25.87
Primary	54	37.76
Junior High School	11	7.69
High School	31	21.68
Intermediate	6	4.20
Graduate	4	2.80
Post-Grad	-	-
Professional	-	-
Total	143	100.00

Table 5: Occupation

Occupation	Cases	%
House-Wife	138	96.5
Labour	5	3.5
Service	-	-
Business	-	-
Professional	-	-
Others	-	-
Total	143	100.00

Table 6: Personal Habits of Victims

Habits	Cases	%
Vegetarian	118	82.52
Non-Veg.	25	17.48
Smoker	5	3.50
Alcoholic	-	-
Drug Addict	-	-
Tobacco Chewer	15	10.49
Total	143	100.00

Table 7: Pre Marital Mental Status of Victims

Mental Status	Cases	%
Normal	131	91.61
Insane	1	00.70
Neurotic	3	2.10
Unstable	4	2.79
Hysterical	2	1.40
Depressed	2	1.40
Drug Addict	-	-
Others	-	-
Total	143	100.00

Table 10: Type of Marriage

Type of Marriage	Cases	%
Arranged	142	99.30
Love	1	00.70
Total	143	100.00

Table 11: Type of Family

Family Type	Cases	%
Nuclear	38	26.57
Joint	105	73.43

Table 8: Husband's Behaviour towards Wife

Behaviour	Cases	%
Neutral	56	39.16
Loving	19	13.29
Rash/Negligent	42	29.37
Unhappy	51	35.66

Table 9: Husband's Habits

Habit	Cases	%
Vegetarian	118	82.52
Non-vegetarian	25	17.48
Smoker	51	35.66
Alcoholic	46	32.17
Drug addict	7	4.89
Tobacco Chewer	73	51.04
Others	-	-

Table 12: Reasons behind Unhappy Married Life of the Victims

Reason of unhappy life	Cases	%
Dowry	39	27.27
Ill-treatment by in-laws	21	14.68
Rash & negligent behaviour of husband	13	9.09
Extra-marital affairs	13	9.09
Drunkenness	8	5.59
Mal-adjustment of wife	6	4.20
Poverty	4	2.80
Infertility in female	3	2.10
Total	107	74.83

Original Research Paper

Pattern of Spot Death Cases Brought to V.S. General Hospital, Ahmedabad: A Retrospective Study

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Abstract

A retrospective comparative study of pattern of spot death cases which were brought dead to V. S. general hospital, Ahmedabad between June 2008 to may 2009 and June 2009 to may 2010 studied and there correlation between various factors were made. In this study age sex, religion, place of occurrence as well as other factors were included like time of death, manner of death etc. There are so many factors which affect the death rate either directly or indirectly. These factors may be climatic, demographic or personal. In this study brought dead cases includes spot death cases which may be natural (physiological / pathological) or unnatural (homicidal/ suicidal/ accidental). In this paper multiple factors have been studied along with their correlation. During the period of June 2008 to May 2010, out of total 2647 brought dead cases, 479 spot death cases were found. Among them maximum spot death cases were due to unnatural and minimum due to natural cause, more in males in morning hours. These results have been discussed in this article in detail.

Key Words: Retrospective study, Spot death, Natural death, Unnatural death

Introduction:

Medical audit in health care has become a significant issue for Government & health care agencies. The funding of health services has come under much greater scrutiny in recent years & in attempts to improve the efficiency of the service, health care audit has achieved a greater profile. Age long physicians' conception of death is "total stoppage of circulation with consequent cessation of animal and vital functions." [1]

Literally spot death (which is also known as death on the site) denotes those deaths happened on the spot within seconds or minutes of incident. Violence and injuries account for 9% of the global mortality and 12% of all disability adjusted life years (DALYs). [2] It is estimated that 5.8 million people worldwide die each year as a result of some form of injury. [3]

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Globally around 520,000 people die every year as a result of interpersonal violence, which equates to 1400 deaths every single day. [4] Spot deaths also make a part of sudden deaths when death occurs acutely either due to medical or surgical or gynecological or pathological reasons. In those cases, as per law, doctor can't issue the death certificate without knowing the actual cause of death.

That is the reason for which post-mortem examination of those brought dead cases is essential & mandatory for establishment of actual cause of death. [5] The aims of this study also include the scenario of sudden death cases with respect to age group, sex-ratio, religion, place of occurrence, time, manner of death etc.

Though it is not commonly done by the relatives to bring the unnatural death cases at emergency department; still few cases are brought to disprove their criminal activity, related to particular death cases with an intention to eyewash the society.

Material and Method:

Ahmedabad is the largest city of Gujarat and 6th largest city of India. Population of Ahmedabad city is about 5 million. In the present work, materials consists of spot death cases brought dead to V.S. general hospital (declared dead at the casualty department of Smt. N.H.L. Municipal Medical College, Ahmedabad, Gujarat and then post-mortem examination done in Morgue).

Criteria for Case Selection:

1. Both male & female victims are taken into consideration.
2. All age groups are included in this study.
3. All police station of hospital jurisdiction.
4. All types (according to apparent manner of death) are taken into consideration excluding death of unknown persons due to incompleteness of related report / data.

Collection of Data:

1. From inquest report – Age, sex, religion, place, date & time of incidence if any previous history available. These findings are taken into consideration.
2. All other reports of examinations of sample preserved likely for chemical examinations and histopathological examinations.

Study on different aspects of spot death cases brought to Mortuary during the period of June 2008 to may 2010.

Observation & Discussion:

The present study has been carried out at the mortuary attached to the Smt. N.H.L. Municipal Medical College and V.S. general Hospital under the Department of Forensic Medicine for a period of two years between June 2008 and May 2010.

It is known to all that most unnatural deaths by means of criminal activity are tried to be hidden up by the offenders but many times that ill effect may be failed and the dead body is brought to emergency by law enforcing authority. These cases should be dealt with precaution, so that actual cause of death comes out & the offender can be identified who tried to conceal the offence & had intention to make a clear case of homicide a natural one or try to destroy the evidence by incinerating the dead body or by burying. The results of observation have been analyzed in the tabular form and the different aspects are taken in to consideration.

In the age wise distribution of cases, it is seen that spot death cases were maximum between 21 to 30 years of age (68, 29.96% and 73, 28.97%) followed by 31 to 40 years of age (51, 22.47% and 56, 22.22%). Only 4(1.76% and 1.59%) cases during each sectional year fall under the >80 years group. (Table 1)

The reason behind it may be that maximum subjects of this age group are students who have lack of responsibility, tendency to show off stunts in driving, minor tension related to study and carrier in adolescent and middle age group people than in extreme of life. Accidents are also more common in the adolescent and middle age people as they are

students / working people spending much of time outside the home.

On sex wise distribution of cases, it was found that more than $\frac{3}{4}$ th of all victims (173, 76.22% and 185, 73.42%) were male where as less than $\frac{1}{4}$ th cases (54, 23.78% and 67, 26.58%) were female. It is obvious as males are more in comparison to females; their normal ratio is 1000: 927. In spite of this due to some other reasons burns cases are more found in females. K. D. Chavan and R. V. Kachare in their study observed suicidal deaths 164 (88.6%) were most common in married females as compared to 21 (11.4%) unmarried females, the most commonly affected age of females was 19 to 25 years and burns was most common cause suicide 58(31.3%) followed by poisoning 23(12.4%).(Table 2) [6]

In case of religion wise distribution 152, 66.96% and 171, 67.86% victims were Hindu – most prevalent religion, only 69, 30.43% and 72, 28.57% were Muslim. Just 6, 2.64% and 9, 3.57% fall in the group other – comprises of Christian, Buddhist etc. In India total percentage of Hindus is 80%, for Muslims it is 13.40% and Christians are only 2.34% but if we consider population of Gujarat, Hindus are 60%, Muslims are 30.9% and rest religion population is just 9 %. [7-9] Despite the population of the Muslims are low in comparison to Hindus, percentage wise spot death cases are more in Muslims because of low literacy rate, avoidance and delay in treatment. (Table 3)

On the basis of place of occurrence, spot deaths cases were found more at residence(109, 35.68% and 101, 40.07%) than on road / pavement – (81, 48.02% and 105, 41.67%).In residence, deaths were mainly due to natural causes and suicides. On road or footpath most common cause is road traffic accidents, some are the dead bodies of persons without any identity, mostly vagabond. There are only 12, 5.28% and 15, 5.95% cases have been occurred at the place of work. The category 'other' constitutes mostly bodies found besides railway track or in some water bodies like pond or river. (Table 4)

Time of occurrence wise distribution of cases, which actually some time denotes the time of discovery of the victims dead bodies, specially for the bodies recovered from footpath, pond or in bed in the morning. Maximum (71, 31.28% and 79, 31.34%) cases happened between 6 a.m. to 1 p.m. Minimum cases (33, 14.54% and 38, 15.07%) were happened between 11 pm to 6 am. (Table 5)

Manner of death is the way in which the cause of death was produced. [10] Distribution

of victims according to cause of death – whether natural or unnatural. Sudden or unexpected death occurs from unnatural cause as well as from natural causes, [11] 41, 18.06% and 45, 17.86% deaths are attributable to different types of natural deaths due to various disease condition, while the rest, 186, 81.94% and 207, 82.14% of cases are unnatural deaths of multiple reasons.

The reason behind it may be, increase tendency of self destruction in adolescent and middle age group people than in extreme of life. Stabbing was the weapon of choice for offence, followed by blunt weapon, then sharp cut and least common was firearm. Physical assault (mechanical Injury) was the most common mode of offence leading to death. (Table 6) [12, 13]

Conclusion:

It is clear in this study that not only the number of the cases which have increased in June 2009 to May 2010 in comparison to year June 2008 to May 2009 but also on the same way all parameters remain increased in approximately same proportion.

In this study most (68, 73) of the cases were within the age group of 21 – 30. Numbers are very few in the extremes of ages. It was observed that (173, 185) cases are male while only (54, 67) victims were female. Regarding religion, most of the victims were Hindu (152, 171). It is also found that maximum incidences took place at residence (109, 101). Most of the incidences occurred in day time between mornings 6 am to noon 1 pm (71, 79).

In this study (186, 207) deaths are unnatural; whereas 41, 45) deaths are caused by some disease process. In this study it is found that maximum no. of natural death occurs in the age group of 61 –80 years and that of unnatural death in the age group of 21 – 30 years. This study also shows that maximum no. of male victims are in 21 – 30 years where as maximum no. of female victims fall in the age group 31 – 40 years.

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Table 1: Age wise Distribution of Cases

S.N.	Age (yrs)	June 2008 to May 2009	June 2009 to May 2010	Total cases
1	<10	10	11	21
2	10 – 20	28	31	59
3	21 – 30	68	73	141
4	31 – 40	51	56	107
5	41 – 50	32	36	68
6	51 – 60	12	14	26
7	61 – 70	16	20	36
8	71 – 80	06	07	13
9	>80	04	04	08
	Total	227	252	479

Table 2: Sex wise Distribution of Cases

S. N.	Sex	June 2008 to May 2009	June 2009 to May 2010	Total Cases
1	Male	173	185	358
2	Female	54	67	121
	Total	227	252	479

Table 3: Religion wise distribution of cases

S.N	Religion	June 2008 to May 2009	June 2009 to May 2010	Total no.
1	Hindu	152	171	323
2	Muslim	69	72	141
3	Others	06	09	15
	Total	227	252	479

Table 4: Place of Occurrence of Incidence

S.N.	Place of occurrence	June 2008 to May 2009	June 2009 to May 2010	Total Cases
1	Residence	109	101	210
2	Road	81	105	186
3	Place of work	12	15	27
4	Others	25	31	56
	Total	227	252	479

Table 5: Time of Occurrence of Incidence

S. N.	Time of occurrence	June 2008 to May 2009	June 2009 to May 2010	Total cases
1	6 am – 1 pm	71	79	150
2	1 pm – 5 pm	65	71	136
3	5 pm –11 pm	58	64	122
4	11 pm –6 am	33	38	71
	Total	227	252	479

Table 6: According to Cause of Death (Natural or unnatural)

S. N.	Cause of death	June 2008 to May 2009	June 2009 to May 2010	Total Cases
1	Natural	41(18.06%)	45(17.86%)	86(17.95%)
2	Unnatural	186(81.94%)	207(82.14%)	393(82.05%)
	Total	227	252	479

Original Research Paper

Union of Epiphyseal Centres in Pelvis of Age Group 18-21 Years in Rajasthan: A Roentgenologic Prospective Study

*Yogesh Sharma, **Akhilesh Sharma, ***Bhavesh Bohra

Abstract

Age estimation is a common feature and a general problem in Forensic Medicine practice. It is very important in criminal as well as in civil cases like fixing of criminal responsibility, judicial punishment i.e. in cases of kidnapping, criminal abortion, theft, offence of railway property, provision of motor vehicle Act etc and in various schemes of social welfare department i.e. employment, attainment of majority, marriage contract etc. Some work for accurate estimation of age has been done in this country, which exhibit differences in different part of this country. This study includes radiological examination of hip joint (AP view) of 100 individuals for the study of fusion of ossification centres of lesser and greater trochanter and the head of the femur in the age group of 18-21 years of both sex in RNT Medical College, Udaipur, Rajasthan.

Key Words: Age estimation, Greater and Lesser trochanter, Epiphyseal union, Iliac crest, Ischial tuberosity

Introduction:

Appearance and fusion of different ossification centres with their corresponding bones has been proved to be a very good and reliable tool for age estimation. The time of completion of ossification is thought to be fairly constant for any particular bone but there are various factors which have their influence on ossification viz., social, climatic, dietic, socio-economic and other differences.

In India as far as adequate data for each area concerned are not available, Survey Committee (1964), reporting on medico-legal practice in India had recommended to the government that zone wise study of the problem of determination of age may be encouraged. Although some work on this line has been done in this country, which exhibit differences in the findings of the basic determinants in different part of this country and data available are not adequate? Further it has been found that the time of union of epiphysis varies with geographic distribution.

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Material & Method:

The study has been conducted on 100 subjects of Rajasthan at RNT Medical, Udaipur. The candidate selected for the study were in age group 18, 19, 20, 21, 22 and 23 years of either sex or belonging to different socio-economical, religions and educational status. Their age as stated by them was further confirmed from their birth certificate or secondary certificate or school record duly verified by head of institution.

After clinical examination, each candidate was X-rayed for pelvis AP view. The following epiphyseal centre has been studied in detail:

1. Head of Femur
2. Greater Trochanter
3. Lesser Trochanter
4. Iliac Crest of Hip Bone
5. Ischial Tuberosity of Hip Bone

Observation & Discussion:

In present study centre of ossification of head femur, greater trochanter and lesser trochanter in female were found fused in all 50 (100%) cases. Female subject of different age group examined indicating that the incidence of union of epiphyses of head of femur, greater trochanter and lesser trochanter are 100% even at age group 18-19 years. The above data of our study indicate that in female these ossification centers are fused at or before 18-19 years of age. (Table 1)

We also observed that center for ossification of iliac crest appeared in all female subjects before 18-19 years of age. We also observed that center of iliac crest units with body of pelvis in more than 75% cases at age of 20-21 years. It is almost similar to study of Gupta et al,[2] but later than Galstaun. [1] In this study centre of ossification of Ischial tuberosity in females was found fused in more than 78% of cases in age of 21-22 years.

We have observed in our study that centre of ossification of head femur; greater trochanter and lesser trochanter in male were found fused in all 50 (100%) subject.

Male subject of different age group examined indicating that the incidence of union of epiphyses of head of femur, greater trochanter and lesser trochanter are 100% even at age group 18-19 years. The above data of our study indicate that in male these ossification centers are fused at or before 18-19 years of age. (Table 2)

Present study showed that fusion of epiphyses in iliac crest in male subject is complete in about 85% cases in age group 21-22 years which is similar to other author's studies. [2]

Center of ossification of Ischial tuberosity units with body of pelvis in males in more than 77% cases at age group 21-22 years (Table 2) which is similar to study by Kothari of Marwar, Rajasthan and Gupta et al [3, 2] and one year later than by Galstaun [1] and Apurba Nandy.[4] The findings in our study of fusion of head of femur and greater trochanter are very

much accordance with other authors [5-8] those stated that it is 17-18 years of age. On comparing data of my study in both sexes, we found that fusion occurs in females almost at the same age with that of males.

Conclusions:

On the basis of observation and discussion of our work described earlier, the following is the age of fusion of epiphyses in years in pelvis sex wise in Rajasthan.

Table 3: Average Age of Union (in years)

Epiphyses	Females	Males
Head of femur	18-19	18-19
Greater trochanter	18-19	18-19
Lesser trochanter	18-19	18-19
Iliac crest	20-21	21-22
Ischial tuberosity	21-22	21-22

Since cases of lower than 18 years were not taken into study so the fusion of epiphyses below 18 years could not be studied.

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Table 1
Incidence of Fusion of Following Epiphyses in Female

Age Group in yrs		18-19	19-20	20-21	21-22	22-23	23-24
No. of Subjects studied		6	8	16	14	4	2
Head of Femur	Non-Fusion	0	0	0	0	0	0
	Partial Fusion	0	0	0	0	0	0
	Fusion	6 (100.0)	8 (100.0)	16 (100.0)	14 (100.0)	4 (100.0)	2 (100.0)
Greater Trochanter	Non-Fusion	0	0	0	0	0	0
	Partial Fusion	0	0	0	0	0	0
	Fusion	6 (100.0)	8 (100.0)	16 (100.0)	14 (100.0)	4 (100.0)	2 (100.0)
Lesser Trochanter	Non-Fusion	0	0	0	0	0	0
	Partial Fusion	0	0	0	0	0	0
	Fusion	6 (100.0)	8 (100.0)	16 (100.0)	14 (100.0)	4 (100.0)	2 (100.0)
Iliac Crest of Hip Bone	Non-Fusion	0	0	1 (6.25)	0	0	0
	Partial Fusion	4 (66.66)	6 (75.00)	3 (18.75)	2 (14.28)	0	0
	Fusion	2 (33.34)	2 (25.00)	12 (75.00)	12 (85.72)	4 (100.0)	2 (100.0)
Ischial Tuberosity of Hip Bone	Non-Fusion	0	6 (75.00)	2 (12.50)	0	0	0
	Partial Fusion	4 (66.66)	2 (25.00)	7 (43.75)	3 (21.43)	0	0
	Fusion	2 (33.34)	6 (75.00)	7 (43.75)	11 (78.57)	4 (100.0)	2 (100.0)

Table 2
Incidence of Fusion of Following Epiphyses in Male

Age Group in yrs		18-19	19-20	20-21	21-22	22-23	23-24
No. of Subjects studied		5	10	14	13	6	2
Head of Femur	Non-Fusion	0	0	0	0	0	0
	Partial Fusion	0	0	0	0	0	0
	Fusion	5 (100.0)	10 (100.0)	14 (100.0)	13 (100.0)	6 (100.0)	2 (100.0)
Greater Trochanter	Non-Fusion	0	0	0	0	0	0
	Partial Fusion	0	0	0	0	0	0
	Fusion	5 (100.0)	10 (100.0)	14 (100.0)	13 (100.0)	6 (100.0)	2 (100.0)
Lesser Trochanter	Non-Fusion	0	0	0	0	0	0
	Partial Fusion	0	0	0	0	0	0
	Fusion	5 (100.0)	10 (100.0)	14 (100.0)	13 (100.0)	6 (100.0)	2 (100.0)
Iliac Crest of Hip Bone	Non-Fusion	2 (40.00)	0	0	0	0	0
	Partial Fusion	1 (20.00)	6 (60.00)	6 (42.86)	2 (15.38)	1 (16.67)	0
	Fusion	2 (40.00)	4 (40.00)	8 (57.14)	11 (84.62)	5 (83.33)	2 (100.0)
Ischial Tuberosity of Hip Bone	Non-Fusion	1 (20.00)	0	0	0	0	0
	Partial Fusion	2 (40.00)	6 (60.00)	5 (35.71)	3 (23.07)	1 (16.67)	0
	Fusion	2 (40.00)	4 (40.00)	9 (64.29)	10 (76.93)	5 (83.33)	2 (100.0)

Original Research Paper

Histopathological Study of Lymph Nodes in Hanging and Strangulation Deaths

*Dildar Singh, **Vijay Vohra

Abstract

Hanging remains to be one of the common methods of committing suicide while strangulation is predominantly homicidal. Hence all cases of hanging are considered suicidal until the contrary is proved. Meticulous dissection and sharp distinction between hanging and strangulation is warranted during autopsy. Histopathology of various neck tissues can help to sort out this matter

The present study was done on medico-legal autopsies conducted by the Department of Forensic Medicine and Toxicology, Government Medical College, Amritsar from 1.3.2001 to 31.1.2003 to study the histopathological changes in neck structures in deaths due to hanging and strangulation. Tissue biopsy from the lymph nodes of the neck above and below the ligature mark was taken and histopathological examination was carried out. Congestion alone of upper and lower lymph nodes was seen more in cases of hanging (8%) as compared to strangulation (none), but congestion associated with infiltration was seen more in cases of strangulation (22.2%) than hanging (12%). No congestion or infiltration in either the upper and lower lymph nodes was observed in 5 (20%) cases of hanging and 4 (22.2%) cases of strangulation.

Key Words: Hanging, Strangulation, Histopathology, Congestion, Infiltration

Introduction:

A number of anatomical and physiological factors in varying permutations and combinations usually operate in bringing death and asphyxia is not the sole element involved [2] in hanging and strangulation deaths.

The local external features comprise marks of a ligature or constricting fingers. The internal findings include bruising in the soft tissues, injuries to blood vessels and congested lymph nodes of the neck. The solid structures of neck like hyoid and larynx are also damaged in some cases. [2, 3]

Only a few specialists [5, 6] have conducted the histopathologic studies of the neck tissue in such deaths to confirm the type and cause of death. The present histopathologic study of the traumatized/affected tissue will help in distinguishing the ante-mortem and postmortem aspects and add impetus to making the circumstances and cause of death in violent asphyxia more lucid.

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Material and Methods:

The present study was done on medico-legal autopsies conducted by the Department of Forensic Medicine and Toxicology, Government Medical College, Amritsar from 1.3.2001 to 31.1.2003 to study the histopathological changes in neck structures in deaths due to hanging and strangulation.

Dissection technique: The skull and the chest cavity were opened prior to the detailed dissection of the neck. It provides a comparatively cleaner field for the study of neck structures and avoids congestive artefactual haemorrhages in the neck structures as cautioned by Prinsloo and Gordon. [4] Tissue biopsy from the lymph nodes of the neck above and below the ligature mark was taken.

Preliminary data were recorded and various tissues under study were examined for their gross appearance. Histopathological examination was carried out as described by Culling et al. [1]

Observations:

In the present study of histopathological changes of trauma to the neck in hanging and strangulation total 1983 cases were brought for postmortem examination and out of which 45 (2.26%) cases were studied, in which the death had occurred due to hanging and strangulation.

Congestion of the lymph node above the level of ligature was seen in 2 (8%) cases of hanging and 3 (16.7%) cases of strangulation. (Fig.1) In 7 (28%) cases of hanging and 4 (22.2%) cases of strangulation, infiltration associated with congestion was observed in upper lymph nodes. (Fig. 2)

Congestion in the upper and lower lymph nodes was observed in 2 (8%) cases of hanging and none in strangulation. Congestion of upper and lower lymph nodes associated with infiltration in the upper lymph nodes was observed in 6 (24%) cases of hanging, 2 (11.1%) cases of strangulation.

Congestion of upper and infiltration in both upper and lower lymph nodes was seen in 1 (5.55%) case of strangulation. Collective congestion and infiltration of upper and lower lymph nodes was seen in 3 (12%) cases of hanging and 4 (22.2%) cases of strangulation. No congestion or infiltration in either the upper and lower lymph nodes was observed in 5 (20%) cases of hanging and 4 (22.2%) cases of strangulation.

Discussion:

Although congestion alone of upper and lower lymph nodes was seen more (8%) in cases of hanging as compared to strangulation (none) but congestion associated with infiltration was seen more (22.2%) in cases of strangulation than hanging (12%). (Table 1)

The reason for this might be more pressure exerted to neck due to greater violence in strangulation leading to rupture of capillaries of lymph nodes and subsequent infiltration into the substance of lymph node. In 20% of hanging and 22.2% of strangulation deaths, congestion and infiltration of lymph nodes was not observed. These are the cases in which vagal inhibition had played a predominant role as cause of death because in these cases, fatal injury, poisoning or natural disease was not present. Sudden cardiovascular collapse due to vagal inhibition did not allow the pressure in the blood vessels to be built to such an extent as to be sufficient to lead to congestion of capillaries and subsequent rupture.

Summary and Conclusions:

Congestion alone of upper and lower lymph nodes was seen more (8%) in cases of hanging as compared to strangulation (none) but congestion associated with infiltration was seen more (22.2%) in cases of strangulation than hanging (12%). The various features of the hanging and strangulation deaths that are available from the history of the case, police investigation, gross findings and autopsy

findings lead a forensic pathologist to the conclusion of compression of the neck and in majority of cases distinction between ante-mortem and postmortem aspects can be clearly made out. **However, borderline cases that test the mettle of forensic pathologist do always exist.** Though the present study will be of great help in establishing the cause of death from the histopathological studies of the soft tissues of the neck as well as ante-mortem v/s postmortem aspects of such cases yet further studies are required to be done to elucidate completely, whether the compression of neck is responsible or not in causing the death.

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Fig. 1: Section of Lymph Node Showing Congestion

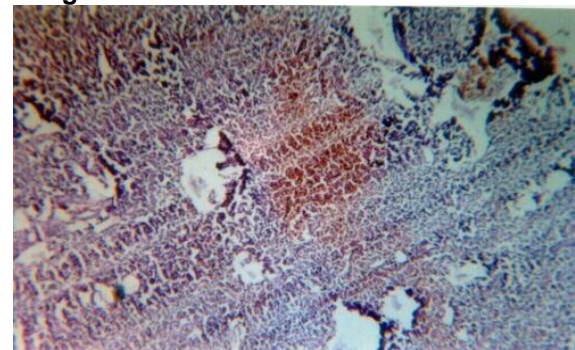


Fig. 2: Section of Lymph Node Showing Infiltration

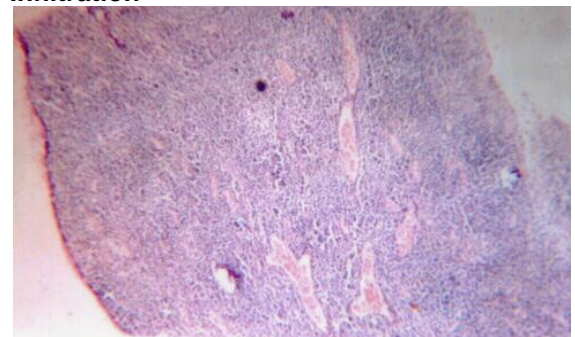


Table 1
Incidence and Distribution of Histopathological Changes in the Lymph Node in Hanging and Strangulation Deaths

Changes in the lymph nodes	Hanging		Strangulation	
	No.	%	No.	%
Congestion of upper lymph nodes	2	8	3	16.7
Infiltration of upper lymph nodes	0	0	0	0
Congestion + Infiltration of upper lymph nodes	7	28	4	22.2
Congestion of upper and lower lymph node	2	8	0	0
Congestion of lower lymph nodes	0	0	0	0
Infiltration of lower lymph nodes	0	0	0	0
Congestion + Infiltration of lower lymph nodes	0	0	0	0
Congestion of upper and lower and infiltration of lower lymph nodes	6	24	2	11.1
Congestion of upper and infiltration of upper and lower lymph nodes	0	0	1	5.55
Congestion + Infiltration of lower and upper lymph nodes	3	12	4	22.2
Cases in which congestion and infiltration is absent	5	20	4	22.2
Total No. of cases	25	100	18	100

Original Research Paper

Scenario of Attempted/ Criminal Abortion in Panoptic Spectrum at Tertiary care Hospital

*A. K. Singh, **U. B. Ghaffar, *T. H. Faruqi

Abstract

Abortion attempted/criminal is silent scourge which is penetrating the society domain. This paper synthesizes recent evidence on the attempted/criminal abortion scenario reported to tertiary care hospital, and explored some of the factors responsible. A total of 257 women admitted for termination of pregnancy were being studied. Findings revealed highest rate of abortion 42% in the age group of 26-30 years age groups and were mostly married (84%) followed by unmarried (13%). Abortion seeking women were mostly from Hindu religion and rural background although catchments' area was predominately Muslim populated. 60.7% of the patients presented between 8-12 weeks of gestation for termination followed by 31.5% between 13 to 16 weeks of gestation. Majority (52%) were multipara having 2-4 offspring with mean (2.8 ± 0.1) followed by primipara 34%. Patients having previous abortion history peaked in grand multipara group with mean (3.6 ± 0.2) followed by multipara (2.2 ± 0.3). Unplanned pregnancy was the main reason for termination, followed by contraceptive failure, social and financial constraints. The introduction of new technologies and legislation is expected to make safe abortion services more accessible.

Key Words: Abortion, Attempted abortion, Criminal abortion, Pregnancy, Multipara

Introduction:

Abortion attempted/criminal a tragic event has severe impact on the family, community, and eventually the nation detailing some very unpleasant truths. 'Miscarriage' is the premature or spontaneous expulsion of the products of conception from the uterus, usually in the first trimester.

'Abortion' is the termination of pregnancy when the fetus is not viable [1] or termination prior to 20 weeks' of gestation or a fetus born weighing less than 500 g (WHO, CDC & NCHS). Nearly thirteen percent of all illegal abortions in the world are carried out in India [2] and out of 20 million women who undergoes unsafe abortion annually, 70,000 die while millions suffer chronic morbidities. [3]

Before the enactment of MTP Act, 1971, induced abortion was illegal and violation of law (IPC 312 Causing Miscarriage). After commencement of MTP Act, medical abortion was almost decriminalized as well as liberalized.

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The reasonable restrictions are to prevent its misuse and to curb the rampant practice of criminal abortion by clandestine practitioners at one hand and, on the other hand imparting to strengthen the womanhood and remove the social fear or stigma associated with induced abortion. The restriction emphasizes as, authorized center, by competent person and in accordance with the provision of the act, which has now become a wide subjective variation. In this scenario an attempt was made by this study to critically evaluate the all abortion cases, conducted at the tertiary care center, directly as well as previously attempted case of unspecified places and persons etc.

Aims and Objectives:

In view of these septic and attempted abortion treated or brought for treatment at this tertiary care institution, our study was designed to know the following objectives in prospect of MTP Act:

- To identify the pattern of unsafe abortion.
- To identify different types of injuries inflicted in attempted abortion.
- To identify various methods used for safe abortion.
- Outcome of septic abortion, maternal morbidity and mortality.
- To identify conflicting issues observed/faced by the doctor in attempted abortion by interview.

Material & Methods:

The present study was conducted by the Department of Forensic Medicine in collaboration with Department of Obstetrics & Gynecology and Medical Record Section at Era's Lucknow Medical College & Hospital, a tertiary care institution of Lucknow, UP, from August 2011 to July 2012. The material for the present study comprises of information obtained from the patient's case record and interview with concerned consultant in charge.

Face to face interview was conducted in the form of pre-designed questionnaire and formulated. The questionnaire was designed so that the in-depth knowledge of safe and unsafe abortion could be fathomed.

Appropriateness in documentation, record keeping, and preservation of material of evidence as maintained were assessed with the standard norms. Proper care was taken for the consent of participants, confidentiality, ethical guidelines, and repute of the institution and individual as well. On the basis of analysis and observation, results were drawn and discussed and compared with other relevant studies available in the literatures.

Results and Discussion:

This prospective study was undertaken in view of different perspectives, so that a comprehensive analysis could be formulated. Study centered on all interrelated issues concluding the interesting picture of abortion and MTP act provisions enthusiastically. Total 257 cases admitted at this hospital in the last one year period, from 1 Aug 2011 to 31 July 2012.

The overall mean age of abortion in our study was 27.96 ± 5.41 ($n=257$), and maximum no of abortion occurs in age group 26-30 years; mean age 27.7 ± 1.4 ($n=109$; 42%) followed by next age group is 31-35 years; mean age is 32.7 ± 1.44 ($n=51$; 20%). (Table 1) The obvious reason of these peak age groups corresponds to the period of peak mating frequency. Similar observation found in the study of Usmani JA et al(2009); Pinto RY (1970) and Ganguli et al (1978). [4-6] Low abortion rate in extreme age groups are due to various social factors like Married-unmarried, education, social status, religion and limiting of family size etc.

In this study abortion is more common in married women ($n=215$; 84%). (Table 2) This clearly illustrates that married women now prefer to utilize the modern medical services for undergoing safer abortion elbowing out unsafe abortion due some social stigma etc. as previously common. Similar findings observed by Usmani et al (2009) in their study. This is

obviously fulfilling the major purpose of MTP Act. This skewed distribution towards married status may reflect hidden social stigma and underprivileged status of Un-married, widow and divorcee due to fear of social ostracization attached to illegitimate children and single motherhood. It cannot be denied that these cases might spuriously be registered as married one as it is based on information stated by patient and their relatives and it is widely accepted behavior.

Reasons of not availing the services of modern safe abortion by these women are many but in our opinion firstly is lack of awareness due to improper advertisement about the features & utility of MTP Act to the target population and secondly financial constraints forcing to land up in the claws of unqualified quacks for cheaper.

Abortion incidences are highest among multipara having 2 to 4 children as 52% ($n=133$), followed by primi 34% ($n=88$) and grand multipara having children 5 or more as 14% ($n=36$). (Table 3) Akinola et al also noted the similar trends with 47.7% in multipara, 43% in primipara and 9.36% in grand multipara. [9] Shiva Kumar BC et al also observed the highest affinity in multipara but similar trends with multipara (63.3%). [7] The reasons for highest distribution of abortion in multipara are many but failure to adoption, improper training of family planning methods and society affliction for male child are the major one.

Present study showed that the maximum rate 60.70% ($n=156$) cases fall in second half of 1st trimester and lowest incidence was recorded in first half of 1st trimester abortion 1.56% ($n=4$). (Table 4) This might be due to many obvious reasons like inappropriate diagnosis, failure of emergency contraceptive pills and medical abortion pills (easily available as an over the counter drugs as advertised and marketed by pharmaceutical companies) etc. Our study corresponds to the study of Shiva Kumar BC et al and Roy Chowdhury et al, they also observed that majority of women 84.7% and 95% were aborted in 1st trimester of their gestation period. [10]

In majority of cases 86.77% ($n=223$) the indication was mentioned as either incomplete (52.14%), Missed (26.85%) or septic abortion (12.45%). (Table 5) This shows inappropriate understanding of MTP Act as well as documentation. We observed some of the interesting finding that the term mentioned in case-record and register is in-fact representing the diagnosis of ailment or illness rather than indication and it is the most prevalent practices, although it might be included in indication criteria

under MTP Act. As these cases might fall in the 1st category of MTP indication in order to save life as it may endanger the life if untreated. The role of public awareness is also emphasized in the study of Jawed et al self consumption of abortion pills without any medical supervision is quite prevalent in this area and imposes a significant problem as observed by many. It has so many complications due to its in-judicial use and they usually hide this from their history due to presence of relatives or other known persons.

In our study retained product/hemorrhage was commonest complication (53.13%) of attempted abortion cases, followed by sepsis (28.13%), uterine perforation (15.63%), Peritonitis (12.50%). (Table 6) Our study which revealed retained product/hemorrhage as most common complication, in contrary to the finding of jawed et al where uterine perforation was the commonest complication (49.5%). This may be due to different population and practices or different prevailing condition in their area.

Most of the cases were performed by untrained "Dias" (inadequately trained female in the art of delivery, empower by state under conducive environment), quacks or practicing nursing staff in remote area under concealed manner. These untrained clandestine Practitioners are quite prevalent in the area and are able to manage the authority as well as run hospitals. There are reports of several lives on stake which is still in process waiting for some concrete action to be initiated.

Though criminal abortion, itself is abuse of medical procedure, and such procedure by untrained person amounts to grave criminality of the act under Sec. 304, 313, 314, 315 and 316 of Indian Penal Code. This is violation of human rights as well as violation of constitutional rights of women, "Right to Health" under Art. 21 of Indian Constitution.

Present study showed that suction evacuation was done in maximum cases 77.43% (n=199), especially first trimester abortion followed by prostaglandins 16.73%, hysterotomy 0.8%, laparotomy f/b Hysterectomy by 2.72% and exploratory laparotomy in 2.34% cases. (Table 7)

Hemorrhages was the most common complication after proper post abortion treatment at our tertiary care set-up in 17% cases, followed by retained product in 3% cases, bleeding disorder observed in 1.17% cases which was managed successfully with timely intervention. (Table 8) Uterine perforation and septicemia not recorded in any cases.

This shows institutional medical termination of pregnancy are safe and its complications if any are being managed safely by trained staff and facility.

Consent for abortion was of standard quality in majority of cases. It is observed that patients own consent which is supposed to be mandatory and sufficient in all cases was not stressed upon, and consent of husband or guardian were taken in majority of cases, though the patients were major and mentally sound.

Primary details such as weeks and months of pregnancy, size of abdomen, USG findings etc, were poorly documented. Indications of MTP as per the Act were mentioned in 8.6% cases of attempted abortion and genital finding in 6% cases only. Procedural note were of average quality. Description of the product of conception was mention in 67% cases which may be important evidential value in cases of attempted abortion. MTP register though being maintained but should be under prescribed format as per the Act. (Table 9)

Abortion is primarily a health concern of women but it is increasingly being governed by patriarchal interests, which is more often to curb the freedom of women to seek abortion as her right. MTP Act at one end widens the scope for protection of women's health, integrity and another on the other end protecting the life of unborn fetuses if the Act is read along with other sections related to miscarriages, Sec 312 to 316 of IPC.

Conclusion:

Abortion is inevitable phenomenon and primarily a health concern of women but, the failure to address this preventable maternal disability and death, represents one of the greatest social injustices. In India it is increasingly being governed by patriarchal interests which more often to curb the freedom of women to seek abortion as a right. It affects throughout the fertility period of women. Women literacy and awareness is the key role in privileges of MTP and scenario of abortion. The lack of commitment on the part of medical and nursing staff to provide prompt, attentive and emotionally supportive care indirectly dooms women whose lives could easily be saved.

MTP Act at one end widen the scope for protection of women's health, integrity and at another end protecting the life of unborn fetuses too, if the Act be read along with other sections related to miscarriages Sec 312 to 316 of IPC. It is the subject of intense moral, ethical, political and legal debates since abortion is not merely a techno-medical issue but "the fulcrum of a much

broader ideological struggle in which the very meanings of the family, the state, motherhood and young women's sexuality are contested". Customary taboos must be removed with government initiatives and benefits of MTP Act must reach to all irrespective of social and marital status. Legible documentation shall ensure accurate and concrete planning for health status of women and other demographic data like fecundity and fertility and other human behaviors etc. might be helpful in limiting the population explosion and improve the quality of life as well.

Suggestion and Recommendation:

Following suggestions are being proposed based on our study and scientific analysis.

1. **Public awareness:** about the benefits of MTP Acts by mass education via Radio, TV, News paper and other appropriate media.
2. **Women literacy:** Specially highlighting as a Women's Rights and empowerments and lawful privilege to the women.
3. **Obligation in rendering services:** The Medical fraternity must assume as obligation for rendering such services rather than to assume as custodian attitude as of some ill minded medical professionals.
4. **Adequate Infrastructure:** Primary health centers and sub centers must be properly staffed and equipped with adequate abortion and delivery services.
5. **Legible Prescription:** Emergency contraceptive and abortion pill must be available only with legible prescription.
6. **MTP/Abortion Clinic:** Hospital must run family planning clinic at all the three tier levels of health system along with abortion clinics.
7. **Pregnancy Registration:** Informal and formal registrations of pregnancy and outcome are monitored. Informal at the time of diagnosis and formal when completed 20th weeks of gestation (Like birth and death registration).
8. **National and State Health Programme:** It must be included in national programme and facilitated by Government programs as of date supported for delivery (free institutional delivery or cash incentives) like free institutional MTP, Incentives, and Paid leaves etc.
9. **Proper Documentation:** Proper documentation within prescribed format as suggested by authorities which includes relevant information and valuable in case of

death in attempted criminal abortion and negligence etc.

10. **Women Consent:** Consent of women is strict adherence in respect to Sec. 313 of IPC (Causing Miscarriage without woman's consent).
11. **MTP register:** MTP register must be properly maintained and clauses of MTP Indication must be properly mentioned and timely be reported to the authorities for analysis of family planning, demographic data and planning of national goals.
12. **Hospital Record Marinating Guidelines/ Record Audit**

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Table 1: Age wise Distribution

Age (yrs)	Cases	Mean Age (yr)	%
15-20	26	18.7 ± 1.29	10
21-25	46	23.2 ± 1.44	18
26-30	109	27.7 ± 1.4	42
31-35	51	32.7 ± 1.44	20
36-40	22	37.5 ± 1.37	09
41-45	03	41.3 ± 0.58	01
Total	257	27.96 ± 5.41	100%

Table 2: Marital Status

Group	Cases	%
Un- Married	34	13
Married	215	84
Widow	03	01
Divorcee	05	02
Total	257	100%

Table 3: Parity, Past H/O, Abortion

Parity	Cases (%)	Mean Parity	Mean Abortion History
Primipara	88 (34)	-	1.3 ± 0.1
Multi (G2-G4)	133 (52)	2.8 ± 0.1	2.2 ± 0.3
Grand Multipara (G5 & >)	36 (14)	5.4 ± 0.3	3.6 ± 0.2
Total	257		

Table 4: Gestational Period

Gestational Age	Cases	%
Up to 7 weeks	4	1.56
8 wk – 12 wk	156	60.70
13 wk – 16wk	81	31.52
17 wk – 20 wk	16	6.23
Total	257	100

Table 5: Indications of MTP/ Medical Abortion

S. N.	Indication of abortion/MTP	Cases (%)
1	In order to save life	9(3.50)
2	In order to prevent Grave injury, physical & mental	--
3	Substantial risk to child to suffer physical & mental abnormalities as seriously handicapped (Congenital diseases)	--
4	Failure of contraceptive device or method	13(5.06)
5	Pregnancy alleged due to Rape	--
6	Incomplete	134(52.14)
7	Missed (Inevitable)	69(26.85)
8	Septic abortion (attempted at unspecified place)	32(12.45)

Table 7: Methods used for Termination/Treatment

S. N.	Methods	Cases	%
1	Suction & evacuation	199	77.43
2	By prostaglandins	43	16.73
3	Hysterotomy	2	0.8
4	Laprotomy f/b Hysterectomy	7	2.72
5	Exploratory laparotomy	6	2.34

Table 6: Complications (Medical & Surgical) in Attempted Abortion at Admission

S. N	Complication	Cases
1	Retained product /Hemorrhage	17 (53.13)
2	Sepsis	9(28.13)
3	Uterine perforation	5(15.63)
4	Peritonitis	4(12.50)
5	Intestinal perforation with peritonitis	3(9.38)
6	Pyometra/ Uterine hematoma	3(9.38)
7	Pyo-peritonitis	2(6.25)
8	DIC	2(6.25)

Table 8: Overall Post Abortive Complications Primarily Conducted at Tertiary Set Up

S. N	Complications	Cases	%
1	Hemorrhage	43	16.73
2	Retained product	7	2.72
3	Bleeding disorders	3	1.17
4	Uterine perforation	--	--
5	Septicemia	--	--

Table 9: Medical Documentation

Criteria's	Status (% cases)	Standard	Average	Poor
Consent of women	Yes (27%)	Yes	--	--
Primary details	Yes (78%)	--	Yes	--
MTP Indications	Yes (8.6%)	--	--	Yes
Genital Findings	Yes (6%)	--	--	Yes
Procedure note	Yes (73%)	--	Yes	--
Product description	Yes (67%)	--	--	Yes
MTP register	Yes	--	--	Yes

Original Research Paper

Determination of Sex by Shape and Size of Hyoid Bone

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Abstract

Identification is the task that an investigator does when an unknown dead body is found with an allegation of crime. Identification is often a difficult task in many of the criminal cases due to decomposition by the time the dead body has been noticed. The present study was conducted to know the relationship of the sex with the shape and size of the hyoid bone. Excised hyoid bones from 81 male and 49 female dead bodies were studied from a South Indian population. Results showed that hyoid bones were highly polymorphic in size and shape across the ages in both sexes. However V shaped hyoid bone was more common compared to U shaped hyoid bone in adult males. The Length and the width of the hyoid bone were larger in males compared to females. The study of hyoid bone will be inadequate in sex determination and needs to be considered along with the measurements of other bones of the same individual for more accuracy.

Key Words: Hyoid bone, Shape, Size, Greater horn, Sex, Identification

Introduction:

Identification assumes great significance in criminal investigations. Determining the age and sex of the individual are the most essential data in establishing the identity of unknown skeletal remains. Studies have been done on establishing the sex from femur, sternum, clavicle, radius, ulna, scapula and others. [1-6] Determining sex from hyoid bone has not been reported from South India.

The present study was conducted to know the relationship of the sex with the shape and size of the hyoid bone.

Materials and Methods:

The prospective study was conducted on 130 cases, that were selected by simple random sampling and details such as sex were noted. In each case hyoid bone was carefully dissected from the neck structures. Observations of the hyoid bone like size, shape were noted with the help of sliding calipers and screw gaze. (Fig. 1)

1. **Width of hyoid (BC):** maximum distance between the greater horns;

2. **Length (AP):** distance from the anterior middle of the body of hyoid to the point lying mid-way between the tips of the greater horns;
3. **Thickness of the greater horns:** minimum diameter at the junction of posterior one third and the anterior two thirds

The hyoid bone was viewed as to belong to either of the two shapes.

- **'V'(Parabolic) Shape** of the hyoid bone, where the width was greater than the length
- **'U' (Hyperbolic) Shape** of the hyoid bone, where the width was equal or less than the length.

Data was designed on a master chart and analysed statistically using SPSS version 15. T-test, fisher's exact test and chi-square test were used to find statistical significance. $P < 0.05$ is considered to be statistically significant.

Fig. 1: Measurements of the Hyoid Bone by Calipers and Screw Gaze



Results:

In our study distribution of V shaped and U shaped bones across the ages was not showing any remarkable trend.

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In males, 56% had V shaped hyoid bones and 44 % had U shaped hyoid bones. In females, 45% had V shaped hyoid bones and 55 % had U shaped hyoid bones. Association between shape and sex was not significant statistically as per fishers exact test. (Table 2)

Present study showed that Hyoid bones were highly polymorphic in size across the ages in both sexes. Their Length ranged between 3 Cms and 4.5 Cms. Their width ranged between 3 Cms and 5.5 Cms. The smallest hyoid bone belonged to a male victim aged 4 years and it was measuring 3 x 3 Cms. In victims aged 12 or more, 3 Cms was the least measure noted in length and 3.5 Cms was the least measure noted in width of the bones. (Table 3)

The average antero-posterior length of hyoid bone was 3.93 Cms and average width was 4.37 Cms in males above 20 years. Average stature of these males was 167 Cms while the average antero-posterior length of hyoid bone was 3.55 Cms and average width was 3.84 Cms in females above 20 years. Average stature of these females was 160 Cms. On comparing the dimensions in sexes, the average length and the average width of the hyoid bone was larger in males by 0.38 Cms and 0.53 Cms respectively.

In our study 17.7% of the cases showed greater horns measuring less than 2 mm in thickness. 10% of the cases had Hyoid bones with bilaterally thin greater horns and 7.7% of the cases had unilaterally thin greater horns. Thin left greater horn was more commonly found than thin right greater horn. 22.4% of the Females and 14.8% of the males had thin greater horns. (Table 4)

The victim aged 4 years had both greater horns thinner than 2mm in thickness. Thin greater horns were reported from almost all age groups without any particular trend beyond 12 years of age. In Females aged 21-30 years, 26.3% of them were having bilaterally thin greater horns and 10.6% were having unilaterally thin greater horns. (Fig. 2)

Discussion:

Identification is the task that an investigator does when an unknown dead body is found with an allegation of crime. Identification is often a difficult task in many of the criminal cases due to the onset of decomposition by the time the dead body has been noticed. Because of the inability for facial recognition and the loss of soft tissues in a putrefied body, sex determination will have to be done with skeletal remains. Age is an important characteristic that helps in identification which has been

researched and published from the same set of hyoid bones. [7]

Identification of sex is a very important opinion for establishing a partial identity of skeletal remains. Accuracy rate in Identification the sex from an entire skeleton is highest when compared to the accuracy rate from individual bones. However, there are situations when the experts have to opine about the sex from a bone or a small set of bones.

The anthropometric measurements of the hyoid in the present series (South India) were comparable with those of a French, Croatian and North Indian studies. [8-11] It is doubtful whether a gross examination of hyoid bone will help us in differentiating populations. The shape and size of the hyoid bone varies with the sex and hence they could be regarded as sex indicators. [10-14] Identification of sex from the hyoid bone is possible as per previous studies. [9, 15] The present study, although found a supporting trend, did not find any significant association.

There have been few studies that are based on indirect and sophisticated/radiological measurements of the size of the bones. [13]

Most of the criminal investigation scenarios are going to give an opportunity for direct measurement of the bone. Commenting on the shape of the bone should best be done by direct examination of the bone after its dissection during autopsy as in this present study because it will be practical, accurate and reliable. Majority of the males in this study had V shaped hyoid bones. Majority of the females in this study had U shaped hyoid bones. Both the types of bones could be found in any sex and this was matching with earlier reports. [14, 16]

Length, width and the thickness of the Greater horn of the hyoid bone were more in males when compared to females. All the previous reports are unanimous on this. [9-16] this greater size in males is a common feature observed in other bones as well.

The vulnerability of hyoid bone to fracture is better decided by incidences calculated from hanging deaths compared to strangulation deaths which are highly variable in terms such as force acting on the bone.

Incidence of fracture of hyoid bone in hanging is variable as per studies. [17] The Present study reports an incidence of thin greater horns as 17.7%, which closely matches with the average of incidence of fracture of the hyoid bone from the previous studies. Di Maio [18], Feigin [19], Nikolic et al [20] have found left greater horn fractured in more number of cases compared to the right greater horn. The present

study is matching with earlier reports which found higher vulnerability on the left side.

Female victims showed higher incidence of fracture compared to the male victims. [19, 21] Miller et al [14] found that the female hyoids had relatively long thin distal segments. Strength of the hyoid bone is less in females. [22] The present study found females to have higher incidence of thin greater horns compared to males and it is matching with reports which found higher vulnerability to fracture in females.

It can be concluded that a gross examination of a hyoid bone to know its shape and size alone will not be useful in determination of sex. However, if the shape and size of the hyoid bone is considered along with the measurements of other bones of the same individual, sex determination could be done with more accuracy.

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Table 1: Age and Sex Distribution of Study Subjects

Age (years)	Males	Females	Total
4	1	0	1
12-20	12	15	27
21-30	27	19	46
31-40	22	8	30
41-70	19	7	26
Total	81	49	130

Table 2: V Shaped and U Shaped Hyoid Bones in Males and Females

	Males	Females
V shape	45 (56%)	22 (45%)
U shape	36 (44%)	27 (55%)
Total	81 (100%)	49 (100%)

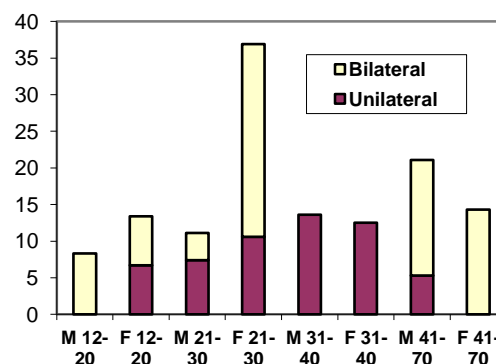
Table 3: Size of Hyoid Bone in Both Sexes with Advancing Age

Age	Males		Females	
	Average length \pm SD	Average width \pm SD	Average length \pm SD	Average width \pm SD
4	3.00	3.00	-	-
12-20	3.83 \pm 0.25	4.12 \pm 0.53	3.50 \pm 0.38	3.90 \pm 0.39
21-30	3.96 \pm 0.24	4.33 \pm 0.50	3.53 \pm 0.31	3.81 \pm 0.45
31-40	3.86 \pm 0.38	4.48 \pm 0.52	3.69 \pm 0.26	3.88 \pm 0.35
41-70	4.08 \pm 0.25	4.53 \pm 0.46	3.57 \pm 0.45	3.71 \pm 0.27

Table 4: Distribution of Thin Greater Horns in Males and Females

Thin Greater horns (%)	Males (n=81)	Females (n=49)	Both Sex (n=130)
Right	2.5	2	2.3
Left	4.9	6.1	5.4
Both	7.4	14.3	10
One or Both	14.8	22.4	17.7

Fig: 2: Incidence of Thin Greater Horns in Different Sex and Age Groups



Original Research Paper

Age Estimation from Eruption of Permanent Teeth as a Tool for Growth Monitoring

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Abstract

Parents consider tooth eruption as an important event in the child's development, and they have often showed their concern about the timing of eruption of teeth. However, it has been suggested in the literature that standards for tooth emergence should be derived from the population in which they are to be applied because factors related to emergence may vary considerably in both dentitions and BMI. Present study was done to find out average age from eruption of teeth in general and to compare relationship between age and BMI. For these 658 school-going children of age group 5 years to 15 years were studied for the eruption of permanent teeth with relation to age and BMI. Out of these 658 cases, 330 were males and 328 were females. It was found that in most cases the permanent teeth erupted earlier in the females than males and that the eruption of teeth was earlier in mandible (lower jaw) than in maxilla (upper jaw) and are consistent with age and BMI.

Key Words: Molars, Age estimation, Teeth, BMI, Children, Upper Jaw

Introduction:

Parents consider tooth eruption as an important event in the child's development, and they have often showed their concern about the timing of eruption of teeth. However, it has been suggested in the literature that standards for tooth emergence should be derived from the population in which they are to be applied because factors related to emergence may vary considerably in both dentitions and BMI. [3] Similarly, adequate knowledge of timing of permanent tooth emergence is essential for diagnosis and treatment planning in pediatric dentistry, orthodontics and Community Medicine for monitoring the growth of children. [1]

Furthermore, information on tooth emergence is also used to supplement other maturity indicators in the diagnosis of certain growth disturbances, and in forensic dentistry to estimate the chronological age of children with unknown birth records. [1-3]

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Therefore, the specific standards on the timing and sequence of emergence of the permanent teeth represent an important resource for general dental practitioners and specialists involved in managing dental that variation exists in the eruption times of permanent teeth, and this may be attributed to numerous racial and nutritional differences.

It has been reported that some other variables like genetic and hormonal factors geographical, ethnic, gender, as well as economic status parameters have been shown to exert influences on eruption times and emergence of permanent teeth. [3, 5-9]

Studies have reported a relationship between the eruption time, with the weight and height of children. Children who are below average weight and height showed a later eruption time than those children who are within the standard range. [5, 10] The objectives of the present study were to determine the mean eruption time of permanent first molars and incisors, and to compare the relationship of the eruption time with Body Mass Index (BMI). BMI was calculated using the following formula

$$\text{BMI} = \frac{\text{Weight (Kg)}}{[\text{Height (m)}]^2}$$

In a developing country like India, a large number of people are illiterate and have no knowledge or records of their date of birth which is required by law enforcing agencies in matters like, criminal responsibilities, identification, judicial punishment, consent, rape, criminal

abortion, employment, attainment of majority, kidnapping, prostitution and for growth monitoring by the parents, teachers and health personnel. [11] This method is more suitable since it does not require any special equipment, expertise and is more economical and can be assessed by the para-medical personnel also with reliable accuracy. Tooth formation is the best choice for estimating the age as variations are less as compared to other development factors. Since population of India is very large and its climatic conditions are different in different areas hence a cross-sectional study was carried out in Community Health Center Farukhnagar District Gurgaon, Haryana to estimate the eruption time of permanent teeth in the age group of five years to fifteen years.

Aims & Objectives:

1. To find out average age from eruption of teeth in general.
2. To compare relationship between age and BMI.

Material & Methods:

658 school-going children of age group 5 years to 15 years were studied for the eruption of permanent teeth with relation to age and BMI. The basic information about the children such as age, educational level, date of birth, place of birth, and family name was recorded on the especially designed form taken from their personal files in the school record. The children were weighed in kilograms using a weighing scale after removal of the shoes only.

The height of the children was measured using a wall-mounted tailor tape on the child's head with their back and knees completely straight, and their feet together. The height was then rounded to the nearest centimeter. Clinical examination was done using a wooden spatula to retract soft tissue, and the status of eruption of the permanent tooth was recorded. Their teeth were examined visually in good light using probe, spatula and mouth mirror for eruption. A tooth was considered erupted, if it has pierced through gums and un-erupted if not present in oral cavity.

Only those cases were considered whose records were available for date of birth from school records or immunization card. After examination of teeth, the data was tabulated and analyzed statistically for mean age, range and S.D. for eruption of each tooth in the upper and lower jaw and also for right and left sides of the same jaw and for sex difference.

Result & Discussion:

The study was conducted during the period of June 2012 to November 2012 and 658

school-going children were examined randomly from various schools under the jurisdiction of CHC Farukhnagar. Our study showed that out of a total of 658 children 170(25.84%) were male children in the age group 5-10 years and 168(25.53%) children in the age group of 10-15 years. Female children were 160 (24.32%) in both the groups. (Table 1)

It was found that in most cases the permanent teeth erupted earlier in the females than males and that the eruption of teeth was earlier in mandible (lower jaw) than in maxilla (upper jaw), The findings were consistent with the findings of Sharma and Mittal [14] who also found that eruption is earlier in females and that too in mandible.

First permanent teeth to erupt were first molars at the age between 9.42-11.16 years in both the jaws. Permanent central incisors erupted between the ages of 6.11 to 8.60 years for both halves of upper as well as lower jaw. Permanent lateral incisors erupt at the age of 7.56 to 9.86 years in both halves of both jaws. First permanent pre-molars erupt between 9.42-11.16 years with mean age of 10.14 ± 0.42 years. Second permanent pre-molars erupts between 10.02 to 11.36 years for the both halves of upper and lower jaw.

Next permanent teeth to erupt are canines at the age between 10.72 to 11.88 years for both halves of upper and lower jaw. Second permanent molars erupt at the age between 12.03 to 14.18 years in both jaws and on both right and left sides with the mean age of eruption at $13.20 \pm .65$ years in lower jaw and 13.30 ± 0.62 years in upper jaw. We found next permanent teeth to erupt were central incisors which erupted between 6.11 to 8.60 years in both halves of upper and lower jaws.

Next teeth found to erupt was found to be second premolars at the age of 10.02 to 11.36 years in both halves of upper and lower jaws with the mean age of eruption 10.65 ± 0.35 years for the lower jaw and 10.70 ± 0.38 years for the upper jaw.

We found that canines erupted at the age between 10.72 to 11.88 years for both halves of the upper and lower jaws with the mean age of eruption 11.36 ± 0.46 years for the lower jaw and 11.28 ± 0.37 years for the left half and 11.23 ± 0.35 years upper jaw. In our study, we found that M2 was next to erupt between 12.03 to 14.18 years for upper jaws and 12.03 to 14.16 years in both halves of lower jaws with the mean age of eruption 13.20 ± 0.65 years for the lower jaw and 13.30 ± 0.62 years for upper jaw.

These finding were similar to the finding of Grewal [15] who in his study found that first

permanent teeth to erupt was M1 and erupts at the age between 6 to 7 years, central permanent incisors erupt between 7 to 8 years, lateral incisors in between 8 to 9 years, first premolars between 9 to 10 years, second premolars between 10 to 12 years, canine to erupt at the age between 11 to 12 years, age of eruption of M2 as 12 to 14 years.

We also studied the co-relation of eruption of teeth with sex of the child; the difference was not significant.

These findings were similar to the study done by Ilieva et al [16] also found no significant difference in eruption and sex of the child as well as no difference in eruption in two jaws. It was noted that the permanent teeth erupted earlier in the females than males and that the eruption of teeth was earlier in mandible (lower jaw) than in maxilla (upper jaw), were consistent with the findings of Sharma and Mittal [14] who also found that eruption is earlier in females and that too in mandible.

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Table 1: Age and Sex wise Distribution

Age group	Male (%)	Female (%)	Total Cases (%)
5-10 years	170(25.84)	160(24.32)	330(50.15)
10-15 years	168(25.53)	160(24.32)	328(49.85)
Total	338(51.37)	320 (48.63)	658(100.00)

Table 2: Eruption of Permanent Teeth in both Jaws and Sides in the Age Group of 5-10 Years

Type of Tooth	Jaw	Side	cases	Range	Mean \pm S.D
Central Incisor	U J	R	67	6.11-8.60	7.32 \pm 0.62
		L	63	6.11-8.60	7.28 \pm 0.63
	L J	R	76	6.11-8.60	7.28 \pm 0.63
		L	74	6.11-8.60	7.28 \pm 0.63
Lateral Incisor	UJ	R	71	7.56-9.86	8.92 \pm 0.56
		L	70	7.56-9.86	8.92 \pm 0.56
	LJ	R	64	7.56-9.86	8.92 \pm 0.56
		L	64	7.56-9.86	8.92 \pm 0.56

Table 3: Eruption of Permanent Teeth in both Jaws and sides in the Age Group of 10-15 Years

Type of Tooth	Jaw	Side	cases	Range	Mean \pm S.D
Canine	UJ	R	47	10.72-11.88	11.28 \pm 0.37
		L	48	10.72-11.88	11.30 \pm 0.34
	LJ	R	58	10.72-11.88	11.36 \pm 0.46
		L	62	10.72-11.88	11.36 \pm 0.46
PM1	UJ	R	80	9.42-11.16	10.14 \pm 0.42
		L	78	9.42-11.16	10.16 \pm 0.42
	LJ	R	80	9.34-11.16	10.18 \pm 0.48
		L	80	9.34-11.16	10.18 \pm 0.48
P M 2	UJ	R	38	10.02-11.36	10.70 \pm 0.38
		L	40	10.02-11.36	10.70 \pm 0.38
	LJ	R	39	10.02-11.36	10.65 \pm 0.35
		L	40	10.02-11.36	10.65 \pm 0.35
M2	UJ	R	272	12.03-14.18	13.30 \pm 0.62
		L	260	12.03-14.16	13.28 \pm 0.61
	LJ	R	284	12.03-14.16	13.20 \pm 0.65
		L	286	12.03-14.16	13.20 \pm 0.65

Original Research Paper

Profile of Mutilation-Murder in Northern Medico-legal Jurisdiction of Himachal Pradesh, India

*Rahul Gupta, **Vijay Arora

Abstract

Although the mutilation-murders are rare, but sudden outbreak of such cases over one year period (May2011-April2012) in Northern Medico-legal Jurisdiction of Himachal Pradesh (India) has put distrust on the security system in the state and have left the public with volte-face due to escalation of the hideous crime in the society. The purpose of this study was to provide an analysis of the mutilation-murders. Among total mutilation-murders all were of 'defensive type' executed through both active (cut-off parts, incineration) and passive (animal gnawing, decomposition) means of mutilation. Among all victims 77.78% are female victims of 18-40years age group; absolute identification could be established in 33.33% cases, which were the local inhabitants and being killed by their lovers and acquaintance in rainy and summer season by means of mechanical asphyxia and were involved in illegitimate sexual relationships. Six of them remained un-identified; this fact is suggestive of need of DNA profiling based identity card of the citizens to conquer the objective of mutilation-murder in the society.

Key Words: Mutilation, Homicide, Corpus delicti, Medico-legal, Crime

Introduction:

Mutilation [1] (the act of removing or destroying a conspicuous or essential part or organ) of a corpse has always been viewed by society to be a more dreadful crime than the homicide itself. "Mutilation-murder" is an extremely rare crime and is defined as "those homicides where the offender tried to dismember the victim". [2] Pu"schel and Koops [3] have suggested four different kinds of homicidal mutilation:

- **Defensive:** where the motive is to assist in hiding or moving the body, or getting rid of evidence, or making identification of the victim more difficult;
- **Aggressive:** where the killing and mutilation is brought about by the same aggressive strong emotions
- **Offensive:** where the dismemberment is in fact the real purpose of the murder all along (lust and nacro sadistic murders);
- **Necromantic:** mutilation carried out on a dead body with a purpose of using some body part(s) as a trophy, symbol or fetish.

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In water all manner of aquatic animals can mutilate immersed bodies, as well as land mammals if the corpse is in shallow water or grounded on a mud-bank or the beach. [4] Rajs J et al [5] have reported that mutilation occurs in time clusters and mostly during the summer and winter periods and had increased during the three decades from 1960 to 1990 with incidence rates of 0.05, 0.1, and 0.125 per million inhabitants per decade respectively.

Dismemberment is in reality a relatively rare method whereby after killing the victim, the murderer uses a very sharp cutting weapon (a saw, axe, etc.) to sever the limbs and cut the body into small pieces. [6]

Apart from an unfavorable personal life situation at the time of the offence, essential predisposing factors are: poor integration in society and family, occupational problems, drug abuse and mental diseases. [7]

It is probably true everywhere in the world that interpersonal relationships, especially those with a sexual component are associated with the most intense of human passions, including violent passion. [8] Mostly in the literature only case reports have been published and there is scarcity of information on the topic of mutilation-murder and its updated trends; our study is an endeavor to establish different medico-legal aspects in this regard.

Material and Method:

This article presents a retrospective study of a consecutive series of 'mutilation-homicides' that were autopsied over the period of one year from May 2011-April 2012 in the Department of Forensic Medicine, Dr. R.P.G.M.C. Kangra at Tanda, H.P. i.e. Northern Medico legal jurisdiction comprising six districts of Himachal Pradesh, India.

Out of 203 medico-legal autopsies conducted over this period, the reports of mutilation-homicide cases were identified. Information about the cases was collected from the police inquest papers and the post-mortem reports; with respect to Forensic point of view, the material facts were noted down and analyzed to compare with the selected studies in other regions of the world.

Results:

As per authors acquaintance only occasional streak cases of mutilation-murders have been reported in the state of Himachal Pradesh (India) and this is the first time when annual incidence of 4.43% (nine cases among total 203) has been noticed and is being documented. Out of total nine cases 55.56% were males and 44.44% were females. Seven were in young adult age group (18-40 years) and two were in age group of 41-60 years i.e. 77.78% of the total mutilation-murder victims and all the female victims were of young adult age group.

The seasonal propensity of mutilation-homicide was 44.44% in rainy season, 33.33% in winter season and 22.22% in summer season. Among males and females, 80% males and 75% females were made victim of mutilation-homicide in rainy and summer season.

Among all cases, the cause of death could be ascertained in 44.44% cases and in 55.56% cases it is being given as 'Homicide by unspecified means'. The various methods for execution of homicide in diagnosed cases were mechanical means of asphyxiation like strangulation, throttling, gagging with strangulation and smothering. The implements used for ligature strangulation and gagging were soft, broad cloths of victims on all occasions. One person was smothered by the soft pillow at his residence only. One male victim was subjected to manual throttling.

The police was able to nail down offenders in three cases (33.33%) only, where the victims have been identified as local inhabitants and two of them were killed by their lover, whereas one was murdered by an acquaintance (family members of girl to whom the victim was in intimate relation). The police

was not able to establish absolute identity of victims whose dead bodies have been retrieved from the mud/ rocky- bank of rivulets along the national and state highways and ultimately for time being the investigation met a dead end.

On police investigation, primary and secondary crime scene were documented in three cases of local inhabitant of the area (two were killed outdoor and one was killed indoor); rest all corpses were retrieved from secondary crime scene (i.e. the mud/ rocky- bank of rivulets along the national and state highways) used only to dispose of and get rid of the corpse. All the three local victims of mutilation-murder were involved in the illegitimate sexual relations; five un-identified cases without any apparel have raised the suspicion of sex related crime and in one case no possibility could be made out.

One male and one female were chopped off after their death with moderately heavy sharp weapon and dead bodies (torso only) were recovered from boxes lying in bank-sides of rivulets. One male and one female after being killed by homicidal strangulation were mutilated by incineration using accelerants like kerosene, petrol, rubber of wheels. The head of four victims were disfigured with heavy stones and then bodies were thrown on road side rivulet's banks in secluded place to subject the corpse for decomposition and gnawing by wild animals. In all these cases mutilation was of post-mortem nature.

All mutilation- murder cases studied were of "defensive type". There was no evidence of any genital mutilation of the body or any other torture over the body remains or over-killing or sharp injuries over breast, lower abdomen, perineum etc. in the studied cases so cannot be classified among remaining three types of mutilation-murders.

Discussion:

The major duties of a medico-legal system in handling deaths falling under its jurisdiction are:

- To determine the cause and manner of death
- To identify the deceased if unknown
- To determine the time since death and injury
- To collect evidence from the body that can be used to prove or disprove an individual's guilt or innocence and to confirm or deny the account of how the death occurred.
- To document injuries or lack of them
- To deduce how the injuries occurred
- To document any natural disease present
- To determine or exclude other contributory or causative factors to the death

- To provide expert testimony if the case goes to trial;

The manner of death as determined by the Forensic Pathologist is an opinion based on the known facts concerning the circumstances leading up to and surrounding the death, in conjunction with the findings at autopsy and the laboratory tests. [9]

Homicide is a ubiquitous phenomenon and the cases included in this study have been labeled as homicide on this medical ground only. The homicide fortified with mutilation of corpse is documented from ancient times. The mutilation of dead body has become common in recent time all over the world. [10-16] In Federal Republic of Germany, Gerchow [16] had reported an average of 6 to 7 mutilation murders every year during a ten-year period in the sixties and seventies. In a study of Rajs et al [5] conducted at Sweden, the incidence of mutilation murders during the three decades 1961–1990 was 0.05 to 0.125 cases per million inhabitants per year.

At the authors working place and in Indian context no previous study pertinent to this subject is available but as per their acquaintance except on streak occasion such cases has never been dealt in large in the previous years and this is the sudden outbreak in the incidence so it is not suitable and prudent effort to compare incidence of such cases in this hilly region of India with the other regional studies. Second reason is in concerned police stations of jurisdiction, no complaint regarding missing local inhabitant was on the record except three cases that were positively identified as inhabitants of the local jurisdiction.

In regard to rest six which were found on the rivulet's side banks: as this place being land of hills, gorges, forests, wild animals and rivers provide the offenders with lot of choice for secluded places; seems to be plausible reason for transporting the corpse to this terrain to taunt the police investigation and to use it as a dumping ground for such corpse so that corpus delicti can be further significantly impaired by passive processes like natural means of advance decomposition and animal gnawing.

In our cases, only 'defensive type' of mutilation-murder cases have been identified; which is in accordance with the study of Gerchow [16], who reported defensive mutilations as common type in the Federal Republic of Germany, Austria, and Switzerland and is in discordance with the study of Rajs et al [5] reporting higher proportion and incidence of offensive mutilations as compared to the defensive mutilation-homicides.

There was a clear association between mutilation and the season of the year. Our study has revealed the seasonal preponderance of 'defensive-mutilation' in order of frequency as rainy, summer and winter i.e. 'defensive-mutilations' were more common in rainy season (August) and this fact is in accordance with other studies. [5]

Irrespective of the different system are being followed in different jurisdiction all over the world, investigation to the incidence of death in suspicious circumstances starts with the establishment of corpus delicti (i.e. facts of any predefined criminal offence); the main fact of which are the establishment of the identity of corpse, infliction of violence in a particular way, at a particular time and place, by the person or people charged with crime.

As in India, during the period of reported cases the cases of murder with dismemberment retrieved from various railway stations and other places have been the headlines of the news, media along with lots of arguments by the concerning investigation authority on their helpless condition to handle such crime because of lack of identification of the corpse. It is our impression that the focus on such crimes in media may have stimulated potential mutilators in this peaceful part of India and have used mutilation as tool to shield them from investigating agencies; this fact is in accordance with other authors. [5] The mutilations were more common in big cities; finding in accordance with reports from the United States and Sweden. [10, 13, 15]

The majority of victims were of young adult age group 18-40 (median 30) years and only two were between 41-60 years. Four females were of adult age group i.e. 18-40 years. The adult age group is more vulnerable as a victim of the mutilation-murder and illicit sexual relation being the perpetuating cause for this sort of end to the life.

The state police was able to nail-down offenders in 33.33% cases of mutilation-homicides where both victims and offenders were the local inhabitants of the Northern medico-legal Jurisdiction of the state. The killing had been performed without any planning where the offender suddenly found himself with a dead body and the aim of mutilating the corpse was to disrupt the identity of the deceased and getting rid of it without any mental or practical preparations. This behavioral pattern is also reflected in the fact that the dead body had been left at the scene of the crime. The cases of defensive-mutilation in this hilly terrain of India have been performed mostly by more than one

disorganized murderers and were not planned and on all occasions the illicit sexual relations have been reported. Sadistic cutting or stabbing may be inflicted on sexually significant areas, especially the breasts, buttocks, perineum and lower abdomen and fatal head injury; throttling and knife injuries may be sexually oriented. [4] In the series of reported cases no such finding has been documented and none of the case was labeled as of 'offensive type' mutilation-homicide.

The causes of death determined at autopsy in four of the nine cases was by different means of the mechanical asphyxiation like manual strangulation, throttling, strangulation with gagging, smothering.

In three out of nine cases the perpetrators were identified and preponderance of male perpetrators aged 17 to 53 years (median 37 years). The offender was assisted in the mutilation-homicide in two cases by the female for mutilation of the corpse after the deceased was being murdered by the offender.

In three cases the body parts were found in the boxes being retrieved from the rivulet bank-side near the vicinity of the state or national highways. Konopka et al [17] reported that homicides ending with corpse dismemberment are most commonly committed by a person close to or at least acquainted with the victim and dismemberment is nearly always performed at the site of homicide, generally at place inhabited by the perpetrator, our findings are consistent with this study.

In the observed 'defensive type' mutilation- homicides cases in this hilly terrain of India; in 33.33% cases the perpetrators have transected the body by cutting off the head and extremities of the victim for transporting the corpse and concealing it where it will not be noticed, in two cases has been mutilated through the postmortem incineration, the mutilation of the corpse in 33.33% cases has been accomplished by disfiguring the head of corpse with stones and further being mutilated by the animal's gnawing, and one case was mutilated by the passive means of the process of decomposition when lonely living corpse kept into a metallic box and his house was locked by the perpetrators from outside.

Konopka et al [17] finding that in defensive mutilations, the perpetrator divides the body of the victim into pieces that allow for transporting the corpse and concealing it where it will not be noticed and in the majority of cases, the head and extremities are cut off the trunk, or the body is cut in halves across the trunk [17]; is consistent with

our study up to certain extent but our study is more elaborately suggesting the different means of mutilation being used by the offenders involved in mutilation- murder cases i.e. the means of mutilation are varying from active(by the act of offender himself) to passive (by the natural means of decomposition and animal gnawing) methods.

Conclusion:

The homicide by mechanical asphyxia seems to be a perpetuating factor which instigates the offender for defensive mutilation method to disrupt the corpus delicti. The wide media coverage of mutilation-murders in metropolitan cities has stimulated the potential mutilators in this peaceful terrain.

It may be suggested that the psychological profiling of such offenders should be performed which can be of an immense value in determining the personality type responsible for such kind of crimes. Most of such criminals are getting successful to taunt the investigation agency by disrupting the corpus delicti.

DNA profiling based identity cards should be issued to the citizens to conquer the objective of mutilation-murder in the society.

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Table 1

S.N	Season	Age (yrs)	Sex	Primary scene of crime	Secondary scene of crime	Weapon used	Cause of death	Identification (Partial/Absolute)	Time between death & postmortem
1	Summer	20-25	F	Not known.	Bank of rivulet	Blunt, moderately heavy	?Head injury	Body found in naked position, grossly disfigured body due to advanced decomposition, only partial identity could be established on p.m.	2-4weeks
2	Rainy	30-40	F	Not known	Bank of rivulet	Blunt, moderately heavy	?Head injury	Body found in naked position, grossly disfigured body due to advanced decomposition, only partial identity could be established on autopsy.	3-4weeks
3	Rainy	30-40	F	Not known	Bank of rivulet	sharp, moderately heavy	?	Torso of Body found in naked position in a metallic box, head & lower-limbs chopped off, only partial identity could be established on autopsy.	2 weeks
4	Rainy	30-40	M	Not known	Bank of rivulet	Blunt, moderately heavy, with broad surface	?Head injury	Body found in half naked position with both arms tightly ligated on the back, grossly disfigured body due to advanced decomposition, only partial identity could be established on autopsy.	1 month
5	Rainy	30-40	M	Not known	Bank of rivulet	Blunt, moderately heavy, with broad surface	?	Body found with clothes without any other belonging, face grossly disfigured with stones kept on head and due to advanced decomposition, only partial identity could be established on autopsy.	2 weeks
6	Winter	30-40	M	In the fields	In the fields	Soft and broad clothe, kerosene oil	Ligature strangulation with fracture of greater cornue of thyroid cartilage on both sides	Body found with burnt pieces of clothes and mobile phone, face grossly disfigured with post-mortem burning more severe on head, absolute identity established with DNA Profiling	3 days
7	Winter	20	F	In the forest area	In the forest	Soft and broad clothe, kerosene oil, tyres of light motor vehicles	Ligature strangulation with gagging	Incinerated remains of head & neck, left hip joint part found with burnt pieces of clothes, part of ligature material over front of neck and gag in mouth, absolute identity established with DNA Profiling	1-2 weeks
8	Summer	40-50	M	Not known	Bank of rivulet in a brief case	Sharp, moderately heavy, manual throttling	Manual throttling	Lower half of neck, Torso of Body with upper half of thigh found in naked position in a brief case, head & lower-limbs chopped off, only partial identity could be established on post-mortem	3-5 days
9	Summer	54	M	In residence	In residence in a metallic box	Soft pillow	Smothering	Body found with clothes, face and body grossly disfigured due to moderate decomposition, absolute identity established.	3-5 days

Original Research Paper

Incidence of Deaths by Poisoning Animals in the Endemic Region during the Twentieth Century

*Agustín Hernández Anaya

Abstract

We analyzed the 100% of the reported deaths registered on the municipality of Acatic, Jalisco México during the XX century, scorpions deaths were 80.43%, spider and insects deaths were 17.39% and snake bites deaths were 2.17%, The present study shows that maximum cases of poisoning animals bites were during the mounts of raining at the study area during May 16 to July 17 with 13 cases which represents 28.26%, Maximum number of deaths was in the age group of kids were 6 years old or less which represent 93.47%, Males predominated females in the ratio 1.42:1, Maximum poisoning bites occur from 5:00 to 11:30 AM with 22 cases which represents 47.82%, the maximum group affected by poisoning bites were on rural communities 89.13% and agriculture workers 80.43%. During the period of the century 1901–1925 have been presented 19 cases which represent 41.30%, the period that present maximum cases were 1926–1950 with 20 that represents 43.47%, during the period 1951–1975 happens 6 cases 13.04% and 1 case for the period 1976–2000 which represents 2.17%.

Key Words: Agriculture workers, spider bites, snake bites, insect bite

Introduction:

Poisoning bites animals are a public problem in several regions of the world, Brush S. P. Charles G. [1] scorpionism is a public health problem in North and South Africa, India, Middle East, Turkey, France, Spain, Mongolia, China, Central Asia, and America, Scorpions are one of the most important animals in America; Chowell G. Hyman J. M. Díaz Dueñas P. [2]

The highest mortality, with over 1,000 deaths per year, has been reported in México. Around the world almost 1,500 scorpion species and almost 2,400 Snake species have been reported, but only about 25 are dangerous scorpion to humans; the venomous species are found in 11 Mexican states bordering the Pacific Ocean was reported by Chowell G, Hyman JM and Díaz Dueñas P. [12]

The temporal incidence of scorpion sting shows a strong seasonal pattern that correlates to climatologically variables. The impact of rainfall was reported by Mazzonti L., Bravo Becherelle [3] they reports higher scorpion sting incidence during the rainy season.

They explain this increase in scorpion activity to the flooding from the rainfall on the burrows where scorpion lives. In the study of Swaroop S, Grab B [4] analysis of snakebite mortality in various parts of the world has revealed two interesting features: first, considerable variation exists from one area to another, and secondly, that high rates are generally founding topographically similar areas, presumably because of the preponderance of certain species of snake in that habitat.

Materials and Methods:

The poisoning animal who lives in the endemic region are the four most dangerous in American Continent; The cascabel snake *Crotalus*, the coral snake *Calliofis*, The black widow spider *Latradectus* and the scorpions *Tiyus Trivittatus*, and lives several insects that could be mortals. In this retrospective study we have investigate the 100% of registered cases of demises in Acatic's Civil Registry in Mexico (Municipality of Acatic archive, 2003) [5] a total of 8735 deaths occurred during the XX century (1901–2000), we analyzed the total of the cases of animal poisoning deaths.

We measured the different species of animal there are poisoning. Besides, there were divided in 4 periods that undertake 25 years each one; from 1901–1925, from 1926–1950, from 1951–1975 and from 1976–2000 with the objective of analyzing the evolution and the results and they were analyzed separately for

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ranks of age, occupational, if they lived urban or rural resident, year season.

Acatic is placed at 40.39 miles of the capital of the State Jalisco, its placed on the pacific coast of Mexico vetoing the states of Guanajuato at east and Colima to the West, has limited communication at the beginning of the XX century, the federal road that joins the region began its construction in the decade of the thirties, before this the transportations ways were by horse or diligence but the road is so far from the municipality which maintained delayed until 1980 which the way was paved to the federal road, drinkable water got at homes at seventies, on that period the town counted only with 6 lines of telephone.

For those ages in 70's it was established the first junior high. the medical services were limited the first rural health center was installed in the early 60's but with minimal equipment and personnel, when the century ended it continued being rural clinic and the services of social security were presented in a provisional house which worked as a clinic, community remained isolated from most of the century civilization.

Observations and Results:

- Out of 46 poisoning cases of death, 37 were from scorpions (80.43%) and 5 poisoning deaths cases were spider (10.87%), one was from snake (2.17%) and other 3 were from insects (6.52%).
- Maximum number of deaths was in the age group of kids less than one year old which represent 27 cases (58.69%). All the cases of death of kids of 6 years old or less represent 93.47%, except for 3 persons that corresponds to a 42, 48 and 60 years old, one male and two females (6.52%). (Table 1)
- Males predominated females in the ratio 1.42:1
- Maximum scorpion bites were observed during May 16 to July 17 with 13 cases (28.26%), and that corresponding to the beginning of raining period of the year. (Table 2)
- Maximum poisoning bites occur from 5:00 to 11:30 AM with 22 cases (47.82%).
- There were no effects on day of the month or lunar phase.
- The deaths presents in rural communities were 89.13% and urban 10.87%,(Fig.2) agriculture workers predominates with 80.43% over others workers. (Fig. 3)

Discussion:

Deaths occurred for animal poisoned bites are common in many countries, and

considerate as a serious health hazard in many places around the world. countries like México has tropical, subtropical and desert ecosystems and its special problems, during the XX century, is that there were limited access to health care, antivenins or antihistaminic or vehicle to move from one place to other in the firsts 50 years.

The present study showed that maximum cases of poisoning animals bites occurred predominantly in males than females (28 males and 18 females) M: F ratio was 1.42:1. (Table 1) In this study Maximum cases were of agricultural occupation 37 agricultures and 9 of others works (Fig. 3), residing in rural areas 41 rural and 5 urban residences. (Fig. 2)

According to Ganneru Brunda, Shashidhar R.B. [6] males predominates for snakes bites in the India 3:1, according to Hansdak S. G., Lallar K. S., Pokharel P., Shyangwa P., Karki P., Koirala S [7] in their study showed that snake bites were 2.5% more in males than in females on Nepal; As per the study by Albuquerque H.N., Fernandez A., Albuquerque ICS [8] males were affected in majority in Brazil and victims belonged maximum to rural areas.

According to the study of Erick K. I. Omogbai., Zuleikha A. M. Nworgu, Michael A. Imhafidon, Anwakang A. Ikpeme, David O. Ojo, Charles N. Nwako [9] male were the maxim victims of bites in Nigeria, according to Otero R., León G., Gutierrez J. M., Rojas G., Toro M. F. et al [10] patients bite by *crotalus* in Colombia were 70% male, according to study of Siria Hernández C. G. Arellano Bravo A. [11] in their study showed that snake bite were 67% for male in México and Abourazzak S, Achour S. El Arqam S. Atmani S. Chaouki S. et al. [19] the male to female ratio was 17:10 to scorpions bite in Argentina.

This study showed that maximum cases of poisoning animals bites were during the months of rain. (Table 2), during May 16 to July 17 with 13 cases which represents 28.26%, and that corresponding to the beginning of raining period of the year; according to Dehesa Davila, Possani [13] an increase in scorpion activity in the warmer months has been observed in the state of Guanajuato, México (East frontiers state of Jalisco), according to De Roodt A. R. Garcia S. I. Salomon O. D. Segre L. Dolab J. A. et al [14] and in Argentina, where an increase in the scorpion sting incidence is observed in the warmer months of October through April.

Siria Hernández C. G. Arellano Bravo A. [11] in their study showed that maximum incidence of snake-bites occurred during the months of July to October in México, regular

raining period of the year in the country starts on June and finish on September, which is consistent with the study of various other authors. [5, 15, 16] According to Sanjib K. Sharma, Francois Chappius, Nilhambar Jha, Patrick A. Bovier, Louis Loutan and Shekhar Koirala [17] majority of victims are males maximum into agricultural occupation residing in rural areas and the incidents occurred most during the monsoons, according with Albuquerque H.N., Fernandez A., Albuquerque I. C. S. [8] maximum victims occurred mainly during the rains in Brazil.

The study of Chowell G. Hyman J. M. Diaz-Dueñas P. Hengartner N. W. [18] showed an strong positive association between minimum temperature and scorpion activity, the highest scorpion sting incidence was reached when the minimum temperature of 19.43°C in the year 2000 and 18.81°C in 2001 and this correlations are agree with the study of Dehesa Davila, Possani [13].

In our study most of affected persons by animal poisoning were kids less than 6 years old which represent 93.47%, and the place of the bites is at home. Chowell G. Hyman J M, Díaz-Dueñas P [2] study showed that most of the scorpion stings occurred inside houses (76.18%) and during the agricultural activities (16.96) and continues indicates that the scorpion activity in the state of Colima Mexico (East frontier state of Jalisco) is greatly associated to temperature changes while other sociological, behavioral or economic factors.

In the study of Kumar Shetty A, Jirli S P[15] and Ganneru Brunda and R.B. Shashidhar snake bites victims were in the age group of 21 to 50 years in India, according to [6] snake bites victims were in the age of group of 21 to 50 years in India, [3] snake bites victims were in the age of group of 11 to 20 years in Nepal, [8] snake bites victims were in the age of group of 30 to 39 years in Brazil, according to the study of Pradey Deb Prasad [19] snake bites victims were in the age of group of 10 to 20 years in Nepal, [10] snake bites victims were in the age of group of 15 to 44 years in Colombia, it could indicate that every place in the earth have its particularly characteristics.

In Acatic only one case of snake bite was mortal, if it us take the study of Siria Hernández C. G. Arellano Bravo A. [11] in México by the period of 2003 to 2007 15.44% of the snake bites in México were mortal this represent that mast be 6.47 snake bites in the century and only one were mortal, there is no statistic of snake bites in the period.

Parrish H. M., Goldner J C Silberg S L [20] studied 1,078 cases of bites, where antivenin was administered there were three deaths, a case fatality rate of 0.28% in the US; but according to the study of Swaroop. S., Grab B. [4 the incident per 100,000 was 0.50 for Arizona, 0.35 New Mexico, 0.19 Florida and 0.10 Mississippi; 0.02 to Canada.

The relation of animal bites in Arizona during 1929–1948 was 15 snake bites (16.30%), 64 scorpion bites (69.52%), 13 spider bites and other insects (14.13%). In our study one snake bites (2.17%), 37 scorpion bites (80.43%), 8 spider bites and other insects (17.39%). (Fig. 2) it showed that principal poisoning animal problems is scorpion, spider and snake at last.

In Mexico during the 1940-41 84.91% of the deaths were scorpions bites, 9.56% snake bites, 5.62% spider and other poisoning animals; in the region North Pacific where Acatic Jalisco is located in the same years were, 83.12% were scorpions, 3.29% snake bites, 13.58% spider and other poisoning.

The incidence of poisoning animals bite mortality depends on the chance of a person being bitten, and other factors contributing to the individual coming in contact with them. Additionally to this, every zone has its wound incidence; during the XX Century the incidence have been change a lot. (Table 3)

In the first 50 years the percentage were more than 40% and the last 25 years its marginal with the 2.17%, it could be explain for several factors including urbanization levels in the cities, the presence of lower scorpion density in the city due to smaller number of suitable environments for they subsistence, mud brinks and wood ceiling was the typical construction materials, today its sewing brinks, iron beams and brinks in the ceiling and the use of plaster material in the walls and ceiling; the number of people occupied in agricultural activities in the land every day is less.

Now people farmers works with machines and every day the technology is most common, and the lower socio-economic level in rural regions correlates with hygiene in households, electric illumination and the use of close shoes and the use of medicaments, antihistaminic, antivenin and the use of vehicles to arrives to the hospital in the big cities helps to minimized the deaths by poisoning animals at the end of the XX century.

Conclusion:

The above study Cleary showed that scorpion bites were more common in rural areas and among people who were engaged in

agricultural work, children males has a higher risk to be bite than female, Most common occurrences were during the raining months.

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Table 1: Incidence of Age & Sex

Age	Male	Female	Total (%)
1 to 6 months	17	8	54.34
7 to 12 months	1	1	4.34
1 to 3 years	7	3	21.73
4 to 6 years	1	4	10.87
7 to 40 years	0	0	0.0
41 to 60 years	1	2	6.52
More than 61 years	0	0	0.0
	28	18	

Table 2: Season-Wise Incidence

Season	No. of Deaths	Percentage
Dec- Feb (Winter)	8	17.39%
March-May (Spring)	13	28.26%
June-August (Summer)	16	34.78%
Sept- Nov (Fall)	8	17.39%

Table 3: Years of the Century

Years	No. of Deaths	Percentage
1901 – 1925	19	41.30%
1926 – 1950	20	43.47%
1951 – 1975	6	13.04%
1976 – 2000	1	2.17%

Fig. 1: Incidence of Poisoning Deaths

Figure I: Incidence of Poisoning Deaths

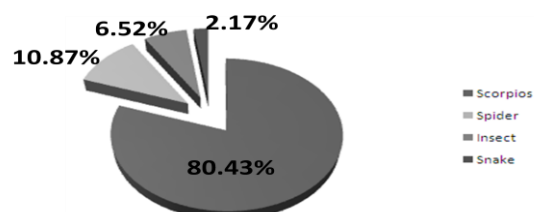


Fig. 2: Locality –wise Death

Figure II: Locality-Wise Death

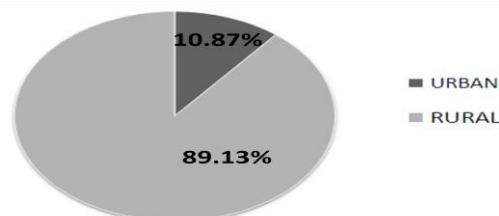
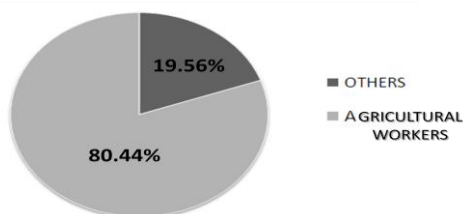


Fig. 3: Occupation Incidence

Figure III: Occupation Incidence



Review Research Paper

Hurt & Grievous Hurt in Indian Context

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Abstract

A doctor posted in the Accident and Emergency Department or casualty very often deals with injury cases either come for treatment or those brought by the police. Though injury may be accidental, suicidal, homicidal or self inflicted, when there is allegation or suspicion of assault, the medical officer besides treating the patient, is legally bound to examine and opine regarding injury in the prescribed *pro forma* i.e. Injury report for the aid of investigating police agency and administration of justice in the court of law. However, as the promptness of police action against the alleged accused person who may also bear some vital evidence to the alleged incidence, lies with the seriousness of injury (nature of injury). Thus medical officer has to opine whether the bodily injuries found on the alleged victim are simple or grievous. Though sec 320 IPC enumerates grievous hurt, medical officer dealing such cases found it difficult in more than one occasion to conclude his/her opinion regarding the nature of injury. The present paper is an attempt to minimize their dilemma.

Key Words: Medico-legal cases, Injury, Grievous hurt, Sec 320 IPC, Opinion

Introduction:

When a patient of assault is brought to the casualty, it is the duty of medical officer to guide the investigating police officer about the type of hurt whether it is simple or grievous. However, it is ultimately the Court who will decide about this matter after considering all the facts, circumstances of the case and medical opinion. In casualty, it is sometimes difficult task for a medical officer to opine about an injury.

Sometimes, the injured person may feign serious disorder to make the simple injury to appear as grievous one. This becomes more difficult when there is lack of knowledge about the concept of hurt and grievous hurt, inability to understand the language of law, difficulty in interpretation and also when there are different opinions given about the same matter by different courts. So, it is required that every medical officer should have sound knowledge about the concept of hurt and grievous hurt. He should make necessary investigations and consult another expert in the field, if required, before giving his final opinion.

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Under the doctrine of stare decisis, a lower court must honor findings of law made by a higher court. So it is always good for a medical professional to make their opinion on the basis of proper knowledge, and judgments made by a higher court. Moreover, it is important that they should not follow these judgments blindly, because these judgments are based on different facts and circumstances.

What is Assault?

According to Section 351 IPC, Whoever makes any gesture, or any preparation intending or knowing it to be likely that such gesture or preparation will cause any person present to apprehend that he who makes that gesture or preparation is about to use criminal force to that person, is said to commit an assault.

Explanation:

Mere words do not amount to an assault. But the words which a person uses may give to his gestures or preparation such a meaning as may make those gestures or preparations amount to an assault.

Illustrations:

- a) A shakes his fist at Z, intending or knowing it to be likely that he may thereby cause Z to believe that A is about to strike Z, A has committed an assault.
- b) A begins to unloose the muzzle of a ferocious dog, intending or knowing it to be likely that he may thereby cause Z to believe that he is about to cause the dog to attack Z. A has committed an assault upon Z.

- c) A takes up a stick, saying to Z, "I will give you a beating". Here, though the words used by A could in no case amount to an assault, and though the mere gesture, unaccompanied by any other circumstances, might not amount to an assault, the gesture explained by the words may amount to an assault. [1]

Comments:

- Essential Ingredients of Section 351 IPC are:
 - Making any gesture, or any preparation by a person in presence of another
 - Intention or knowledge that such gesture or preparation will cause any person present to apprehend that the person making it is about to use criminal force to him.
- It is not every threat that constitutes an assault; there must, in all cases, be the means of carrying the threat into effect. [2]
- Mere preparation to commit a crime is not punishable, yet the preparation with the intention specified in this section amounts to an assault. [2]
- An assault is sometime less than the use of criminal force. However, an assault is included in every criminal force. [2]
- In order to constitute assault it is not necessary that there should be some actual hurt caused. Pointing a loaded pistol at another is undoubtedly an assault within the meaning of this section. [2]

What is injury?

The word "injury" denotes any harm whatever illegally caused to any person, in body, mind, reputation and property. [1]

Comments:

- 'Injury' is an act contrary to law i.e. illegal.
- Legally the term 'injury' includes body, mind, reputation and property. So it is a wider meaning than the term 'Hurt', as it also includes illegal damage to reputation or property of other. In other words, all hurts are injuries, but all injuries are not hurt.

What is Hurt?

According to Section 319 IPC whoever causes bodily pain, disease or infirmity to any person is said to cause hurt. [1]

Comments:

- Many of the offences which fall under the head of hurt will also fall under the head of assault. But bodily hurt may be caused by many acts which are not assaults. A person, for example, who mixes a deleterious potion and places it on the table of another, may

Cause serious hurt; but cannot be said to have committed assault. [2]

- 'Bodily pain' covers all harm, except those which no person of ordinary sense or temper would complain of.
- 'Infirmity' is inability of an organ to perform its normal function which may either be temporary or permanent.
- There is no requirement of direct contact between the accused and victim in Section 319 IPC, and so nervous shock and mental derangements are also included. [2,3]
- Where there is no intention to cause death or knowledge that death is likely to be caused from the harm inflicted, and the death is caused, the accused would be guilty of hurt only if the injury caused was not serious. [2]
- Hurt can be simple or grievous. Simple hurt are those which are simple in nature and do not fall under the domain of grievous hurt. [4] Grievous hurt is hurt of a more serious nature. It is sometime difficult to draw a line between those bodily hurt which are serious and those which are slight. [5]

What is Grievous hurt?

The following kinds of hurt only are designated as "Grievous":

First- Emasculation

Second- Permanent privation of the sight of either eye,

Third- Permanent privation of the hearing of either ear,

Fourth- Privation of any member or joint,

Fifth- Destruction or permanent impairing of the powers of any member or joint,

Sixth- Permanent disfiguration of the head or face,

Seventh- Fracture or dislocation of a bone or tooth,

Eighth- Any hurt which endangers life or which causes the sufferer to be during the space of twenty days in severe bodily pain, or unable to follow his ordinary pursuits. [1]

Comments:

"Emasculation" means depriving a male of masculine vigor. [2] So, this clause is not applicable to female victims. This could be done by castration, by cutting the male organ, or by causing injury to testis or to the spinal cord at the level of 2nd to 4th lumbar vertebrae to result in impotence. [4, 7]

'Permanent' does not mean that it should be incurable. For instance, loss of sight occurring due to corneal opacity resulting from injury to the cornea may be curable by corneoplasty but being permanent by itself

constitutes a grievous hurt and chances of treating by corneoplasty do not lower its gravity. [7, 8] The gravity of injury lies in its permanency because it deprives a person of the use of the organ of sight and also disfigures him. Permanent privation of sight can be caused by gouging out of eyes, poking eyes, chemicals, etc. [5]

Permanent privation of hearing may be caused by a blow on the head or the ear, or by blows which injure the tympanum or auditory nerves or by trusting something or pouring hot liquid into the ear which causes deafness. [5] Even, permanent partial loss of hearing is considered as grievous. [9] The term “**member**” means any organ or limb of a subject responsible for performance of a distinct function. It includes eyes, ears, nostrils, mouth, hands, feet, etc. [5]

Disfiguration means doing a man some external injury which cause change in configuration and personal appearance of the subject, but does not weaken him. [2, 4]

Age, sex, occupation of the subject is immaterial. However, there are judgments of different courts considering these factors. Moreover, medical officer should not consider these factors while opining about the nature of injury and it is only court who can take these factors into consideration.

Fracture or dislocation of a bone or tooth causes great pain and suffering to the injured person and hence it is considered grievous hurt. For application of this clause it is not necessary that a bone should be fractured through and through or that there should be a displacement of any fragment of bone. Any break or splintering of the bone, rupture or fissure in it would amount to fracture.

Although fracture has not been defined in sec 320 IPC, but as per Supreme Court judgment in the case of **Hori Lal and Anr vs. State of U.P. (1969)**, incised wound to the bone is to be consider as fracture, hence, grievous hurt. [10] Before giving opinion, it has to be proved that, the tooth was not originally loose and injury caused fracture or dislocation of tooth. [4] An injury can be said to endanger life if it is in itself that it put the life of the injured in danger. [2] There is thin line between degree of body injury ‘dangerous to life’ and ‘likely to cause death’. [3] So, The line separating Grievous Hurt and Culpable Homicide is very thin.

In Grievous Hurt, the life is endangered due to injury while in Culpable Homicide; death is likely to be caused. However, acts neither intended nor likely to cause death may amount to grievous hurt even though death is caused.

Moreover, in **Niranjan Singh V State of Madhya Pradesh**, the Court observed that the term “endangers life” is much stronger than the expression “dangerous to life”. [11]

The mere fact that a man has been in hospital for twenty days is not sufficient; it must be proved that during that time he was unable to follow his ordinary pursuits. [2]

A disability for twenty days constitutes grievous hurt; if it constitutes for a smaller period, then the offence is hurt. [2]

‘Ordinary pursuits’ means acts which are a daily routine in every human being’s day to day life like eating food, taking bath, going to toilet, etc. [9] Where there is no intention to cause neither death nor knowledge that death is likely to be caused from the harm inflicted, and the death is caused, the accused would be guilty of grievous hurt if the injury caused was of serious nature, but not of culpable homicide. [2]

A person is responsible for voluntarily causing grievous hurt only when he both causes grievous hurt and intends or having knowledge of causing grievous hurt (Explanation of section 322). [1] It is immaterial while causing one type of grievous hurt he actually causes grievous hurt of another type. (Explanation of Section 322) [1]

Dangerous injury is a variety of grievous injury. Dangerous injuries are those which cause imminent danger to life, either by involvement of important organs and structures, or extensive area of the body. If no surgical aid is available, such injuries may prove fatal. [5]

If an opinion regarding the nature of injury cannot be formed at the time of the examination, as in the case of a head injury where the symptoms are obscure, the injured person must be either re-examined after 24-48 hours or admitted under observation until a definite opinion can be formed. [3]

Section 321 to 338 IPC describes various types of Hurts and Grievous Hurt depending upon various circumstances in which the offence was committed. However, for Forensic point of view one should know what is “dangerous weapon or means”. The Section 326 IPC enumerates various things which are considered as dangerous weapon or mean. Self inflicted injuries are not covered. [6] However, the opinion regarding whether the injury was self inflicted or not is left to the discretion of court.

S. 326 IPC: Voluntarily causing grievous hurt by dangerous weapons or means:

Whoever, except in the case provided for by section 335, voluntarily causes grievous hurt by means of any instrument for shooting,

stabbing or cutting, or any instrument which, used as a weapon of offence, is likely to cause death, or by means of fire or any heated substance, or by means of any poison or any corrosive substance, or by means of any explosive substance, or by means of any substance which it is deleterious to the human body to inhale, to swallow, or to receive into the blood, or by means of any animal, shall be punished with imprisonment for life, or with imprisonment of either description for a term which may extend to ten years, and shall also be liable to fine. [1]

Comments:

The essential ingredients to attract Section 326 are: (1) voluntarily causing a hurt; (2) hurt caused must be a grievous hurt; and (3) the grievous hurt must have been caused by dangerous weapons or means. [12] Whether a particular article can per se cause any serious wound or grievous hurt or injury has to be determined factually. [13]

Medical personnel / Forensic Specialist can opine whether the alleged weapon of offence is "dangerous weapon or mean" or not. However, Court will finally decide whether the assailant was armed with dangerous weapon or not, depending upon the circumstances of the case and expert medical opinion.

In **Prabhu V State of Madhya Pradesh**, the Court held that the expression "any instrument which, used as a weapon of offence, is likely to cause death" has to be gauged taking note of the heading of the Section. What would constitute a 'dangerous weapon' would depend upon the facts of each case and no generalization can be made. [13] The intention of the accused is gathered from the nature of the weapon used, the part of the body chosen for assault and other attending circumstances.

Sections 324 and 326 expression "dangerous weapon" is used. In some other more serious offences the expression used is "deadly weapon" (e.g. Sections 397 and 398). The facts involved in a particular case, depending upon various factors like size, sharpness, would throw light on the question whether the weapon was a dangerous or deadly weapon or not. [13]

In **Aniyan Kunju and Others vs. State of Kerala (2004)**, the Court held that Medical evidence is a factor which has to be weighed along with other materials to see whether the prosecution version is reliable, cogent and trustworthy. When the case of the prosecution is supported by an eyewitness who is found to be truthful as well, mere non-explanation of the injuries on the accused persons cannot be a

foundation for discarding the prosecution version. [14]

Recently, Supreme Court, in **Gurmukh Singh v. State of Haryana**, enumerated the various factors which are required to be taken into consideration before awarding appropriate sentence to the accused.

- a) Motive or previous enmity;
- b) Whether the incident had taken place on the spur of the moment;
- c) The intention/knowledge of the accused while inflicting the blow or injury;
- d) Whether the death ensued instantaneously or the victim died after several days;
- e) The gravity, dimension and nature of injury;
- f) The age and general health condition of the accused; whether the injury was caused without pre-meditation in a sudden fight;
- g) The nature and size of weapon used for inflicting the injury and the force with which the blow was inflicted;
- h) The criminal background and adverse history of the accused;
- i) Whether the injury inflicted was not sufficient in the ordinary course of nature to cause death but the death was because of shock;
- j) Number of other criminal cases pending against the accused;
- k) Incident occurred within the family members or close relations; the conduct and behaviour of the accused after the incident.
- l) Whether the accused had taken the injured/the deceased to the hospital immediately to ensure that he/she gets proper medical treatment?

The list of circumstances enumerated above is only illustrative. Each case has to be seen from its special perspective. In considered view of Supreme Court, proper and appropriate sentence to the accused is the bounded obligation and duty of the court. [15]

Right of Private Defence:

In **Darshan Singh v State of Punjab**, Court observed and held that Right of private defence of person and property is recognized in all free, civilised, democratic societies within certain reasonable limits. The citizens, as a general rule, are neither expected to run away for safety when faced with grave and imminent danger to their person or property as a result of unlawful aggression, nor are they expected, by use of force, to right the wrong done to them or to punish the wrong doer of commission of offences. When there is real apprehension that the aggressor might cause death or grievous hurt, in that event the right of private defence of the defender could even extend to causing of

death. A mere reasonable apprehension is enough to put the right of self-defence into operation, but it is also settled position of law that a right of self-defence is only right to defend oneself and not to retaliate. It is not a right to take revenge. [16]

In **State of Haryana V Sher Singh & Ors**, Supreme Court held that Section 99, I.P.C. lays down the extent to which the right of private defence is available and "The right of private defence in no case extends to the inflicting of more harm than it is necessary to inflict for the purpose of defence." [17]

Latest Amendment under the Criminal Law Ordinance, 2013:

"326A: Whoever causes permanent or partial damage or deformity to, or burns or maims or disfigures or disables, any part or parts of the body of a person or causes grievous hurt by throwing acid on or by administering acid to that person, or by using any other means with the intention of causing or with the knowledge that he is likely to cause such injury or hurt, shall be punished with imprisonment of either description for a term which shall not be less than ten years but which may extend to imprisonment for life and with fine which may extend to ten lakh rupees" Provided that any fine imposed under this section shall be given to the person on whom acid was thrown or to whom acid was administered.

326B: Whoever throws or attempts to throw acid on any person or attempts to administer acid to any person, or attempts to use any other means, with the intention of causing permanent or partial damage or deformity or burns or maiming or disfigurement or disability or grievous hurt to that person, shall be punished with imprisonment of either description for a term which shall not be less than five years but which may extend to seven years, and shall also be liable to fine.

Explanation 1:

For the purposes of section 326A and this section, "acid" includes any substance which has acidic or corrosive character or burning nature, that is capable of causing bodily injury leading to scars or disfigurement or temporary or permanent disability.

Explanation 2:

"Permanent or partial damage" includes deformity, or maiming, or burning, or disfiguring, or disabling any part or parts of the body of a person.

Explanation 3:

For the purposes of section 326A and this section, permanent or partial damage or

deformity shall not be required to be irreversible.' [18] So, after the present amendment, following changes took place:

- Earlier only permanent disfiguration of face is alone considered as grievous hurt. But now even disfiguration of any part of the body by throwing or administering acid is also considered as grievous hurt.
- After insertion of 326A & 326B, even temporary or permanent disability due to throwing or administering of an acid is covered under grievous hurt. Moreover, the damage or deformity shall not be required to be irreversible.
- The punishments are now enhanced and may extend to imprisonment of life and a fine which may extend to ten lakh rupees.
- Under section 326B, even attempt to throw or administer acid on any person is punishable. Offences under section 326A and 326B are cognizable and Non-bailable.

Lastly it is the duty of medical personnel to know the law correctly and apply them in their strict sense. It is finally the Judiciary which will interpret the law and apply according to the fact and circumstances of each case.

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Review Research Paper

Desi-Katta (Country-Made Firearm) and Wound Ballistics A Review

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Abstract

The use of country made guns or 'Desi-Kattas' for criminal activities are rising in an exponential manner in India. Even though India has a very tough gun control act, it is home to the world's second largest civilian firearms in the world. This is reflected by the fact that in the year 2011 about 88% of all 'murders by the use of firearms' were committed by 'illegal and unlicensed' ones. Whenever a case of Desi-katta firearm injury is presented to the autopsy surgeon, he should refrain from making any categorical remarks especially with respect to range as most of them are derived from western literature which cannot be blindly applied to Desi-Kattas. Nevertheless it is appalling to know that little scientific research has been done in this field. There is an urgent need for multi-disciplinary and multi-centric research in order to understand this menace.

Key Words: Desi-Katta, Illegal Weapon; 0.38/0.32 in. revolvers; 12 bore pistols; Powder soot

*"Force and mind are opposites;
Morality ends where a gun begins."*

Ayn Rand (Russian born American Writer)

Introduction:

Ever since the invention of gun powder and firearms, mankind has seen lot of bloodshed. May be it is war, terror, insurgency or crime; firearms have changed the very dimension of the game. Time and again peace activists rally for a world without nuclear weapons, free from weapons of mass destruction. Atomic bombs silently sit in their silos and have never been used since World War II, but on the other hand small arms have killed more people than any other weapon in the world. If we think prudently small arms are the real weapons of mass destruction.

Understandably 'civilian' possession and ownership have been closely regulated by the governments around the world. On one end of the spectrum we have the United States of America, where the Second Amendment to the Constitution guarantees every one of its citizen 'right to possess firearms' [1], unless someone specifically prohibited by law.

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On the other end are UK and India where strict statutory guidelines are in place for the civilian ownership of firearms. [2]

Even though, India is regarded as a nation having one of the toughest gun control legislations in the world (Indian Arms Act 1959 has very stringent rules for granting gun licenses) [3]. It was done with the right intention, but has resulted in a paradoxical effect. Our country has acquired a dubious distinction of having large number of Civilian Firearms second only to the United States of America. (Fig. 1) [4]

The total estimated civilian owned firearms in the whole world is about 650 million out of which India accounts for approximately 40 million. What comes as a shocker and is mindboggling to know, out of these just 6.3 million or 15.75% are 'licensed' firearms (Fig. 2), the rest are 'unlicensed, illegal guns'. [5] These may be country made guns called 'Desi-Kattas' or factory-made guns smuggled across the international border.

This notorious truth is reflected by the fact that according to National Crime Record Bureau's annual report of the year 2011, number of victims murdered by unlicensed firearms is 7 times more than those killed by the licensed ones. 2964 persons were murdered by the unlicensed guns as against 404 by the licensed. (Fig. 3) [6]

Three states viz. Uttar Pradesh, Bihar and Jharkhand account for 66.4% murders committed by firearms in India and overwhelming 92.8% of these were committed from illegal firearms. According to a brief

released by Small Arms Survey, out of 8 top dangerous megacities in India; 5 were from the state of Uttar Pradesh. The list was topped by Meerut which is about 70 Kms from national capital, New Delhi. [7] According to one study, there are about 3, 00,000 illegal firearms in the national capital [8].

In the year 2011, Delhi saw 63 murders being committed by firearms and 90% of these were from illegal ones[6]. There are many possible theories behind the proliferation of the Desi-Kattas primarily in UP; some of them include:

- a) Guns are regarded as status symbols [9]
- b) With the growth in GDP, more people have the money to buy guns
- c) Presence of traditional gunsmiths [10] (since British Raj days, who had passed on the knowledge of gun making from generation to generation)
- d) Availability of abundant raw materials
- e) Poor law enforcement [7]
- f) Cheap cost [11]

As discussed earlier, the procedure to obtain a civilian firearm license is very difficult. Even if one manages to get them, the costs of legal firearms are astronomically beyond the reach of most people.

On an average a simple Desi-katta costs INR 500-1000/- only, [12] as against a standard factory made 0.32" Revolver which comes with the price tag of INR 63,000 plus taxes. [13]

Thus Desi-katta has been an ideal weapon for criminals as it is cheap and after commission of crime it can be 'easily disposed-off'. Again it will be a herculean task for the law enforcement agencies to file a watertight case against them sans the very weapon of offense.

From the crime scene to the courtroom, Forensic Medicine and Forensic Science are vital part of investigations. Forensic best practices are fundamental for recognizing and preserving all items of evidence.

The criminal justice system relies heavily on the impartial objective data provided by them to build cases based on unequivocal physical evidence in addition to eyewitness statements and circumstantial evidence. The role of trained autopsy surgeons and forensic ballistics experts are paramount in firearm cases.

But little credible research has been undertaken and published in the study of Desi-Kattas. One such study was done in Central Forensic Science Laboratory, Chandigarh, India where 300 country-made firearms were studied. [14] They found that 92% Desi-Kattas comprised of country made pistols, 12 were shotguns and

12 were revolvers. Out of these country made pistols, 228 were capable of firing .303 or .315" rifle cartridge and 48 were capable of firing 12 gauge shotgun cartridges.

Thus broadly Desi-Kattas can be classified as 0.315/0.303 in. single shot pistols, 0.38/0.32 in. revolvers and 12 bore pistols

1. Relevant Features of 0.315/0.303 in. Single Shot Pistols:

Even though the .303/.315 in. pistols were designed to chamber that cartridge, there were wide variances in many parameters of the weapon like barrel length, muzzle and breech diameter.

- a) The barrels were made from automobile axle and its length varied from 8.25cms up to 24.38cms; likewise muzzle diameter varied from 0.78cms to 1.18cms. Thus important factors affecting wound ballistics are:
- b) Barrel made by automobile axles, water pipes, cheap steel tubes etc. are inherently unsafe, and user is at risk of injury.
- c) No rifling done- The bullets/projectiles retrieved from the body will not have rifling marks. The guns are only accurate at short distance.
- d) Great variance in the length of the barrel- The amount of soot, partially burnt and unburnt powder particles exiting the firearm varies.
- e) Variance in the muzzle diameter- The amount of soot, partially burnt and unburnt powder particles exiting the firearm varies.

2. Relevant Features of 0.38/0.32 in. Revolvers:

Most of them are designed to fire 0.38 and 0.32 in. cartridges. Barrels were made from cheap steel tubes and some guns had crude rifling. The cylinder gap varied considerably and the alignment of the chamber with the barrel was often erroneous.

The important factors to remember that affects wound ballistics are

- a) Barrel made by water pipes, cheap steel tubes, etc. - are inherently unsafe, and user is at risk of injury.
- b) Cylinder gap variable- will lead to loss of muzzle velocity and affect primer residue deposition.
- c) Crude rifling- Very unique individual characteristics are imparted on the bullets that will greatly aid in ballistic confirmation with the alleged gun.

3. Relevant Features of 12 Bore Single Shot Pistols:

It was found that 12 gauge shotgun cartridges were also used in hand guns.

- a) Barrel made by water pipe- are inherently unsafe, and user is at risk of injury.
- b) Great variance in the length of the barrel- The amount of soot, partially burnt and unburnt powder particles exiting the firearm varies.
- c) Variance in the muzzle diameter and absence of choking- The amount of soot, partially burnt and unburnt powder particles exiting the muzzle varies. The shotgun pellet spreading pattern will vary considerably.

Role of Autopsy Surgeons in Case of Firearm Injuries:

Whenever any case of firearm injury is presented to the autopsy surgeon, apart from the routine objectives like, cause of death, time since death, manner (if possible), he is expected to determine:

1. Location and description of the firearm wound. (Rifled or smooth-bored, entry and exit wounds)
2. Relative direction at which the bullet enters the body
3. Range of fire i.e. distance from the muzzle of weapon and the body (skin/clothing)

The autopsy surgeons should be extra careful in analyzing and interpreting the above mentioned parameters while dealing with firearm injury cases in India as there are high chances of the same being inflicted by country made Desi-katta.

Since most textbooks have taken the values based on the ballistic analysis of factory made firearms from western literature, it is liable for erroneous interpretation. Here are some important factors that are to be kept in mind before interpreting pathological findings.

Relative Direction at Which the Bullet Enters the Body:

When the firearm is discharged from a standard rifled firearm, bullet travels straight due to gyroscopic stability imparted by rifling, if hits the body with a perpendicular axis, will create circular entry wound with symmetrical abrasion collar around it.

On the other hand if it is entering the body at an angle, it will give rise to an oblique entry wound with eccentrically prominent abrasion collar, indicating the relative direction of entry of bullet. [15]

On the contrary when a cartridge is fired through a crude Desi-katta, with its barrel lacking

rifling, the bullet is bound to be unstable and after some distance there are high probability of the same to yaw as well as tumble [16]. Thus even if the cartridge is fired perpendicular to the surface of the body, the entry wound can be oval with uneven eccentric abrasion ring (due to tumbling bullet), thus erroneous interpretations can be made.

Range of Fire:

Based on the distance between the body and the muzzle of the firearm, the entrance wound can be classified as

1. Contact wound
2. Near contact wound
3. Intermediate range wound sometimes termed Medium range wound
4. Distant range wound.

Specific pathognomonic features are imparted on the body following the discharge of the weapon depending on the distance between the muzzle and the body. There are many factors which affect various phenomena at wound of entry, but not limited to: [13]

- Barrel length
- Muzzle shape
- Type of gunpowder: Black, Smokeless
- Shape of the powder: flake, ball or cylinder
- Clothing

Thus following factors are to be kept in mind in accessing the range while dealing with Desi-Kattas as against standard factory made firearms almost all the above mentioned parameters will be unique for every gun.

1. Contact Wounds:

It can be further categorized as 'hard contact', 'loose contact' and 'angled contact' wounds. [17]

- a) In hard contact wounds, the muzzle is firmly held against the body, even after the trigger is pulled, it will continue to envelope the skin.

The salient features of the entry wounds are Muzzle imprints, abrasion ring with seared and blackened edges (which cannot be washed by strong scrubbing).

- b) In loose contact wound, the muzzle is loosely held against the body, as and when the trigger is pulled, there is momentary loss in contact with the body.

The salient features of the entry wounds are abrasion ring surrounded by zone of 'powder soot (which can be washed away by scrubbing)'.

- c) In angled contact, the axis of the barrel is at an angle to the body and only a part of the circumference of the muzzle is in touch with the body. The salient features of the wound

are abrasion ring, surrounded by the oval shaped powder soot.

2. Near Contact Wound:

In near contact wound, the muzzle of the weapon is neither touching the body, not too far so that partially burnt/unburnt particles can spread to produce iconic powder tattooing.

3. Intermediate Range Wound:

The muzzle of the weapon is held away from the body for any soot to deposit, yet suitably close so that the partially burnt and unburnt gun powder grains expelled from the muzzle spread and strike the body with sufficient kinetic energy to produced punctate abrasions termed 'Powder Tattooing'.

Thus in all the above mentioned parameters because of the highly uncertain and variable make of Desi-Kattas, like the barrel length, muzzle configuration, type of cartridge, type of propellant etc., one should not jump to calculate approximate distance.

Some text books have empirically mentioned some ranges in metric values. Such conclusion should not be made by the autopsy surgeons as the same is unique for every gun and more so unique in every case of Desi-katta. This should be done in the Forensic Science Laboratory by test-firing the same gun, with the same batch of ammunition.

4. Distant Range Wound:

In these wound the distance between the muzzle and the body is further away and only the bullet proper will strike the body. An important aspect is in most Desi-Kattas, the barrels are often greased, consequently the entry wound surrounded by bullet wipes.

This black colored greasy bullet wipe can be confused for powder soot. These are the few points one has to keep in mind before confronting a firearm case where the role of Desi-Kattas are confirmed or suspected.

Here are some Do's and Don'ts while dealing with firearm injuries by Country crafted Desi-Kattas is suspected.

Do's:

- Always take adequate history like, time of the incidence, type of weapon (if recovered), sample cartridges (if any) number of weapons involved, number of shots fired, relative positions of the assailant and the victim.
- Unless otherwise proven, assume the alleged firearm as Desi-katta.
- Examine the cloths before the autopsy
- Radiological examination of the body before autopsy(CT if facilities permit)
- Scene of Crime visit if possible

- Photographs of the wounds
- Take swabs for Primer Residues
- While commenting about the range, just appropriately classify the entry wound as contact, near contact, intermediate or distant

Don'ts:

- Estimate the metric range of the firearm injury.
- Resolutely comment the relative direction at which the bullet enters the body.
- Get prejudiced with the firearm cases as each case is a unique one.

Conclusion:

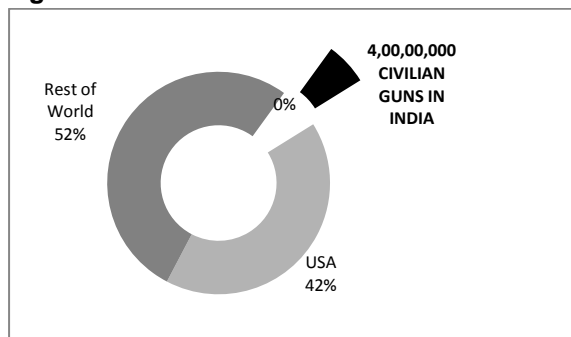
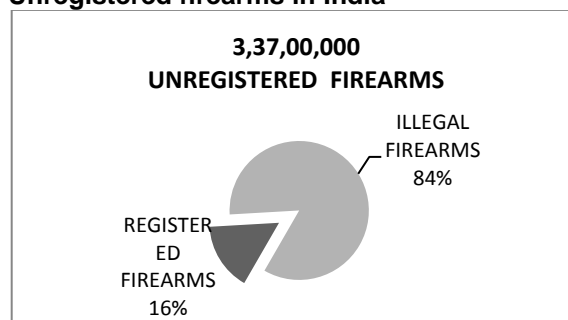
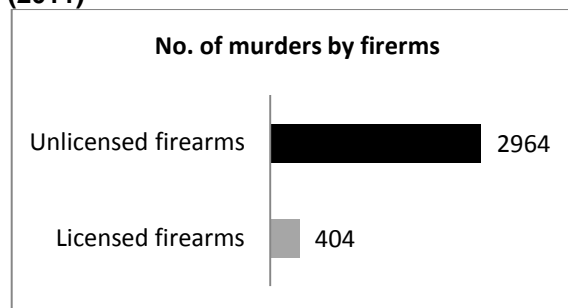
Even though it's a fact that Desi-Kattas are choice of criminals in India, little systemic research has been conducted in scientifically analyzing the problem. Since the problem is India centric, we cannot depend on foreign research.

A multi-centric, multi-disciplinary approach is required in order to sensitize government about this menace, which if not stemmed will mushroom into a major crisis.

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Fig. 1: Civilian Owned Firearms in the World**Fig. 2: Number of Registered and Unregistered firearms in India****Fig. 3: Victims Murdered by Use of Fire arms (2011)**

Review Research Paper

Kidney Transplantation in India: Hopes and Despairs A scientific study of Ethics, Commerce and Law

*Patnaik, A.M.M., **Naik Jagadeesh, ***Narayana Rao V.

Abstract

Kidney transplantation has come as a boon (hope) to large number of patients suffering from End Stage Kidney Disease (ESKD), all over the world. This boon has however a curse (despair) in it, in the form of an ugly organ trade; resorted to by middlemen operating in secrecy, exploiting donors and patient alike, giving rise to intense humanitarian, ethical and legal dilemmas. WHO is considering this as in human resolved to ban this trade. The Government of India enacted the "Transplantation of Human Organs Act" (THOA), 1994 and amended from time to time to prevent commercial dealings in human organs. Recent Amendment has been done in the year 2011 with a view that enhanced punishment may act as deterrent effect in preventing commercial dealing in human organ trade.

This paper deals with study of various loopholes in the current law on organ transplantation in India, reasons for commercial dealings and suggestions for their prevention.

Key Words: Kidney Transplantation, Humanity, Ethics, Commerce, Law

Introduction:

"Desperate diseases require desperate remedies"

In India, high prevalence of poverty, illiteracy, and lack of enforcement of law leading to trading and commercialization of human organ and exploitation and even deaths of many innocent is the reality.

To prevent commercialization in human organs, Government of India enacted the Transplantation of Human Organ Act (TOHOA) in the year 1994. This principal Act was not able to prevent the desired aim of enactment leading to various amendments from time to time and recent were in the year 2011.

Materials & Methods:

The failure of TOHOA Act, consequent thriving trade and the dilemmas involved in the kidney transplantation have been searched and researched in this article, under four aims and objectives.

Aims & objectives:

1. **Humanitarian:** To project the plight of victims of ESKD, living in the shadow of death.

2. **Commercial Angle:** To highlight the murky trade of organ donation.
3. **Legal:** To simplify the complex and comprehensive law for better understanding
4. **Ethical Issues:** To discuss the dilemma of organ trade in the face of paucity of donations.
5. **Suggestions:** To give suggestions for prevention of commercial dealings

Study material has been searched from following sources:

1. The Transplantation of Human Organ Act (TOHOA) 1994, Rules 1995, Amendments up to 2011.
2. Literature on the subject available on the internet.
3. Newspaper reports.
4. Consultation with legal personalities.
5. Consultation with urologists.

Discussion:

Humanitarian:

The burden of End Stage Kidney Disease (ESKD): The number of people suffering from ESKD in India as predicted at approximately more than one lakh.

Table 1: Burden of ESKD in India, requiring a transplant surgery [1]

Country	India
Approximate Population in 2009	120 crores
People suffering from ESKD Per annum	>1 lakh
People waiting for a transplant surgery	2 lakh
Transplant surgeries conducted, donors (Live, deceased)	4000 organs available per annum

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The number of people dying is 3000 to 4000 per year waiting for a kidney in U.S.A.[2] considering that the burden of ESKD in India will be three to four folds as compared to US; at least 10000 to 12000 people are dying in India, waiting for a kidney. These premature deaths ruin the families putting huge burden on the society. Though large numbers of hospitals in India are now registered to conduct transplant surgeries; only 20952 transplants have been carried out from 1971 to 2011, indicating a huge gap in the demand position, leading to increasing number of deaths. [3]

The rich and the higher middle class have the means to go ahead with the surgery and the poor who cannot afford this surgery are destined to suffer because of paucity of kidneys and cost of surgery, respectively.

The Commercial Angle:

In India 30% of upper strata population say 35 crores have the means to live like the rich in the advanced countries. The bottom 30% earn less than 1 dollar (50 rupees per day [4]. This disparity in economic power and paucity of organs has paved the way for a thriving but dirty kidney trade.

Foreigners are also coming to India to purchase a kidney because the surgery can cost >130000 US \$ (> Rs.70 lakhs) in the west while the costs of surgery are Rs.10 lakh in India [5]. The rich in their desperation are ready to pay huge sums of money for a kidney and the poor ready to barter their kidneys for their own reasons. In this scenario middlemen secretly enter into the trade and exploit both the recipient and the donor alike, charging up to Rs.10 lakh for a donor kidney.

Following are two classic examples of kidney racket in India:

1. The deeds of "Dr. Horror" Amith Kumar, accused of running a huge illegal kidney racket with national and international ramifications, out of Gurgaon under the very nose of the Central Government. [6]
2. A racket busted by Andhra Jyothi news paper dated 31.08.2012 reveals, the kingpin operating from Bengaluru charging Rs 25 lakhs for a safe kidney transplant operation at Srilanka where the laws appear liberal. [7]

Major fall of the high costs of transplant surgery is that up to 60% of India's population shall not be able to pay, which is beyond their means and are destined to die.

The Legal Angles:

With a view to eliminate in human and ugly kidney trade and to provide better facilities to the donor and the recipient the Indian

parliament passed a sort of regulatory act numbered 42 of 1994, titled "TOHOA", Rules 1995 and amendments 2009 & 2011[8]. This law is comprehensive, complicated, stringent and difficult for doctors and other lay people to comprehend. Therefore efforts have been made to focus the salient features of law in simple and precise terms for the benefit of doctors. The doctors should not try to adore the role of a good samaritan in the issues involving the organ donation.

The law: The Act has 25 sections, several sub-sections, rules and forms dealing with:

1 Appropriate Authority (AA):

Constituted under Section 13 of this Act- an apex decision-making authority of the state and union territories with quasi-judicial powers to issue registration number to the hospitals and regulate them. The authority, a high level bureaucrat located at the state headquarters is competent to file criminal cases in the courts of law.

2 Advisory Committee: under Section 13 A (1) A multi member body including health officials, social workers, NGO and legal experts that assist and advise the Appropriate Authority.

3 Authorization Committees: under Section 9.4(a, b) constituted by the Central and State Governments based at UT, State, District and Hospital level. A multi member board consisting of doctors, officials and eminent citizens for the purpose of giving authorization for transplantation of organs after completing all legal formalities in accordance with the requirements of the law.

Procedures and Regulations:

- Hospitals having facilities and having applied for registration are issued registration numbers under section 10, (i) (a, b, c), (ii). By the AA (Appropriate Authority) to carry out the transplant surgeries.
- Authority for permitting removal of human organs is granted under Section 3 (1), (2), (3), (4), (5), (6), (7) and under section 5(1), (2) and 6 (a, b) read with sub-section 1A
- Authorization denied under certain conditions under Section 4 (1, 2)
- Preservation of human organs dealt in under Section 7
- Restriction for removal and transplantation under Section 9 (1, 2, 3, 4, 5, 6).
- Prohibition of removal of human organs for other than therapeutic purposes under Section 11

- Explaining hazards of operation to the donor under Section 12
- Suspension and cancellation of registration under Section 16 (1, 2) by the AA.
- Appeals – under Section 17 (1) (i), (ii)
- Offences and penalties for removal of human organs without authority 18(i), (ii).
- Punishment for commercial dealings under Section 19 a, b, c, d, e, f
- Punishment for contravention of any other provisions of Act under Section 20
- Cognizance of offence under Section 22.
- National human organs and tissues removal and storage network under Section 13 (c).
- National registry of donor's under Section 13 (1).

Types of Donors:

- 1 **Any Live Donor:** under Section 3 (1) can give authorization for removal and transplantation of the kidney "out of affection or attachment" to anyone.
- 2 **Deceased Donor, II (a):** under Section 3 (2) had in writing and in the presence of two or more witnesses (at least one of whom is a near relative), pledging kidney donation. The person in charge of his dead body can give authorization for removal and transplantation of his kidney to anyone.
- 3 **Deceased donor II (b):** under Section 3 (3) who had expressed his desire to donate a kidney after his death but no written authorization had been made. The person in charge of the dead body can authorize the removal of the kidney for donation to a **near relative**.
- 4 **Deceased donor II (c):** under Section (1) (2) on some occasions human organs can be authorized to be removed and transplanted by hospital and jail authorities in case of unclaimed dead bodies.
- 5 **Deceased donor II (d):** under Section 6 (a, b) a competent person can give authorization for removal of organs from bodies sent for P.M. examination. This type of donation is not suitable for kidney transplantation.

Ethical and Humanitarian Dilemmas:

The following questions need to be answered.

I. For the Patient:

- 1 Is it ethically correct on the part of the patient suffering from ESKD to buy a kidney?
- 2 If a patient on deathbed is caught in the trading of a kidney, will he be punished as per law?

II. For the Society:

- 1 Can the Government or the society make available a kidney to the patient suffering from ESKD? In the times of his need?
- 2 Should such patients be allowed to die in thousands every year?

III. For the Donors:

Kidney is sold for:

- Treatment of a dear one
- Daughter's marriage
- To repay family debts
- To maintain the family
- A farmer to come out of a debt trap and avoid suicide

The answers to these questions find echo in the following comments:

- Says, a Supreme court lawyer: "obtaining an organ illegally could be done in a life and death situations since ensuring that patient lives is more important" [9]
- Says, a reputed doctor, "A father has donated a kidney to marry off his daughter. In our country we have no social security to help the poor" [10]
- Asks a potential donor: "it is better than prostitution, right"? [10]

"What is wrong if a farmer in a debt trap sells his kidney, instead of committing suicide?" These are the issues which cannot be dismissed lightly. The causes and the solutions to the nasty organ trade are reflected in the above sentences.

Conclusion and Suggestions:

In a country with so much visible poverty and illiteracy law and ethics play little role in such issues. It is money that can mitigate some long term and short-term problems. We appear to have two sets of options to this problem, at present.

Set 1 of Suggestion:

1. Organ donation out of "attachment and affection" clause should be deleted so that the organ trade can totally be eliminated. And allow ESKD patient to die.
2. If this clause is retained Government should try hard to improve the financial lot of bottom 30% of our population so that socio economic constraints will not be a cause for trading their kidneys.

Set 2 of Suggestion:

- 1 A clue from surrogacy indicates that the surrogate mother is adequately compensated for lending her womb. [11]
- 2 Each year large number of personalities who excel in fields like sports, literature, acting, scientists etc. is both rewarded handsomely.

- 3 The patient of a transplantation operation has to pay huge fee for the operation, which benefits doctors and other staff including hospital management. The Government too receives revenue from corporate taxes, income tax. The patient too is immensely benefited with a boon of life. In such a scenario we expect the donor to accept, concession in railway fare, limited periods of insurance coverage and an exchange donor [12]. It appears that injustice is done to the donor. After all nobles cannot be made out of suffering humanity (poverty).
- 4 In some way we feel, if the donor is compensated in the precincts of law, directly and in full view of all; probably the murky deals will stop.
- 5 The honorable Act of organ donation still remains **majestic and noble**.

"Be an organ donor and save a life"

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Table 2
Depicting Violations & Punishments under the Act
(Compiled from TOHOA, 2004 and as amendments up to 2011)

Nature and description of the violations	Relevant Sections	Punishments	
		Imprisonment	Fine
A. Removal of organ without authority: Any person rendering services, conducting, associating or helping in any manner in the hospital for removal of any human organ.	18 (1)	Up to 10 years	Up to Rs.2000000
B. Any medical practitioner violations as per above	18 (2)	Up to 10 years	Up to Rs.2000000 Suspension of Registration for 3 years for 1 st offence. Permanent erasure for subsequent offence.
C. Same violation for tissue removal in a hospital without authority	18 (3) (New)	Up to 3 years	Up to Rs. 500000
A. Commercial dealings in human organs: (a) Making (b) Seeking (c) Offering (d) Negotiating any arrangement for the supply for a payment (e) Involvement of a society, firm or a company (f) Publishing and distributing for supply of an organ as per a, b, c, d above for payment (g) New addenda (2011) abetment in the preparation and submission of false documents, including giving false affidavit in respect of "near relationship" and out of "affection and attachment"	19	5 to 10 years	Rs. 2000000 to 10000000
B. Commercial dealings in human tissues: Clauses-a, b, c, d, e, f as above Contravention of any other provisions of the Act. Not mention separately.	19 (A) 20	1 to 3 years Up to 5 years	Rs. 500000 to 2500000 Rs. 2000000

Case Report

Traumatic Scrotal Emphysema: A Rare Case

*S.S. Bhise, **G.S. Chavan, ***C.S. Kulkarni

Abstract

Subcutaneous scrotal emphysema, also known as pneumoscrotum, is the increase in volume caused by air accumulated in the scrotal sac. This process has been explained by different theories. The large majority of reported cases are related to thoracic pathologies. A 19 year old male met with a fatal vehicular accident in early hours of morning and died before admission. On external examination there was generalized swelling all over the body prominently on eyes, face, chest, scrotum. On palpation crepitus was felt & air bubbles were seen on incising the skin mixed with blood. Enlarged scrotum mimic like hydrocele but after careful examination it was found that was due to pneumoscrotum. After careful examination and dissection final cause of death was given as 'death due to multiple injuries, with accidental emphysema of chest, abdomen and scrotum'. This case illustrates the degree to which air may spread throughout the soft tissues after initial pneumothorax.

Key Words: Scrotal emphysema, injury, fascia, Pneumothorax, Pneumoscrotum

Introduction:

Presence of subcutaneous air in the scrotum is a rare condition and only a few cases have been reported in the literature. Air in the scrotum secondary to trauma is even far less common and minimal discussion exists on this topic. We present a case of traumatic pneumoscrotum which was made unique by the fact that the amount of air that was introduced through the ruptured lung, to the subcutaneous fatty planes superiorly to the level of the face and temporal region, inferiorly up to legs.

Literature:

In the review of literature, we found several cases of pneumoscrotum with non-infectious etiologies from 1912 to 2011. 8 cases were due to endoscopic and surgical procedures, [1-5] one case was developed by perforated duodenal ulcer and the origin of seven cases was in the thorax. [2, 5-8]

Subcutaneous air may have reached the scrotum by any of the three following routes:

- Subcutaneously to the subcutaneous spaces of the scrotum and remain there, or dissect or diffuse interstitially through the dartos muscle to deeper layers.

- Retroperitoneally through the inguinal canal but superficial to the facial coverings of the spermatic cord.
- Intraperitoneally, through a patent processus vaginalis to the tunica vaginalis (least likely). [2]

Case History:

A 19 year old male met with a fatal vehicular accident in early hours of morning. He was immediately taken to the Sir JJ hospital where he was declared dead before admission. Postmortem was done at JJ pm center. Police inquest mentioned about the presence of multiple injuries with bloating of body features.

Postmortem Findings:

External Examination:

- There was generalized swelling all over the body prominently on eyes, face, chest, scrotum. Rigor mortis was partially developed in limbs. Post mortem lividity was faintly seen, not fixed, pink.
- Oozing of blood stained fluid from mouth. Eyes closed; on opening the eyes bulbar conjunctiva were protruding out. (Fig. 1-3)
- On palpation crepitus was felt over face, chest upper limbs, abdomen with fractured multiple ribs on both sides. Skin over face, chest, abdomen, and scrotum was tense and shiny.
- Scrotum was enlarged, (Fig. 4) swollen with loss of rugosity of skin and embedded penis.
- It was mimicking like hydrocele but on pressing the scrotum; air inside the sac was getting dispersed over abdominal wall and

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on releasing the pressure scrotum was getting ballooned up again.

Internal Examination:

- The plane of the emphysema was subcutaneous. Air bubbles were seen on incising the intercostal spaces mixed with blood which was oozing out suggestive of pneumothorax. (Fig. 5)
- **THORAX:** Left side massive pneumothorax, pleura lacerated; Lungs collapsed, contused lacerated; contusion of heart was seen over the apex, fracture of 3rd to 5th ribs posteriorly of left side.
- **ABDOMEN:** All organs were intact, pale, no equivocal ante mortem injuries were noted
- **HEAD:** Diffuse subdural and subarachnoid hemorrhage over left cerebral hemisphere with linear undisplaced fracture of the left petrous temporal bone was seen.
- **SCROTUM:** On dissection air came out forcefully revealing normal sized testis and penis. Fluid was absent inside the tunica vaginalis. (Fig.6)

Final cause of death was given as 'death due to multiple injuries, with accidental emphysema of chest, abdomen and scrotum'.

Pathophysiology: (Fig. 7)

The endothoracic fascia of chest wall continues with fatty superficial layer of Campers and deep membranous layer of Scarpa's fascia of abdomen. Subcutaneous emphysema means trapped air beneath this fascia.

Causes for this are trauma, iatrogenic due to endotracheal tube injury, surgical, gas gangrene, etc. In chest trauma with fractured ribs and tear of pleura and lungs, the air inside the alveoli travels from thoracic cavity to sub-muscular plane and from it to subcutaneous space that is fascial layer.

As this subcutaneous plane is continuous all over the body; air can travel to face, abdomen, armpits, limbs and genitalia rarely. This air causes swelling of the tissues.

Subcutaneous layer in the scrotum is replaced by Dartos muscle which continuous with subcutaneous layer of thigh and abdomen (i.e. Campers and Scarpa's fascia).

In this case air has traveled from lacerated lungs through endothoracic fascia towards abdominal wall where air was trapped between fatty superficial layer of Campers and deep membranous layer of Scarpa's fascia.

As this Campers and Scarpa's fascia continues with Dartos fascia with muscle in scrotum; air has trapped in between these layers of scrotum which has caused enlargement of scrotum.

Discussion:

Subcutaneous emphysema of the scrotum especially of traumatic etiology is not a common medical condition. Causes that may result in the presence of air in the scrotum are:

- Iatrogenic: such as various endoscopies (colonoscopy, laparoscopic procedures, Tracheostomy, CPR, chest drain tube insertion, dental procedures).
- Gas producing infection.
- Pneumothorax.
- Scrotal trauma.
- Visceral perforation.

The true nature of the development of the subcutaneous emphysema of the scrotum has not been fully elucidated. Three possible mechanisms were proposed:

- Rapture of the alveoli and expansion of the air through the mediastinum in the subcutaneous area.
- Expansion of the emphysema along the Scarpa's Fascia.
- Through the mediastinum air passes in the paranephric space and through the retroperitoneum and the inguinal canal is gathered in the scrotum.

Conclusions:

This case illustrates the degree to which air may spread throughout the soft tissues after initial pneumothorax subcutaneously dissected through the fat & subcutaneous planes, superiorly to the level of the face and temporal region, inferiorly up to legs involving scrotum.

Route of spread was to the subcutaneous spaces of the scrotum and remain there, or dissect or diffuse interstitially through the Dartos muscle to deeper layers. Scrotal emphysema may be confused with hydrocele so proper examination is very important

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Fig. 1: Swelling of Eyes, Face, Neck & Chest due to Air



Fig. 2: Whole Body swelling with Scrotum



Fig. 3 Protrusion of Bulbar Conjunctiva due to Air Pressure



Fig. 4 Enlarged scrotum due to air



Fig. 5: Air Bubbles in Blood



Fig. 6: Normal Size Testes

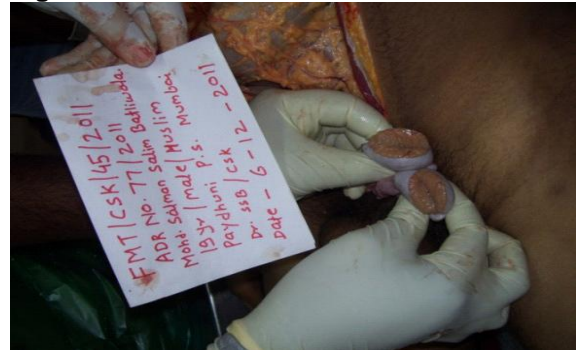
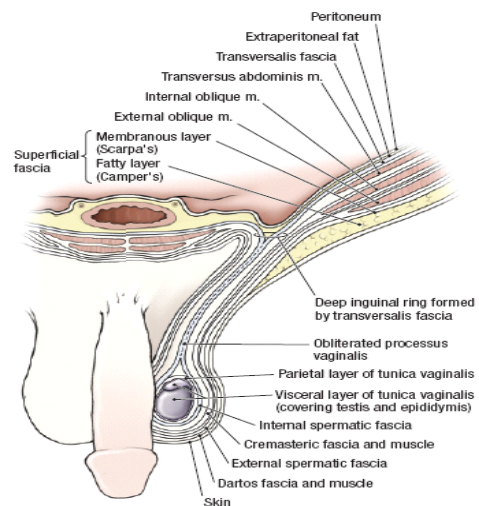


Fig. 7: Normal Anatomy of Abdominal and Scrotal Fascia



Case Report

Nitrite in Alcohol: A Turnabout from an Accidental to a Homicidal Case

*Aman Deep Kaur, **Vinay Kumar Atreya

Abstract

The nitrates/nitrites are an important metabolite in the biological nitrogen cycle, and natural constituent of soil and vegetation. Nitrates in commercial use are all of synthetic origin. Nitrite poisoning in fatal cases is commonly seen as an occupational hazard in farmers who use nitrates as fertilizers, pesticides and in this region of Rajasthan (Sanganer) in the dye industry, where it is used as mordant of dye. Dyeing, including block painting is a method which imparts beauty to the textile by applying various colors on to a fabric. Dyeing of Sanganeri Printed Cloth is by use of natural vegetable colors. But with change of times, synthetic products have found their way into the dyeing process. It is estimated that 25% population of Sanganer is directly or indirectly dependent on Sanganeri Print Industries for their livelihood. In this particular case that is discussed here, it was the easy availability of the lethal compound for its use in household dye industries that led to its homicidal use. The mordents used to set dye colour on fabrics to give it, its longevity, curtailed the longevity of life of someone.

Key Words: Nitrate/Nitrite Poisoning, Methaemoglobinemia, Carcinogenic Effect

Introduction:

Nitrites/nitrates salts in various forms are used in day to day activities wherein it can pose danger because of its toxicity. The major use of nitrate is as fertilizer. It is also used in the manufacture of nitrites, nitrous oxide, explosives, pyrotechnics, matches, freezing mixtures and special cements.

It is also used as a colorings and preserving additive to food, for coagulation of latexes, in the nuclear industry and for odour (sulphide) and corrosion control in aqueous systems. Nitrite is used as a food preservative and coloring agent, e.g. curing of meat, in the manufacture of diazo dyes and rubber, in the textile industry as a mordant [16] and in photography. Nitrite is also used in analytical and preparative chemistry, as a corrosion inhibitor and as an antidote in cyanide poisoning. [1] As it has quite a range of uses, its unwise use generally poses an accidental damage because of its physical resemblance to common salt, its use as a homicidal agent also has been seen. [2, 3]

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Case Report:

This particular case in question was brought as an ordinary case of alcoholic intoxication wherein no significant **postmortem findings** were there other than congestion of the viscera and 50 ml of whitish fluid in the stomach. Police gave the **brief history** that the deceased was a fruit vendor and a known alcoholic. He had drinks with his fellow vendors at around 8.30am on the day of *holi (dhulandi)*.

Bottle which was half full was brought by one of the drinkers who made the drinks also. Out of the group of four people who were there for the drinks, one didn't drink, the other two took a sip but they couldn't drink the rest as they found the flavor strange.

However, the deceased drank his drink in one shot. He complained of nausea soon after and started vomiting in about 15-20 minutes. His relatives took him to a nearby hospital from where he was referred to a tertiary care hospital. By the time he reached our hospital he was pronounced 'Brought Dead on arrival'. The whole incident took around two hours which culminated into his death.

After conducting the postmortem examination, viscera and blood sample were collected and sent for chemical analysis along with the alcohol bottle in question. The **chemical analysis** showed the presence of ethyl alcohol which was in non fatal concentration besides the presence of 'nitrites' in the viscera and the bottle

and also the presence of Methaemoglobinemia in the blood sample. This implied that the cause of death in this case was not alcohol intoxication but nitrite poisoning.

After this opinion, the case which was filed under section 174 Cr.P.C. and was being considered as an accidental case of alcohol intoxication was then converted to a homicidal case under section 302 IPC as accidental source of nitrates could not be explained. On further investigation, it was found that the person who had arranged the bottle for the drinks had not drunk from it and had bought the nitrate from a general merchant (it is readily available in this part of Jaipur(Sanganer), Rajasthan for its use in dye industry). The accused is now in custody and is being tried for murder.

Discussion:

As we saw that Nitrate occurs in the environment, in air, food particularly in vegetables and fruits and water, and is produced endogenously. It is also used as a food additive, mainly as a preservative and anti-microbial agent. It is used in foods such as cheese and cheese products, raw and processed meats, edible casings, processed fish and fish products and spirits and liquors. This wide range of use in our day to day life also makes it a potential poison if used unwisely.

Salts of nitrates are odourless and colourless with a saline taste while those of nitrites are colourless or slightly yellow. Both salts are hygroscopic and are variably soluble in water but as opposed to good solubility of sodium nitrate in alcohol, potassium nitrate is insoluble. Oral intake of nitrate and nitrite in food and drinking water is the major route of entry. The body can take up nitrate and nitrite from inhaled dust, e.g. from fertilizers.

Nitrogen oxides are transformed to nitrate/nitrite in the lung [19] but this exposure gives only 1.3 mg NO_3 /day. [15] There is no information available on inorganic nitrate and nitrite absorption through intact skin. [4] Sodium nitrite given intravenously is traditionally used in the treatment of cyanide poisoning in conjunction with sodium thiosulphate in doses of 300 mg for adults (200 mg NO_2). [16]

Nitrate and nitrite given orally are absorbed and transferred to the blood in the upper part of the gastrointestinal tract. Regardless of route of exposure, nitrate and nitrite are rapidly transferred into the blood. Nitrite is gradually oxidized to nitrate which is readily distributed into most body fluids (urine, saliva, gastric juice, sweat, ileostomy fluid), where bacteria are present and the environment

can be anaerobic, and nitrate can be reduced to nitrite. The main site for this reaction is mouth and stomach, but nitrite formation in the lower intestine and in the bladder (urinary infection) may also be of some toxicological importance.

There are no reports that suggest that nitrate as such has toxicological effects. The main toxicological concern is associated with its conversion to nitrite before or after reaching the human body. In blood, nitrite transforms haemoglobin into meth haemoglobin and is simultaneously oxidized to nitrate. Normally, meth haemoglobin gradually revert backs to haemoglobin through enzymatic reactions. The major acute toxic effect from nitrite is development of methaemoglobinaemia, a condition where more than 10% of the haemoglobin is transformed into methaemoglobin. When the conversion exceeds 70% the condition can be fatal.

Nitrite also transforms into nitric oxide or a NO containing molecule which acts as a signal factor for smooth muscle relaxation thereby contributing to use of nitrates as a potent vasodilator. The major concern of possible long-term effects of exposure to nitrate and nitrite is associated with formation of nitroso compounds, many of which are carcinogenic as documented in laboratory animals. The documented fatal dose of sodium nitrate is one to 2 gm, nitroglycerine is 200mg and that of silver nitrate is 2 to 10 gm. The fatal period for nitrates/nitrites is within few hours to few days.

As stated, Ingestion is the major route of exposure. The first symptoms may appear within 10 to 45 minutes. Clinical symptoms may include: nausea, vomiting, abdominal pain, headache, and dizziness, fall in blood pressure, tachycardia, collapse, bluish-grey cyanosis, hyperventilation, stupor, convulsions, coma and death. Methaemoglobinaemia is the principal and constant feature of acute nitrate and nitrite poisoning. Methaemoglobin levels correlate well with symptoms in most cases [10]:

- 0-3%- Normal level
- 3-10% - No clinical symptoms
- 10-15%- None or slate grey cutaneous coloration "chocolate brown" blood.
- 15-20%- Generalized blue-grey cyanosis, usually asymptomatic.
- 20-45%- Headache, fatigue, dizziness, exercise intolerance, syncope.
- 45-55%-Increasing CNS depression
- 55-65%-Coma, seizures, cardiac failure, cardiac arrhythmias, metabolic acidosis
- > 65%- High incidence of mortality

In mild cases, gastrointestinal symptoms and asymptomatic cyanosis dominate the clinical presentation. In severe cases coma and death can occur in the first hour due to hypoxia (severe methaemoglobinaemia) and circulatory collapse. In case of parenteral administration the onset of methaemoglobinaemia is immediate. Prognosis is usually good if adequate treatment is provided.

For diagnosing the poisoning, Arterial blood samples are taken which reveal a characteristic chocolate-brown colour. Methaemoglobin concentrations can be quantified by spectrophotometry and should be measured immediately. Biochemical analysis for Total hemoglobin, blood count, Serum electrolytes, especially potassium, Acid-base balance, Arterial blood gases, Urine analysis is done. Toxicological analysis's most relevant investigation is methaemoglobin concentration which correlates well with symptoms and should be monitored according to the clinical condition.

Death due to nitrates and nitrites has resulted from large suicidal ingestions, ingestion of contaminated food, industrial accidents and ingestion of contaminated well water in neonates. [6, 8, 10] Human red cells deficient in glucose-6-phosphate dehydrogenase are more sensitive to the methaemoglobin-generating activities of nitrite than normal red cells. [9]

Patients with congenital NADPH Meth b reductase deficiency are also particularly susceptible to nitrates/nitrites. Neonates are particularly sensitive to methaemoglobin induced by nitrates and nitrites due to their transient deficiency in methaemoglobin reductase, their low levels of erythrocyte NADH and the greater susceptibility of hemoglobin F (foetal hemoglobin) to oxidation. [14]

The treatment of nitrite poisoning requires supportive measures which include treatment of respiratory failure, shock, acid-base disturbances and convulsions. Oxygen therapy is indicated if there are clinical signs of methaemoglobinaemia. If the nitrates are ingested, gastric lavage is indicated in recent ingestion up to four hours. Although activated charcoal is not less effective in adsorbing nitrite than other methaemoglobin-inducing organic compounds, it could be administered per os. If an naso-gastric tube is in place, administer activated charcoal through the tube after the lavage. Contaminated clothes are taken off and skin is washed with copious amount of water.

Exchange transfusion may be useful for Methylene blue failures or for patients with known G6PD or NADPH methaemoglobin reductase deficiencies. [10] No data indicating

the benefit of forced diuresis, haemodialysis or haemoperfusion are available.

Methylene blue is the specific antidote indicated in methaemoglobinaemia induced by nitrates and nitrites. It is effective but may have significant side effects if used inappropriately.

Treatment with Methylene blue is indicated in symptomatic patients and when methaemoglobinaemia levels are greater than 30%. [5, 9] The initial dosage is 1 to 2 mg/kg or 0.1 to 0.2 ml/kg of a 1% solution, administered intravenously over 5 to 10 minutes. Clinical improvement and clearing of cyanosis occur within 1 to 2 hours. Methaemoglobin levels should be monitored 1 hour after the infusion. If the patient remains symptomatic and the level is still high, a second dose may be given. [6, 9, 10] Methylene blue will be ineffective in reversing methaemoglobinaemia and may produce hemolytic anemia in patients with glucose-6-phosphate dehydrogenase deficiency as this enzyme is essential for the generation of NADPH in the hexose monophosphate shunt. Without NADPH Methylene blue cannot act as a reducing agent in the transformation of methaemoglobin to hemoglobin. [7]

The total dose of methylene blue should not exceed 7 mg/kg [18] Methylene blue therapy may have significant side effects as precordial pain, dysnoea, restlessness and methaemoglobinaemia.

Patients with mild cyanosis but without symptomatic evidence of hypoxia and methaemoglobin concentrations of less than 25% will only require close observation and supplemental oxygen. [7, 9]

Ascorbic acid has been mentioned as an alternative therapy but according to most authors its reducing effects are too slow to have significant benefits. [7, 9, 10] It was also found that toxic methaemoglobinaemia that is not life-threatening is best treated by preventing further administration of the offending chemical and allowing normal metabolic pathways to reduce the methaemoglobin with high flow oxygen treatment as a valuable adjunct to management. [13] Levels of 20 to 30% of methaemoglobin resolve spontaneously in two to three days with no further effects.

Severe methaemoglobinaemia of toxic or hereditary etiology should be treated with one to two mg/kg of methylene blue intravenously as a 1% solution in saline. It acts as a co-factor in the alternate methaemoglobin reduction pathways involving NADPH.

Conclusion:

The solubility of sodium nitrate in alcohol and as it was the festival of colours (the deceased's body was covered with colours which also didn't come off even after a thorough wash to the dead body) that misled the interpretation of nitrite poisoning as it would have been suspected because of its characteristic postmortem staining of chocolate brown colour. But the chemical analysis unveiled the diagnosis. As stated that this nitrite poisoning could be because of the consumption of well water with chemical or bacterial contamination, with serious consequences especially for infants, such wells should be tested periodically to ensure their safety and compliance with national regulations or WHO recommendations for potable water.

The recommended maximum limit of concentration (mg/liter) in drinking water is 50 for nitrate and 3 for nitrites. High levels of nitrites cannot be detected without tests, and poisoning is not commonly detected unless health symptoms occur. Vegetables of known high nitrate content (carrots, spinach, beets, and cabbage) should be restricted in infants. [11] Sodium nitrites tablets (1 g) widely used in the medical and dental profession to prevent rusting of instruments should be recognized as a potent poison and should be kept in secure storage. [9]

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Case Report

Female Infanticide: The Innocence Murdered Again

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Abstract

Infanticide refers to the deliberate killing of a child below one year of age. Female infanticide is the intentional killing of baby girls due to the preference for male babies and from the low value associated with the birth of females. The killing may be consequent to active infanticide in which the means like fatal injuries & poisonings are the direct & immediate cause of death, & passive infanticide which involve the indirect causes like sustained nutritional deprivation. The crime of infanticide is generally committed at the time of or within a few minutes or hours after the birth of the child. In many cases the child has obvious injury marks & other external findings that rule out accidents and confirms that a homicide has occurred beyond a reasonable doubt. In other cases the evidence is not obvious and there might simply be a suspicion that an infanticide has occurred. Here we are representing a case of female infanticide in which the innocent female infant was murdered brutally by inflicting fatal contusions all over her body.

Key Words: Infanticide, Concealment, Decomposition, Homicide, Contusions

Introduction:

"It is as natural to die as to be born; and to a little infant, perhaps the one is as painful as the other" is a well said truth. Infanticide is defined as the killing of an infant, where an infant is defined as a child under the age of 1 year. [1] Outright infanticide can be classified into active infanticide & passive infanticide; the difference being that in the former the cause of death such as fatal beatings, poisonings etc. are direct and immediate, while in the later, the means such as sustained nutrient deprivation, are indirect and delayed. [2] Female infanticide is the intentional killing of baby girls due to the preference for male babies and from the low value associated with the birth of females. [3]

Legally infanticide amounts to homicide and all legal provisions applicable to the offence of homicide are applicable to infanticide. The crime of infanticide is generally committed at the time of or within a few minutes or hours after the birth of the child. [4] In a case where infanticide is not proved, the mother is usually charged under section 318 of the Indian Penal Code, with a lesser offence of concealment of birth.

Section 318 IPC clearly states (in context to the female infant) that whoever secretly buries or otherwise disposes the dead body of a newly born female child, whether such child dies before or after or during its birth, intentionally conceals the birth of such child, shall be punished with rigorous imprisonment for a term which may extend to five years and shall also be liable to fine which may extend fifty thousand rupees. [5]

In many cases the child has obvious injury marks & other external findings that rule out accidents and confirms that a homicide has occurred beyond a reasonable doubt. In other cases the evidence is not obvious and there might simply be a suspicion that an infanticide has occurred. The secret disposal of the infant's body in an open place like jungle, fields, railway tracks etc. in adverse environmental conditions invites the decomposition after a period of time.

The findings of any trauma may be significantly altered, externally as well as internally, by advanced decomposition and may produce hindrance in the interpretation of the injuries if any. But nothing can be concealed from a careful autopsy. In a similar case of decomposed female fetus we found a number of fatal homicidal contusions all over her body. The same is described here in detail.

Case History:

The dead body of a female fetus was brought for autopsy to the Department of Forensic Medicine, Pt. B.D. Sharma PGIMS, Rohtak. Purportedly the body was recovered

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from the outer aspect of a railway station disposed in the shreds of plants a bit away from the railway line recovered a day before autopsy.

It was an unidentified body brought Under Section 318 of Indian Penal Code (Concealment of birth). The apparent cause of death was unknown to the investigating officer of the case. The motive of the autopsy was to find out age and cause of death of the female foetus.

On examination, the body was in the advanced stage of decomposition with foul smelling, dark greenish discoloration all over with epidermis showing slippage and bloated unidentifiable facial features. The stump of cut umbilical cord was tied with a black thread. All the internal solid viscera were softened & putrefied. On careful examination of the body multiple diffuse reddish contusions of varying sizes with deep ecchymosis were found at various sites all over the body as below:

1. The scalp was diffusely contused over left fronto-temporal-parietal region with ecchymosis in all layers of scalp. (Fig.1) The brain matter was diffusely hemorrhagic & paste like.
2. Multiple reddish contusions of considerable sizes varying from 9-12x6-8 cm. were present over whole of the bilateral & posterior aspects of abdominal walls (back), patchily sparing some small areas. (Fig. 2, 2a & 2b) The underlying tissues were deeply ecchymosed & the muscles were contused.
3. Diffuse reddish contusions were noted over the right side of the face & left lower front neck and adjacent chest region (Fig. 3) with underlying tissues & muscles deeply ecchymosed.
4. Diffuse reddish contusion was noted over the right upper limb involving lower arm region (Fig. 4) with ecchymosis of underlying tissues.

The length of the foetus was 49 cm. The centres of ossification had appeared for talus & lower end of femur but not for upper end of tibia. At the end of the autopsy it was opined that this is the dead body of a female foetus aged between 36 to 40 weeks. The cause of death in this case was haemorrhage & shock consequent to the injuries caused by hard & blunt force impact, ante-mortem in nature and fresh in duration. The post mortem interval was opined to be between 36 to 72 hours.

Discussion:

Infanticide is killing of an entirely dependent child under "one year of age" who is killed by mother, parents or others in whose care the child is entrusted. [6] Infanticide must be

differentiated from sudden infant death syndrome (SIDS) which is the sudden death of any infant or young child which is unexpected by history and in whom a thorough necropsy fails to demonstrate an adequate cause of death. [7] The legal bearing on infanticide is the same as in culpable homicide and is regarded as murder in law except that the law presumes that the child was born dead. It is punishable under the Indian Penal Code 1860 Section 302, by death or imprisonment for life and also fine. [4] India has a social structure that makes it beneficial for a family to favor male offspring to that of female.

In rural India, the centuries-old practice of female infanticide can still be considered a wise course of action. [8] It remains a critical concern in a number of "Third World" countries today, notably the two most populous countries on earth, China and India.

A number of strategies have been proposed and implemented to try to address the problem of female infanticide, along with the related phenomena of sex-selective abortion and abandonment and neglect of girl children. The laws that punish people who commit infanticide, abandonment, and neglect of female children, and the laws and regulations on the protection of women and children should be strictly enforced.

Conclusion:

In India, most often, female infants are killed as soon as they are born either by suffocation or poisoning. Occasionally they are abandoned. However every possible cause should be ruled out and that requires a thorough careful autopsy of the innocent female child that might have been murdered brutally. To conclude with, our emphasis is on a thorough and careful examination as much as possible so that the innocence could be given true justice.

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Fig. 1a: Contused Scalp



Fig. 2b: Contusions over back



Fig. 2: contusion over abdominal wall



Fig. 3: Contusion over lower front neck & chest



Fig. 2a: Contusions over lateral side of abdomen



Fig. 4: Contusion over Rt. Upper Limb



Case Report

Perimortem Human Teeth Bite Mark: A Resuscitative Artefact

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Abstract

A human teeth bite mark as a peri-mortem resuscitative artefact has never been reported in the literature. Such an artefact could appear similar to ante-mortem teeth bite marks which can potentially mislead the law enforcing agency and the autopsy surgeon. We present a case of 46 year old female bar dancer who was found hanging in her room. On examination of dead body two human bite marks, one on the right cheek and the other on the right forearm were present on her body. Some erythematous abrasion-like lesions on both cheeks, a bruise over lower lip and a small abrasion over neck were also seen. The investigating agency initially suspected possibility of homicide after sexual assault followed by post-mortem hanging from ceiling. However on crime scene examination and detailed discussion with relations of deceased, it was revealed that deceased mother-in-law had bitten on her cheek and arm to give her pain stimuli, in an attempt to revive her, after the deceased body was brought down from ceiling. This case report would enlighten the forensic medicine experts and investigating authorities about possibility of such rare artefacts.

Key Words: Artefacts, Resuscitation, Hanging, Teeth bite marks, Crime scene investigation

Introduction:

All events that happen after death and may simulate ante-mortem injuries are grouped together under the heading of post-mortem artefacts. [1] Artefact is any change caused or feature introduced in a body after death that is likely to lead to misinterpretation of medico-legally significant ante-mortem findings. [2]

India is a land of diversified cultures. Numerous myths and misconceptions are widely prevalent in the society. These myths and misconceptions sometimes pose a challenge to the science. A myth that if a person does not respond to intense painful stimulus likes human teeth bite, then he or she is assumed to be dead. The marks left by such human teeth bites on a person can pose a serious challenge to medico-legal investigation.

Bite mark identification is essential, because it places someone at the scene of crime. [3] Ante-mortem human bites are highly significant from medico-legal point of view because they are commonly seen in cases of sexual assault, homicide and child abuse.

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Their proper characterization would be central to the whole investigation process. Human bite marks, found on the body of a deceased, as an artefact has not been reported earlier in literature, hence we felt the necessity of reporting the present case.

Case Report:

A 46-year old widow, a bar dancer, was found hanging from ceiling fan by her daughter at her home. With the help of other family members her body was brought down by cutting the ligature. Her mother-in-law and other family members tried to revive her by slapping, mouth to mouth breathing and biting. After these unsuccessful attempts, the police was informed about the incidence. After a request by investigation agency authors made a visit to the scene of crime.

External Examination:

Deceased clothes were intact and did not have any evidence of struggle or violence. Rigor mortis was present all over the body. Post mortem lividity was present on back and dependent parts of the body in supine position. Eyes and mouth were partially closed. There were no signs of decomposition. Multiple petechial hemorrhages were present on lower palpebral conjunctivae of both eyes. Nails and palms were bluish in colour.

The following injuries were present on the body.

1. An inverted V-shaped yellowish brown parchment ligature mark was present on

anterior, left lateral and posterior aspect of neck. It was 1.5–2 cm in width and 32 cm in circumference. On dissection base was avascular, pale and glistening. The margins were clear and there was no extravasation of blood into surrounding tissues. The thyrohyoid complex was intact.

2. Two pressure abrasions (knot impressions) of sizes 2 x 1 cm and 1 x1 cm with 1 cm separation were present on anterior aspect of neck 02 cm below chin.
3. A bluish colour contusion of size 3 x1 cm was present along the margin of left side of lower jaw 5 cm lateral to midline.
4. A human teeth bite mark with both upper and lower teeth impression was present on right cheek. The lower arch of the impression was well defined where as the upper arch was diffuse. The maximum width of each arch was 3.5 cm.
5. A greyish blue human teeth bite mark with both upper and lower teeth impressions was present over dorsal aspect of right forearm. Both the arches were well defined. The maximum width of each arch was 3.5cm.
6. A reddish superficial erythematous lesion of size 4 x 1.5 cm was present just below right eye. On dissection no extravasation was seen in the surrounding tissues.
7. A reddish superficial erythematous lesion of size 5 x 1.5 cm present on left cheek below left eye. There was no extravasation in the surrounding tissues.
8. Small reddish abrasions clustered together were present on right side of neck.
9. A small reddish abrasion was present on left lateral aspect of neck anteriorly. A bruise of size 0.8 x 0.6 cm was present on inner aspect of lower lip on left side.

There were no injuries on breasts, thighs, buttocks and genital region.

Internal Examination:

Small petechial hemorrhages were seen under the scalp in frontal region. Sub pleural hemorrhages were seen on the surface of both lungs. All internal organs were congested. The stomach contained partially digested food of about 500 ml. Mucosa of the stomach was healthy. Toxicological analysis did not detect any drug or alcohol. Death was due to asphyxia as a result of ante mortem hanging. The bite marks seen on the body of the deceased could have been inflicted during peri-mortem period.

Discussion:

Post mortem artefacts of various types and their significance have been frequently reported in literature. Resuscitative artefacts are

one of them. Commonly reported resuscitative artefacts are injection marks, contusions due to application of defibrillator, bruises due to external massage, soft tissue contusions on neck, and bruises on lips due to mouth-to-mouth breathing. [2] Grey [4] has reported a case of artefactual injury from application of defibrillator simulating human bite mark.

Harm and Rajs [5] had reported nail marks around the neck, chin and nostrils in patients who died of causes other than mechanical asphyxia and remarked that these injuries could be easily differentiated from injuries due to throttling. Bruising in the soft tissues and musculature of the neck has been described following mouth-to-mouth ventilation. [6] The literature has also documented bite mark artefacts of animals such as dogs, cats, rodents, etc. [7-11] Artefacts due to ant bite marks are commonly encountered in dead bodies left in open for some time.

Marks produced by insects are dry, brown with irregular margins and are usually seen in moist parts of the body. They resemble ante mortem abrasions and as they become dry, they resemble brush burns. Extensive linear ant lesions around neck resemble ligature abrasion. [2] Human bite mark as a resuscitative artefact has not been documented in literature so far. The case presented here is interestingly complicated from a medico-legal perspective.

A human bite mark on a female dead body invariably raises a suspicion of sexual assault or foul play. Some small abrasions on the neck, a bruise on the lip and erythematous abrasion like lesions on the cheeks almost point the case towards the diagnosis of some foul play. However the detailed discussion with relatives and crime scene investigation revealed these bite marks, abrasions and bruise to be post-mortem artefacts.

The bite marks were inflicted by mother-in-law of the deceased to revive her, which were later confirmed by comparing bite mark with the teeth of the mother-in-law. Absence of bite marks on the breasts, neck, and thighs of the body decreases the possibility of sexual assault. The absence of defense injuries and any signs of struggle further strengthen the theory of suicide. The pattern of ligature mark was typical of suicidal hanging. The small abrasions on the neck of the deceased could have been produced while removing the ligature from the neck.

The bruise on the lips could have been produced while trying to give the deceased mouth to mouth breathing. Thus in the instant case the human bite marks, small abrasions on the neck and bruise on the lips are post-mortem

resuscitative artefacts. The erythematous lesions on both cheeks were superficial, and there was absence of extravasation into the surrounding subcutaneous tissues.

These were probably due to dermatologic reactions as a result of excessive use of cosmetics. Sometimes skin lesions due to dermatologic diseases like dermatitis artefacta, erythema infectiosum, erythema multiforme, phytodermatitis or septic rash may be mistaken as bruises. A lesion of irritated dermatitis artefacta had been earlier reported as "pseudo-rodent" artefact. [11]

The case presented here highlights the rare possibility of human teeth bite mark as a post-mortem artefact. Wrong interpretation of artefacts on the body of the deceased can mislead the whole investigation process and put some innocent person/ persons to unjustified trouble. The report also emphasizes the importance of crime scene investigation and detailed history taking in complicated medico-legal cases.

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Photo 1: Ligature Mark on neck



Photo 2: Human Teeth Bite Marks on Right Cheek



Photo 3: Human Teeth Bite Marks on Right Forearm



Case Report

Suicidal Endosulphan Poisoning In a Pregnant Woman A Case Report

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Abstract

We report a case of 23-year old pregnant woman, who attempted suicide with Endosulfan, and presented to the Emergency Department with generalized tonic clonic seizure. She was in a state of altered consciousness, vomiting, hypotension, metabolic acidosis and finally developed cardiac failure. Endosulfan, an organochlorine insecticide associated with a high fatality rate in humans when ingested accidentally or with aim of suicide. Toxicological analysis of Blood and urine samples revealed endosulfan as causative agent. Endosulfan causes overstimulation of central nervous system. It is highly toxic and can be fatal if inhaled, swallowed or absorbed through the skin. Organochlorines are strongly lipid soluble and sequestered in body tissues with high lipid content such as brain and liver. Mortality and morbidity rates are high and there is no specific antidote. Treatment is symptomatic and supportive.

Key Words: Endosulfan, Pregnant woman, Suicide, Organochlorine insecticide

Introduction:

Endosulfan is an organochlorine insecticide and acaricide. All routes of exposure can be hazardous (stomach, lungs, skin). India is currently touted the world's largest user and producer of endosulfan. [1] Poisoning by chlorinated hydrocarbon insecticides is well known. One such insecticide is endosulfan, and has been widely used in agriculture since 1960. [3] Accidental and suicidal poisoning with endosulfan is reported in literature. [4-9]

Endosulfan became a highly controversial agrichemical due to its acute toxicity, potential for bioaccumulation, and role as an endocrine disruptor. Endosulfan causes overstimulation of central nervous system by inhibiting Ca^{2+} and Mg ATPase and antagonizing chloride ion transport in gamma-aminobutyric acid receptors. Endosulfan is a widely used insecticide that is associated with a high fatality rate in humans when ingested accidentally or with the aim of suicide.

Case History:

A married woman of 23 years with 22 weeks pregnancy was brought to emergency department NIMS hospital with hypotension.

She was cyanotic, having feeble pulse and was in a state of shock. Her attendant gave history of ingestion of endosulfan intentionally two hour prior to admission. Basic CPR was done for her and after 15 min she had BP: 110/60 and PR: 142/min regular rapid and deep respiration. Then urgent USG was done to assess fetal well being. With fetal heart rate 154, BPD corresponds to 55 mm; FL corresponds to 39 mm, normal fetal cardiac activity with presence of fetal movement.

After that, I.V. fluids were given to achieve the hemodynamic stability. Gastric lavage was not performed as the patient is pregnant. To control seizures diazepam, Phenobarbital and Phenytoin were given. The seizures were tonic-clonic in nature. She was transferred to ICU for mechanical ventilation and supportive care.

Investigation showed Leukocytosis with elevation of liver enzymes both AST and ALT with hypokalemia. (Table1) Urine examination showed pH 6 (acidic), Albuminuria, RBCs and WBCs. (Table2) After 12 hrs she developed cardiac arrest and did not respond to CPR and she expired in less than 24 hours after ingestion of endosulfan. (Fig.1)

Autopsy Findings:

Autopsy examination of the reported case has revealed damage to liver, kidney and brain. On External Examination there is no injury over the body. Massive congestion and focal hemorrhagic spots were observed on the surface and cross-sections of brain and

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cerebellum. No evidence of pathological abnormality was observed on the surfaces and cross-sections of both lungs. The liver had a congestive appearance and there were a few hemorrhagic spots of 1–2 cm on it.

The stomach was full with a pale yellow color semi digested material. Both kidneys are congested. Uterus was enlarged in size and soft in consistency. On dissection uterus contains a male fetus of crown-heel length of 25 cm and wt. about 350 grams with attached umbilical cord and placenta. Skin is covered with vernix caseosa and light hairs are present overhead.

Discussion:

Endosulfan is a very fatal poison that produces CNS stimulation and status epilepticus. Acute symptomatic seizures require urgent therapy. The etiology should be found out immediately and treated accordingly. The patient had no personal or family history of epilepsy, and there was no etiology except history of taking endosulfan as a motive of self-harm.

CNS hyper-stimulation (with little or no peripheral component) is the predominant toxicological effect of endosulfan mediated by inhibition of calmodulin-dependent Ca- and Mg-ATPase and antagonism of chloride ion transport in gamma-aminobutyric acid receptor/ionophore complex which releases the synaptic inhibition on neurons [2] Life-threatening status epilepticus and hemodynamic instability may occur.

Treatment is symptomatic and supportive. Supportive care for these patients include decontamination of skin, gastric lavage, activated charcoal, lidocaine for arrhythmia and treatment of status epilepticus. As there is no antidote available, aggressive supportive treatment remains the mainstay of management.

Conclusion:

Endosulfan, a banned pesticide in most of the countries but in India used extensively. A ban on endosulfan exists in Kerala (imposed through a court order), which came as a result of public pressure following the poisoning of many villages due to aerial spraying of the chemical. Especially in the rural areas cases with acute generalized seizures should suggest endosulfan intoxication when etiology is uncertain even in the absence of any signs of intoxication. Because of its threats to human health and the environment, a global ban on the manufacture and use of endosulfan was negotiated under the Stockholm Convention in April 2011.

Endosulfan poisoning is a devastating catastrophe with very high mortality. To prevent

endosulfan poisoning, the usage of it should be restricted and even prohibited all over India. Owing to the extensive use of endosulfan in developing countries such as India, more research proving its deleterious effects on human life is essential to impose a ban on chemical.

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Fig. 1



Table 1: Biochemical Investigation

Investigations	At Admission
Hb (gm%)	10.0gm%
TLC(/mm ³)	13,500
DLC(%)	N85L14E01
ESR	33 mm 1 st hour Wester green
Blood sugar(R)(mg/dl)	151
Serum Creatinine	1.2mg/dl
Serum Sodium	141 meq/l
Serum Chloride	101 mmol/l
AST(U/L)	322
ALT(U/L)	334
LDH(U/L)	1050

Table 2: Urine Examination

Physical	Microscopic
Color- Pale yellow	RBCs- 10-15/HPF
Reaction (pH) – 6.0	WBCs- 2-4/ HPF
Albumin- ++	EPITH. CELL- 1-2/HPFS