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From Editor's Desk

It is my great privilege that I am presenting the last issue of the journal of the current year. I hope you will like this issue like the previous issues. I am highly thankful to all of you for your active cooperation. This time I am sharing with you my feelings about the saddest event of this year –Tsunami which has played havoc with the lives and properties of hundred thousands of people. Many people have lost their lives and still many others have been left behind without any means to continue with life. They are without homes, clothes and food. It will take decades before they will be able to live an honorable life. I appeal to all of you to render all possible help to the hapless victims of Tsunami who are awaiting your generosity. I thank Mr. Bhatia from OSB Agencies Pvt. Ltd. who has rendered financial help to make this issue possible along with Dr. V.S.Mohi, Civil Surgeon Patiala and my friend Dr. K.K.Aggarwal. Once again I thank all my department colleagues for their all out help to bring this journal to you.

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TSUNAMI – A HORROR OF NATURE

Tsunamis are enormous sea waves due to underwater disturbances like earth quakes, volcanoes, meteorites and submarine landslides. These waves can be differentiated from other waves that in such tsunami waves' length between two wave crests may be 100 km. Time interval between two such waves may be from 10 minutes to one hour. In the deep oceans the height of the waves may be just one feet. From the area where the tsunami originates, waves travel outward in all directions. They travel at the speed of supersonic jet at about 800 km per hour. Once the wave approaches the shore, it builds in height. Tsunamis produce waves which can travel hundreds of miles and when they strike the seacoast they cause huge waves even up to 100 feet depending upon the topography of the seashore. At some seashore they may cause a few feet waves and a few miles away they may cause enormous waves depending upon the topography of the region. If the centre of disturbance is within one mile of seacoast and level of height land is less than 25 feet there may be huge loses. Earthquakes are the most common cause of Tsunamis.

This time Tsunami occurred on Dec 26, 2004 at 7.58 AM. It had the magnitude of 9 and is the 4th largest earthquake since 1900. It was due to undersea earthquake epicenter of which was north of Simeulue Island off the western coast of northern Sumatra and it was 30 km below main sea level and tsunami created by it affected the Indonesia, Sri Lanka, South India, Thailand and South Africa. Resulting waves were up to 50 feet high and these caused a lot of damage. About 165,000 to 234,000 people died on conservative basis and many more are missing. Sea bed is estimated to have been raised by several meters resulting in tsunami. This liberated about 2.0 exajoules of energy which is equal to energy needed for boiling 150 liters of water for every individual on this earth.

Vertical rise of seabed by many meters displaced a large amount of water which caused tsunami. In deep oceans it caused only a small hump which traveled at a high speed and was harmless but near the coastline speed slowed down and formed large destructive waves. It is the deadliest tsunami so far. Efforts were done to bury the bodies.

It has caused environmental impact. Fishing has suffered a lot as well as farming due to salt water in the fields. Drinking water becomes a problem. Poisoning of fresh water supplies and soil by salt water poses a lot of challenges to human population. Tidal waves and then the receding water can cause heavy damage.

We should learn from the shortcomings which we see in tackling such situations. As a forensic pathologist I have seen that issuing of death certificate had been a big problem. Until the dead bodies get identified no compensation is possible to be given to the relatives of the dead persons. Who should do this work and how it should be done.

In my view identification is the most important thing in such circumstances as cause of death in such situations takes a back seat which is usually drowning. It is important that identification is done before such bodies are cremated or buried. If bodies are cremated then it will not be possible to identify the dead bodies later on though this may not be the case in burial cases. Buried bodies can be dig out later on and identification may be possible

It is better and easy to number the dead bodies found at a scene, area or locality. It is good to have the photographs of all the dead bodies with number on the dead bodies with a digital camera and these can

be stored in a computer. There will not be a problem of photographic films and results can be viewed at the same time and photograph repeated if it is not of good quality. Immediately these can be stored in a computer or any other storing device. This has the advantage that this can be given to the media people who can air it thus helping in the identification.

Simultaneously some tissue samples can be taken for DNA profiling from each body. In such situations dry ice may be problem but hair can be plucked very easily from each body and may be preserved in dry conditions without any problem if taking of blood sample is not possible in such situations. Alternatively a tooth may be extracted and kept as such without the danger of preservation for quite a long time after death. All these samples should be numbered as in the photograph. All these samples can be utilized later on if there is any doubt about the identification of the dead bodies. Personal belongings should be described in detail or preserved in dry conditions if possible as these will also helping the identification in such circumstances.

There should be plans in advance to tackle such mass disasters with the governments otherwise governments are always found wanting to tackle these situations. Mostly it is left to the NGO's to provide the immediate help and governments step in later on due to lack of advanced planning. There should be a tsunami warning system in the Indian Ocean.

If coastal population is warned by some system like sirens that tsunami is approaching loss of life and injuries to the population can be minimized. Timely evacuation may help a lot in saving lives. Public consciousness should be raised about tsunamis and the areas should be identified which are prone to such hazards. If people are on small boats they should park their boats and should run for the high land. If there are big ships they may be taken to the deep sea and should not be brought back till the tsunami warning is over, this should be done in consultation with the harbor authorities.

Whenever there is warning of tsunami one should evacuate the coastline area and move to higher lands or safer areas. If there is noticeable recession in water away from the shoreline this is nature's tsunami warning and it should be heeded. One should move away immediately.

One should heed natural warning as well as official warnings one should expect many waves. One should go the high ground and should stay there. One should abandon belongings. Sometimes person may survive the first wave and then try to collect the belongings. In this way they may be taken by the second wave and may lose the life. Do not depend much upon highroads to go to highlands. Those may be broken by the waves and may not lead you anywhere. One should go to the upper floor or roof of a building or should climb a tree or climb onto something that floats. These are not sure methods to save life but his may help. Expect quakes to lower coastal lands after the tsunamis. Some houses survive tsunami there may be many people whose houses have collapsed then such houses may have to be used to shelter the people and all should help them.

Immediately after such disasters problem arises of food and shelter. Temporary camps may be arranged and facilities provided there so that there are no starvation deaths. Medical aid is also required on a large scale under these situations to treat the injured and diseased as well as to prevent the spread of epidemics. In such situation health authorities should work in unison with public health authorities. Huge amount of finances are required later on for reconstruction and rehabilitation of the people.

New development should be avoided in tsunami hazard area. New development that is located in hazard area should be designed to minimize future loss. Existing urbanized development in hazard area should be redeveloped or recycled in to other uses to prevent future losses of life and property.

Prof. R.K.Gorea

PREMENSTRUAL SYNDROME (PMS) THE MALADY AND THE LAW

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ABSTRACT

A study was conducted in 96 females suffering from PMS. Behavioral symptoms appearing during PMS were noticed. It was found that there is a substantial link between PMS and behavior alterations. Depression, aggression, irritability etc. were recognized as extremely common symptoms of the syndrome. Considering at this point, these psychological symptoms associated with PMS might form a plea of insanity for some female offenders.

KEY WORDS: Premenstrual syndrome, Behavioral symptoms

INTRODUCTION

PMS is a psycho-neuro-endocrinal disorder of unknown etiology, often noticed just prior to menstruation [1]. There is a cyclic reappearance of a large number of symptoms during the last 7-10 days of menstrual cycle which are not caused by any organic disease.

Various studies have shown appearance of significant behavioral symptoms - depression, aggression, agitated depression and other symptoms like irritability etc. during PMS. The nature of behavioral changes or symptoms, which perhaps are the focus of the link with criminal law, has been studied for about 30 years. Some research focuses on the fact that the menstrual cycle is in itself influenced by stress to such a large extent and thus that the relationship between behavioral changes and premenstrual changes is complex and multidirectional [2]. One such study in the United States of America observed that 79% of women report experiencing emotional changes such as mood swings, irritability, anger and depression when they have PMS. And men are perceptive when it comes to PMS and its effect on women in their lives - 84% of men report that women are close to experience the emotional changes of PMS [3].

As per this study, women believe that their personal relationship suffer the most as a result of the emotional changes of PMS. The survey shows

that 72% of women feel that PMS negatively affects their relationship with their husbands/significant others and 62% of them feel it negatively affects their relationship with their children [3]. Dalton (1959) found that 46% of all admissions in psychiatry ward and 53% of attempted suicides were during menstruation or pre-menstruation [4].

A strong relationship between psychiatric illness especially depression and severity of PMS was confirmed [5]. In a study of prison inmates it was found that out of a group of 42 women who had committed crimes of violence, the crime of 25 (62%) of women had taken place in pre-menstruating and one at the end of menstrual phase [6].

MATERIAL AND METHODS

Ninety-six, self referred females having PMS in the age group of 18-45 years, having regular, normal menstrual cycle ranging 21-35 days, attending premenstrual clinic of Obstetrics & Gynecology, Rajindra Hospital, Patiala and Pharmacology Department of Govt. Medical College, Patiala were taken.

A randomized single blind study was done. Survey of behavioral symptoms - depression, aggression, agitated depression, irritability, mood swings etc. were done. Premenstrual tension syndrome (PMTS) self rating scale consisting of 36 questions [7] were answered by encircling Yes/

No by patient twice, once in premenstrual phase and once in post- menstrual phase. Observations related to behavioral symptoms -depression, aggression and agitated depression were then analyzed.

OBSERVATIONS

The present study consists of 96 females suffering from PMS.

Out of 96 females, 37.5% belongs to the age group of 18-24 years, 41.67% in the age group of 25-34 years and 20.83% in the age group of 35-45 years. In the age group of 35-45 years, out of 20 patients, 80% had depression, 80% had aggression and 80% had agitated depression and 100% had other symptoms as shown in table 1.

In study group of 96 females, 37.5% were

married, 62.5% were unmarried. In married group all the symptoms were more as shown in table 2.

Occupation wise distribution of study group consisted of maximum number of nurses comprising 41.6% and minimum of students comprising 4.16% of total study cases. Out of 12 housewives, 100% had depression, 100% had aggression and 100% had agitated depression and 100% had other symptoms. Among 4 students, all had depression, aggression, agitated depression and other symptoms. Same is with service women, out of 8 service women; all had depression, aggression, agitated and all other behavioral symptoms as shown in table 3.

In table 4, parity wise distribution has shown. Out of 36 married females, 33.3% had no children, 55.5% had 1 or 2 children and 11.1% had >2

Table 1 Age wise Distribution

Age(in years)	Study Cases		Depression		Aggression		Agitated depression		Others	
	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age
18-24	36	37.5	20	55.5	36	100	20	55.55	28	77.77
25-34	40	41.67	16	40	16	40	12	30	36	90
35-45	20	20.83	16	80	16	80	16	80	20	100
Total			96		100		52		68	

Table 2 Marital Status

MaritalStatus	StudyCases		Depression		Aggression		Agitated depression		Others	
	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age
Married	36	37.5	24	66.6	28	77.77	24	66.66	36	100
Unmarried	60	62.5	28	46.6	44	73.33	28	46.66	48	80
Total	96	100	52		72		52		84	

Table 3 Occupation wise Distribution

Occupation	Study cases		Depression		Aggression		Agitated depression		Others	
	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age
Doctor	20	20.83	4	20	4	20	4	20	20	100
Nurse	40	41.66	16	40	32	80	16	40	28	70
Teacher	12	12.5	8	66.66	12	100	8	66.66	8	66.66
Housewife	12	12.5	12	100	12	100	12	100	12	100
Student	4	4.16	4	100	4	100	4	100	4	100
Service	8	8.33	8	100	8	100	8	100	8	100
Total	96	100								

Table 4 Parity Status

No. of Children	Study cases		Depression		Aggression		Agitated depression		Others	
	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age
No Child	12	33.33	4	33.33	8	66.66	4	33.33	12	100
1 or 2	20	55.55	16	80	16	80	16	80	20	100
>2	4	11.11	4	100	4	100	4	100	4	100
Total	36	100								

children. Out of 4 females having >2 children, 100% had depression, 100% had aggression, 100% had agitated depression and 100% had other symptoms.

DISCUSSION

In present study, 96 females suffering from PMS were observed for various behavioral symptoms occurring during PMS.

In this study, out of total 96 cases, maximum behavioral affection was noticed in females with in the age group of 35-45 years. Depression and agitated depression were 80%. Dalton suggested more incidence of PMS in women >30 years of age in comparison to younger women [8].

Any significant correlation between marital status and PMS has not been accounted. According to this study more behavioral symptoms were noticed in married females among which aggression was maximum i.e. 77.77%.

According to Freedman, 1985[1], housewives and women with less education report more premenstrual symptoms than those employed or better educated. Likewise is this study, housewives were reported maximum (100%) behavioral affection during PMS whereas better educated females like doctors were reported with only 20% symptoms. Dalton (1984)[9] found that incidence of PMS has been more in women with more parity. In present study, it was found same that women with more parity i.e. having >2 children were reported with 100% changes in behavioral symptoms during PMS whereas women with no child were having very less (33.33 %) depression and agitated depression.

CONCLUSION

From the present study, it has been shown that there is appearance of marked behavioral changes like depression, aggression, irritability, mood swings etc. during PMS. These behavioral

changes affect some females to such as extent that they act uncharacteristically and commit minor to major crimes which can turn into unlawful behaviors. If the criminal behavior is associated with hormonal changes of female reproductive cycle, their findings could be admissible in criminal trials of female offenders. Even psychological symptoms associated with menstruation might form a plea of insanity for some female offenders.

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A STUDY OF WRIST OSSIFICATION FOR AGE ESTIMATION IN PEDIATRIC GROUP IN CENTRAL RAJASTHAN

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ABSTRACT

The age of ossification of different centers at wrist joint i.e. Carpals and lower ends of radius and ulna have been studied in pediatric age group in central Rajasthan. The study included 244 healthy children of both sexes up to 12 years of age. Capitate and Hamate were first (during infancy) and Pisiform (9-12 years) was last to ossify. Ossification of the 8 carpals and 2 centers for lower ends of radius and ulna respectively have a definite relation with age and can be consider as good indicator for age assessment in pediatric age group.

KEY WORDS: age, carpals, ossification.

INTRODUCTION

In law the crime and punishment is entirely based on criminal responsibility and this in turn is dependant on the age of a person [1]. In the modern society the crimes against the children and by the children are increasing. The pediatric age group (up to 12 years) has got significant medico-legal importance (Table - 1).

There are various criteria for age determination of an individual, of which eruption of teeth and ossification activities of bones are important. Nevertheless age can usually be assessed more accurately in younger age group by dentition and ossification along with epiphyseal fusion [2]. A careful examination of teeth and ossification at wrist joint provide valuable data for age estimation in children [3]. Studies on ossification of the carpal bone are very few in India [4, 5, 6, and 7] and abroad [8,9].

Reporting on medico-legal practice in India, a survey committee recommended to the

government of India, in the year 1964 [10], that a zone wise study for the problem of determination of age is to be encouraged. The present study was conducted in Ajmer (central Rajasthan) to find out age of the children in pediatric age group (11 to 12 years) from ossification activities of the carpals and the lower ends of radius and ulna. It was found that ossification at wrist joint acts as a “good indicator of age” in children.

MATERIAL AND METHOD

This study was carried out in the department of forensic medicine at J.L.N. Medical College, Ajmer on 244 healthy subjects of pediatric group i.e. Up to 12 years of age of both sexes. Only the children having certified proof of their birth were included in the study. The pediatric group in the study was further classified into three groups as follows: -

- Group I: 0 - 3 years (age of deciduous teeth emption)
- Group II: 3 - 6 years (age of non emption of teeth)

Table no.1 - Medico-legal importance of pediatric age

Age in years	Medico-legal significance	Relevant IPC / Act
0 - 1 year	Infanticide	Sec. 302 IPC And British Infanticide Act - 1938
> 5 years	In deciding criminal responsibility of a child	Sec. 127-130 of Indian Railway Act, 1890
< 7 years	In deciding criminal responsibility of a child	Sec. 82 IPC
7-12 years	In deciding criminal responsibility of a child	Sec. 83 IPC
10 years	Kidnapping for valuables	Sec. 369 IPC
< 12 years	Oath	Indian Oaths Amendment Act- 1939
> 12 years	Consent for physical examination	Sec. 89 IPC

Group III: 6 - 12 years (age of mixed dentition)

Ossification of all the eight carpal bones and lower ends of radius and ulna were studied. For the study, the skiagram of both wrists (PA view) were taken and the x-ray plates were developed as per the routine procedure in the department of Radiodiagnosis for observing the above ten centers of ossification.

OBSERVATIONS

Age and sex wise study of cases (table 2)

There were 51.63% males and 48.27% females in the study with male to female ratio being approximately 1: 1. Precaution was taken to select equal proportion of the cases from each year interval of the age, from 0 to 12 years in both sexes. 22.95% children in the study belonged to group I, while 30.32% children were from group II and remaining 46.73% children belonged to group III.

Table no.2 - Distribution of cases according to age and sex

Group	Age in years	Number of cases			
		Male		Female	
I	0-1	6		8	
	1-2	12	30	8	26
	2-3	12		10	
II	3-4	8		16	
	4-5	12	32	12	42
	5-6	12		14	
III	6-7	8		10	
	7-8	10		8	
	8-9	10		8	
	9-10	14	64	8	50
	10-11	10		8	
	11-12	12		8	
Total		126		118	
		(51.63%)		(48.27%)	

Religion, habitat and dietary habit of cases (table - 3)

Most of the children (81.14%) in the study were Hindus followed by Muslims (18.03) and the Christians (0.83%) with male to female ratio of 1: 1 in two major communities of the country. 63.12% children in the study were from the urban area whereas remaining 18.85% and 18.03% were from the semi-urban and the rural habitat respectively. Number of the vegetarian and non-vegetarian subjects in the study\was almost same i.e. 36.88% and 35.26% respectively followed by the egg eaters (27.86%). Among the males number of non-vegetarians and egg eaters slightly predominated over the females whereas among the vegetarians number of the females exceeded over the males.

Ossification of carpal bones (table - 4)

Capitate and Hamate ossified during infancy in both sexes. The Triquetral and Lunate showed their appearance at 3 to 4 and 4 to 5 years respectively in both the sexes while trapezium, Trapezoid and Scaphoid ossified in 16.66% males and 28.57% to 42.85% females at the age of 5 to 6 years in the study.

The Trapezium, Trapezoid and Scaphoid ossified in all the females and males at the age of 8 to 9 and 9 to 10 years respectively. Among the few males trapezoid (9-10 years) appeared later than Scaphoid while females showed reverse pattern i.e. Scaphoid (8-9 years) appeared earlier than the trapezoid.

The Pisiform was last to ossify in both the sexes. In the males, it appeared between 9-10 years (14.28% cases) to 11-12 years (in all children) whereas; it ossified between 10-11 years (25%

Table no.3 distribution of cases according to religion; habitat and diet

Parameters		Number of cases		Total	
		Male	Female	Number	Percentage
Religion	Hindu	100	98	198	81.14
	Muslim	24	20	44	18.03
	Christian	2	0	02	0.83
Habitat	Rural	24	20	44	18.03
	Semi urban	24	22	46	18.85
	Urban	78	76	154	63.12
Diet	Vegetarian	40	50	90	36.88
	Egg-eaters	40	28	68	27.86
	Non-vegetarian	46	40	86	35.26

Table no.4 - Showing ossification of carpal bones in both sexes

Age in years	Percentage of cases showing ossification of															
	Capitate		Hamate		Triquetral		Lunate		Trapezium		Trapezoid		Scaphoid		Pisiform	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
<1	100	100	100	100	-	-	-	-	-	-	-	-	-	-	-	-
1-2	100	100	100	100	-	-	-	-	-	-	-	-	-	-	-	-
2-3	100	100	100	100	-	-	-	-	-	-	-	-	-	-	-	-
3-4	100	100	100	100	50	62.5	-	-	-	-	-	-	-	-	-	-
4-5	100	100	100	100	100	100	50	83.3	-	-	-	-	-	-	-	-
5-6	100	100	100	100	100	100	100	100	16.6	28.5	16.6	42.8	16.6	28.5	-	-
6-7	100	100	100	100	100	100	100	80	50	80	50	40	75	40	-	-
7-8	100	100	100	100	100	100	100	100	100	100	100	100	100	75	-	-
8-9	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	-
9-10	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	-
10-11	100	100	100	100	100	100	100	100	100	100	100	100	100	100	40	25
11-12	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	75

Table no.5 - Showing ossification at lower ends of radius and ulna

Ossification center at lower end of	Percentage of cases showing ossification at age (years)																	
	< 1		1 - 2		2 - 3		3 - 4		4 - 5		5 - 6		6 - 7		7 - 8		> 8	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Radius	-	-	100	40	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Ulna	-	-	-	-	-	-	-	-	-	-	50	14.3	50	80	80	75	100	100

Table no.6 - showing ossification at wrist and total number of centers appeared in pediatric age

Age in years	Ossification at wrist		Total No. of centers ossified		Symbols
	Male	Female	Male	Female	
<1	CH	CH	2	2	C=Capitate
1-2	CH	CH	2	2	H=Hamate
2-3	CHR	CH	3	2	Q=Triquetral
3-4	CHRQ*	CHRQ*	3-4	3-4	L=Lunate
4-5	CHRQL*	CHRQL*	4-5	4-5	M=Trapezium
5-6	CHRQLUM*D*S*	CHRQLUM*D*S*	6-9	6-9	D=Trapezoid
6-7	CHRQLUM*D*S*	CHRQLUM*D*S*	6-9	6-9	S=Scaphoid
7-8	CHRQLUSM*D*	CHRQLUMDS*	7-9	8-9	P=Pisiform
8-9	CHRQLUSM*D*	CHRQLUMDS	8-9	9	R=Radius lower end
9-10	CHRQLUSMDP*	CHRQLUMDS	9-10	9	U=Ulna lower end
10-11	CHRQLUSMDP*	CHRQLUMDSP*	9-10	9-10	*=Ossification ±
11-12	CHRQLUSMDP	CHRQLUMDSP*	10	9-10	

cases) and 11-12 years (75% cases) among the females. So up to the age of 12 years Pisiform did not ossify in all females in this study.

Ossification at lower ends of radius and ulna (table 5)

The centre (for lower end of radius ossified at the age of 1 to 2 and 2 to 3 years in all the males and females respectively in this study. At the age of 1 to 2 years only 40% females showed ossification at lower end of radius while ossification started ,it the lower end of ulna at 5 to 6 years of

age in both the sexes and at the age of 8 years and above it was present in all the children in this study.

Number of ossification centers appeared at wrist during pediatric age (table 6)

In the children of group I (up to 3 years) three centers ossified at wrist which included two for carpals and third for lower end of radius. At 3 to 4 and 4 to 5 years of age the same number (3-4 and 4-5) of ossification centers were observed in both the sexes respectively while at 5 to 6 years of age over all six centers ossified at wrist which, included

four centers for carpals and centers for lower ends of radius and ulna. So there was an addition of two more centers for carpals and third for lower end of ulna in group ii (between 3 to 6 years) children.

Centers for remaining four carpals (trapezium, trapezoid, Scaphoid and Pisiform) appeared in group III (between 6 to 12 years) children of which the Pisiform ossified in the last in both the sexes. If we further subdivide group III age into two i.e. 6-9 years and 9-12 years, the appearance of trapezium, trapezoid and Scaphoid was observed between 6 to 9 years and Pisiform at any time between 9 to 12 years in this study.

So out of 10 ossification centers at wrist joint 3 appear up to the 3 years of age, 6 up to the 6 years of age and 9 up to the 9 years of age whereas last one center (Pisiform) appear at any time during last three years of the pediatric age.

DISCUSSION AND CONCLUSION

In the present series Capitate and Hamate ossified during infancy which is almost consistent with other studies [7,8,9], Chaurasia [11] mentioned appearance of Capitate slightly earlier than Hamate, the 3rd carpal which showed its appearance at the age of 3 to 5 years was Triquetral this carpal ossified earlier in Englanders [8] and Australians [9] than in Indians. Lunate was the 4th carpal to ossify at 4 to 6 years of age in the study.

For first four carpals as mentioned above there was no wide sex variation in their ossification whereas, remaining four carpals i.e. Trapezium, trapezoid, Scaphoid and Pisiform showed slight variation (1-2 years) in their ossification in two sexes.

Trapezium, trapezoid and Scaphoid ossified between the ages of 5 to 9 year's in both the sexes in the present study. Ossification of Scaphoid has been also reported earlier in Englanders and Australians than Indians similar to Triquetral. Appearance of last carpal i.e. Pisiform has been reported at the age of 9 to 12 and 10 to 12 years in the males and females respectively. All other studies (Indian and abroad) showed almost similar age of ossification of Pisiform with a difference of ± 1 year.

Ossification at the distal End of radius and ulna are also helpful in assessment of age along with carpal bones in children below 12 years of age. In the present series, center for lower end of radius

ossified (M 1-2 years; F 2-3 years) earlier than ulna (M and F 5-8 years). Both Englanders and Australians showed the ossification at lower end of radius (within one year) and ulna (4.5 years) earlier than Indians while authors in India [1,12] have mentioned the age of appearance of ossification centers for the distal ends of radius and ulna consistent with present study. Variations in the appearance of center of ossification at wrist joint shows influence of race, climate, diet and regional factors. Ossification centers for the distal ends of radius and ulna consistent with present study.

Variations in the appearance of center of ossification at wrist joint shows influence of race, climate, diet and regional factors.

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CHANGES IN THE LEVELS OF VITREOUS POTASSIUM WITH INCREASING TIME SINCE DEATH

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ABSTRACT:

This study was done to know the changes in the levels of potassium in the vitreous humour of eye with increasing time since death by flame photometry method. 200 cases brought to the mortuary of Govt. Medical College, Patiala, formed the material of this study. The cases were divided in 2 groups, burn cases (24) and non-burn cases (176). The data thus collected was analyzed statistically. It was found that the vitreous humour potassium concentration was increasing in a linear fashion with increasing time since death and this increase in the level was independent of the factors like age, sex, environmental temperature and humidity.

KEY WORDS: Potassium, vitreous humour, time since death.

INTRODUCTION:

For investigation of crime, it is very important to determine 'time since death' i.e. the interval between death and the time of postmortem examination also called as 'postmortem interval'. This is very important in criminal cases as it shows the track to the investigators to reach the suspected person and to obligate the innocent ones. In the matters of transfer of property also the time since death plays an important role and some times these matters depends solely on the time since death.

In spite of its great importance, to fix the time of death within the limits of probability is a recurring problem in forensic medicine. It is self-evident that the longer the time interval between death and the examination of the body the wider will be the limits of probability. The routine methods to estimate postmortem interval are cooling of body, changes in eye, postmortem staining, rigor mortis, decomposition changes, contents of stomach and bowels, contents of urinary bladder and circumstantial evidence. From these methods only the approximate time of death can be estimated.

Various body fluids like blood, spinal fluid, aqueous humour and vitreous humour of eye show chemical changes immediately or shortly after death. These changes progress in a fairly orderly fashion until the body disintegrates. Each change

has its own time factor or rate. Thus determination of these chemical changes could help the forensic pathologists to ascertain time since death more precisely [2].

The determinations that may prove valuable include the potassium content of the aqueous humour and lactic acid, ascorbic acid, non-protein nitrogen, sodium and chloride [5] and magnesium, phosphate and bicarbonate [10] content of the vitreous humour. Although no single measurement gives a completely reliable estimate of the postmortem interval, combinations of chemical determinations can be useful adjuncts in cases of un-witness death [4]. Amongst these vitreous humour of eye is relatively stable, less susceptible than other body fluids to rapid chemical changes and contamination, easily accessible and its composition is quite similar to that of aqueous fluid, cerebrospinal fluid and serum; thus it is suitable for many analyses to estimate postmortem interval [8].

The accurate prediction of time of death is of great value in medico- legal investigations of serious crimes, thus as a result several workers have reported the possibility of accurate prediction of time since death (within two hours), from measurement of the levels of potassium in the vitreous humour [1].

In this study a relationship between the potassium levels of vitreous humour collected separately from each eye and the increasing time since death was found.

MATERIAL AND METHODS:

Two hundred cases brought to the mortuary at Government Medical College; Patiala formed the material for collection of vitreous humour. The information regarding time of death was gathered from police records, hospital records and from eye witnesses, relatives, friends and attendants of the deceased. Cases where exact time of death was not known were not included in this study.

The cases were studied in two groups as burn and non-burn cases.

Two samples were drawn, the first from the right eye as early as possible after the delivery of dead body to the mortuary and the second from the left eye at the time of commencement of autopsy (only the clear samples were taken, samples having any particulate matter were discarded). All the information about the deceased i.e. age, sex, address, cause of death, exact time of death, time of each sampling, temperature and humidity were recorded.

Vitreous humour was collected at autopsy from the posterior chamber of the eye, slowly and gradually avoiding tearing of loose fragments of tissues by needle aspiration through a puncture made 5-6 mm away from the limbus using 10 ml sterile syringe and 20 gauze needle and was poured in a rubber stoppered vial. Syringe and rubber stoppered glass vials washed with deionised double distilled water and dried in hot air oven and were used for sampling. Liquid paraffin gel was injected in the posterior chamber of eye for cosmetic purposes.

As much of the vitreous humour as can be aspirated was removed because the vitreous humour next to the retina has a different concentration of solutes than in the central portion of the globe. The samples were analyzed in the Department of Biochemistry, Government Medical College, Patiala. Each sample was centrifuged at 3000rpm for 10 minutes and the supernatant fluid was taken for determination of potassium by flame photometry method [11] and the values were expressed in mEq/l.

OBSERVATIONS & DISCUSSION:

After determining the potassium concentration the statistical analyses was done which showed a highly significant increase in the levels of vitreous potassium with the increasing time since death in both the groups (Table 1) which was linear in fashion.

Further it was observed that the vitreous potassium levels were significantly higher in burn cases. So it is evident that there is a significant effect of temperature at the time of death on the levels of potassium (Graph 1).

When the samples from both the eyes were taken at the same time and analyzed separately, no significant difference was observed.

It was also observed that there was no effect of other parameters like age, sex, temperature and humidity on the levels of vitreous potassium.

CONCLUSIONS:

From the present study it is concluded that:

1. There is linear relationship between vitreous potassium concentration and time since death.
2. Potassium levels were found to increase up to 104 hrs.

Table 1 showing mean potassium concentration (mEq/l) in relation to time since death

TSD (hrs)	Mean K ⁺ (mEq/l) ± SD			
	Non-Burn Cases (176)		Burn Cases (24)	
	1 st Eye	2 nd Eye	1 st Eye	2 nd Eye
Within 12 hrs	05.66 ± 1.76	06.78 ± 2.11	6.05 ± 1.59	07.20 ± 0.64
12.1 – 24 hrs	08.59 ± 1.06	09.42 ± 1.14	9.84 ± 1.51	11.24 ± 1.34
Above 24 hrs	12.88 ± 2.49	12.14 ± 1.98	-	15.00 ± 0.00

3. The factors like age, sex, temperature and humidity have no appreciable effect on the concentration of vitreous potassium.
4. Potassium values in burn cases are found to be higher than the non-burn cases.
5. The levels of potassium in vitreous humour are found to be the same, when the vitreous samples from both eyes were drawn at the same time and were examined as separate samples.

SUGGESTIONS FOR FUTURE STUDY:

1. As we did not correlate the electrolyte concentration of the blood at the time of death which may disturb the vitreous electrolyte concentration, so these parameters should be included in the future studies [7].
2. The combined estimations of various electrolytes in body fluids can help in estimating time since death more precisely like 3-MT (3-methoxytyramine), in the putamen of the brain in combination with vitreous potassium [9] and using both potassium and hypoxanthine levels

in vitreous humor of eye can be included in the future studies [6].

3. The newer method of capillary zone electrophoresis (CZE) can help to achieve a rapid and simultaneous determination of inorganic ions in the extra cellular fluid and substantial improvement of postmortem interval prediction [3].

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UNNATURAL DEATHS IN NORTHERN INDIA A PROFILE

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ABSTRACT

A ten-year retrospective study was carried out on the cases of unnatural deaths subjected to medicolegal autopsies from 1994 to 2003. The main objectives of the study were:

- a) To ascertain the various aspects of unnatural deaths,
- b) To analyze the probable reasons for the same &
- c) To find remedial measures to bring down the incidence.

The incidence of unnatural deaths was found to be persistently increasing. Maximum number of such deaths 1342 (47%) belonged to the age group of 21 - 30 years. Male: female ratio was 2.2: 1. Rural population was more prone to poisoning whereas the urban became victim of road-traffic accidents. Males preferred poisoning and hanging whereas females preferred self-immolation (burns) to end their own lives. Suggestions relating to road safety, decreasing the stress of the modern mechanical life-style, educating the public in general and regarding the availability, use and storage of poisonous substances in particular have been put forward, while highlighting the social evil of dowry system prevailing in India.

KEY WORDS : Unnatural Deaths, Dowry Deaths, Road Side accidents.

INTRODUCTION

Unnatural deaths are known to claim a substantial number of lives, the world over, with the vehicular accidents accounting for a lion's share. The vehicular accident rate per thousand vehicles is greater in developing countries than in the developed. In India, one person dies in less than every five minutes due to vehicular accidents [1] and the accident rate i.e. number of accidents per hundred thousand populations is 24.3. The increased pace of mechanization, increasing number of fast moving vehicles, unskilled or semi skilled drivers, drunken drivers and the woefully inadequate road system have ushered in this man made epidemic in India. Ignorance and intentional violation of traffic rules, encroachment of the roads by shopkeepers, hawkers and stray animals play an important role in contributing to the increase of vehicular accidents [2].

Poisoning is a major problem all over the world, though the type of poison and the associated morbidity and mortality varies from place to place and changes over a period of time. The use of poisons for suicidal and homicidal purposes dates back to the Vedic era in India. The exact incidence of this problem in India remains uncertain, but, it is

reported that 1 to 1.5 million cases of poisoning occur every year, of which nearly 50,000 die [3]. The last quarter of the century has seen tremendous advances in the fields of agriculture, industrial technologies and medical pharmacology. These advances have been paralleled with remarkable changes in the trends of acute poisoning in developing countries, including India [4].

Fire and its searing / cleansing powers have been held in great reverence and fear in the Indian psyche. This extended to cleansing and blessing of human bonds and relationships over it. Even Shushruta's ancient medical treatise gave it the final sterilizing / cleaning authority. From this background, setting oneself on fire may have been arrived at, as an Indian means of honorable suicide [5]. The burn fatalities in India go beyond the meaning implied in the term 'accident' and the impact they cause, no longer remains confined to the family but spreads far wide to be aptly termed as a 'Social Calamity' [6]. The prevailing system of dowry, which is mainly responsible for all such deaths, is a product of emerging capitalist ethos - the offshoot of an unequal society, a result of rampant consumerism, aided and abetted by the black-market economy. Its increasing incidence is

symbolic of continuing erosion and devaluation of women's status in independent India [7].

The other means of unnatural deaths - include hanging, drowning, jumping from height, etc for suicidal purposes. This is so because methods used by individuals bent on self- destruction depend upon the availability of the lethal instruments [8-15]. Snake bites, electrocution, anaphylactic deaths, etc categorized under "others" constitute a substantial number of unnatural deaths in this part of the world because of the lack of infrastructural facilities for timely management of such patients. Undiagnosed and sudden deaths are registered to be under suspicious circumstances and inquest proceedings initiated by the police, only to find on postmortem examination, that in most of such cases a disease process was responsible for the death. Crime rate in a community is directly linked with the rate of poverty and illiteracy [16]. India being a poor country with a high unemployment and illiteracy rate, the crime rate though disproportionate, still contributes its bit towards unnatural deaths.

MATERIAL & METHODS

The present study was carried out from January 1994 to December 2003 in the Department of Forensic Medicine & Toxicology at Govt. Medical College and hospital, Chandigarh, India, a tertiary care center for the North Indian states of Punjab, Haryana and Himachal Pradesh. The materials of study comprised 2835 cases of unnatural deaths subjected to medicolegal autopsy. The information regarding age, sex, socioeconomic background, marital status and the circumstances leading to such deaths was obtained from the relatives /

friends of the deceased, hospital records and the concerned investigating agencies.

The reports of the relevant samples / viscera subjected to chemical analysis on autopsy to establish the poison consumed in suspected cases of poisoning and to establish / rule out any intoxication in other cases were thoroughly scrutinized. The use of kerosene oil was also subject to confirmation from the reports of chemical analysis in cases of burns. The reports of relevant samples preserved during autopsy and subjected to histopathological examination to arrive at a conclusion regarding the cause of death due to a disease process, but under suspicious circumstances were also taken into consideration.

RESULTS

Trends of Unnatural Deaths: (Table 1)

Out of a total number of 2835 cases of unnatural deaths / deaths under suspicious circumstances autopsied during the period of study, more than one third 1028 cases (36%) were the victims of road-traffic accidents. Poisoning accounted for 21 % (595 cases) whereas burns claimed 18% (519) lives, 3% (92) cases died due to mechanical violence.

The study revealed a more [redacted]-fold increase in the overall incidence of poisoning and burns while a downward trend in road-traffic accidents from .59% (139/235) in 1994 to 29% (82/285) in 2003 was observed (Figure-1). A look at the year wise trend of unnatural deaths reveals an almost steady pattern of the accidental deaths whereas a four-fold increase in the suicidal deaths

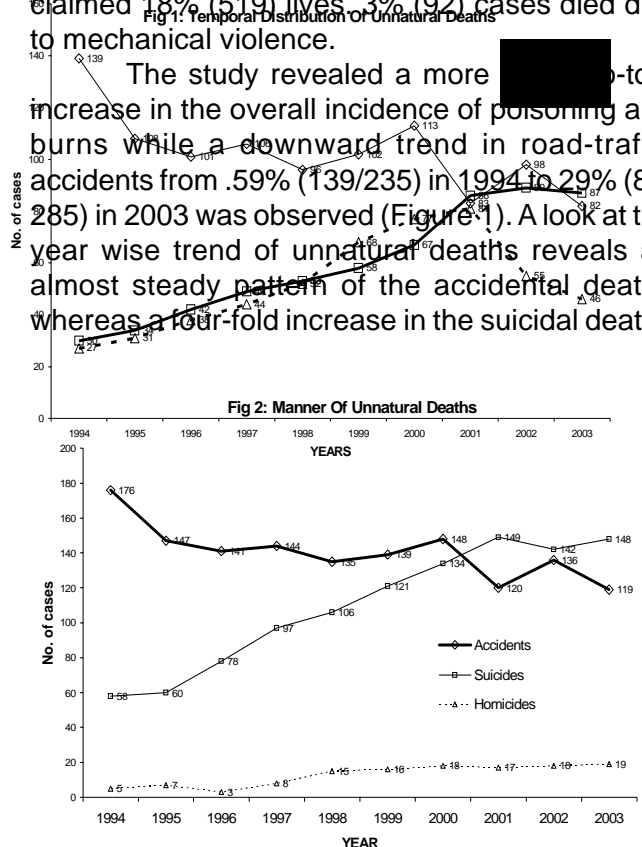


Table 1: Yearly Trends of Unnatural Deaths in relation to total number of autopsies

Cause of Death	1994	1995	1996	1997	1993	1999	2000	2001	2002	2003	Total
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
RTA	139 (13.5)	108 (10.5)	101 (9.8)	106 (10.3)	96 (9.3)	102 (9.9)	113 (11.0)	83 (8.1)	98 (9.5)	82 (8.0)	1028 (36.3)
Poisoning	30 (5.0)	34 (5.7)	42 (7.1)	49 (8.2)	53 (8.9)	58 (9.7)	67 (11.3)	86 (14.5)	89 (15.0)	87 (14.6)	595 (21.0)
Burns	27 (5.2)	31 (6.0)	38 (7.3)	44 (8.5)	52 (10.0)	68 (13.1)	77 (14.8)	81 (15.6)	55 (10.6)	46 (08.9)	519 (18.3)
Violence	04 (4.3)	05 (5.4)	03 (3.3)	06 (6.5)	11 (12.0)	13 (14.1)	16 (17.4)	11 (12.0)	12 (13.0)	11 (12.0)	112 (03.2)
Hanging	08 (7.4)	07 (6.5)	08 (7.4)	10 (9.3)	09 (08.3)	13 (12.0)	14 (13.0)	11 (10.2)	07 (6.5)	21 (19.4)	108 (03.8)
Electrocution	02 (5.3)	01 (2.6)	—	06 (15.8)	07 (18.4)	04 (10.5)	08 (21.1)	03 (7.9)	06 (15.8)	01 (2.6)	38 (01.3)
Drowning	01 (3.4)	02 (7.0)	—	05 (17.2)	06 (20.7)	05 (17.2)	04 (13.8)	03 (10.3)	01 (3.4)	02 (7.0)	29 (01.0)
Fall	02 (7.1)	01 (3.6)	—	03 (10.7)	06 (21.4)	03 (10.7)	05 (17.9)	01 (3.6)	04 (14.3)	03 (10.7)	28 (01.0)
Strangulation	01 (5.6)	02 (11.1)	—	02 (11.1)	04 (22.2)	03 (16.7)	02 (11.1)	02 (11.1)	01 (5.6)	01 (05.6)	18 (0.6)
Disease	14 (6.6)	22 (10.4)	19 (9.0)	25 (11.8)	19 (09.0)	22 (10.4)	27 (12.8)	19 (09.0)	21 (10.0)	23 (10.9)	211 (07.4)
Others	07 (4.1)	05 (3.0)	14 (8.3)	10 (5.9)	23 (13.6)	12 (7.1)	19 (11.2)	27 (16.0)	44 (26.0)	08 (04.7)	169 (06.0)
Total	235 (08.3)	218 (07.7)	225 (07.9)	266 (09.4)	286 (10.1)	303 (10.7)	352 (12.4)	327 (11.5)	338 (11.9)	285 (10.0)	2835 (100)

Table 2: Manner of Unnatural Deaths

Mode of death	Total		Suicidal		Accidental		Homicidal		Natural	
	No.	%	No.	%	No.	%	No.	%	No.	%
RTA	1028	36.26	—	—	1028	73.17	—	—	—	—
Poisoning	595	20.98	530	48.49	59	04.20	06	04.76	—	—
Burns	519	18.30	435	39.79	74	05.27	10	07.94	—	—
Hanging	108	03.73	108	09.88	—	—	—	—	—	—
Strangulation	18	00.63	—	—	—	—	18	14.29	—	—
Drowning	20	00.71	29	01.82	—	—	—	—	—	—
Violence	92	03.25	—	—	—	—	92	73.02	—	—
Disease	211	07.44	—	—	—	—	—	—	211	100
Indeterminate	75	02.65	—	—	75	05.34	—	—	—	—
Others	169	05.96	—	—	169	12.03	—	—	—	—
Total	2835	100	1093	38.55	1405	49.56	126	4.44	211	7.44

was observed. The homicidal deaths registered a moderate increase during the latter half of the study (Figure 2).

Preferred Modes of Suicide: (Table 2)

Poisoning 48%, burns 40% and hanging 10% were the most common methods adopted to end one's own life in this part of the world. Of the various poisons, Aluminium Phosphide was the

most preferred, 55% cases, followed by insecticides, 23% and ethyl alcohol, 8% respectively (Figure 3). In those who committed suicide by poisoning or hanging, ethyl alcohol was detected in the viscera of 4% cases. The use of kerosene oil as an accelerant was found in 62% of the samples sent for chemical analysis in deaths due to burns. 59% (309/519) of the burn victims had 70 to 80 percent burns (Figure 4).

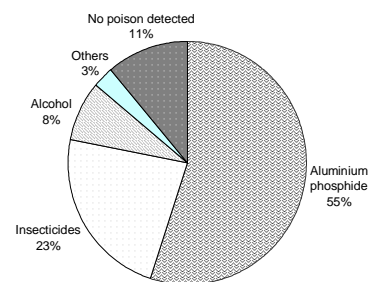
Table 3: Age and Gender distribution of Unnatural Deaths

Age in years	Accident			Suicide			Homicide			Natural		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
0-15	36 (64.3)	20 (35.7)	56 (4.0)	02 (100)	—	02 (0.2)	01 (50.0)	01 (50.0)	02 (1.6)	04 (66.7)	02 (33.3)	06 (2.8)
16-20	112 (72.7)	42 (27.3)	154 (11.0)	158 (68.1)	74 (31.9)	232 (21.2)	11 (78.6)	03 (21.4)	14 (11.1)	07 (58.3)	05 (41.7)	12 (5.7)
21-25	216 (80.0)	54 (20.0)	270 (19.2)	173 (54.9)	142 (45.1)	315 (28.8)	35 (77.8)	10 (22.2)	45 (35.7)	07 (63.6)	04 (36.4)	11 (5.2)
26-30	285 (70.7)	118 (29.3)	403 (28.7)	180 (72.0)	70 (28.0)	250 (2.2.9)	26 (72.2)	10 (27.8)	36 (28.6)	06 (50.0)	06 (50.0)	12 (5.7)
31-40	126 (65.0)	68 (35.1)	194 (13.8)	122 (65.6)	64 (34.4)	186 (17.0)	10 (71.4)	04 (28.6)	14 (11.1)	20 (66.7)	10 (33.3)	30 (14.2)
41-50	120 (71.4)	48 (28.6)	168 (12.0)	45 (69.2)	20 (30.8)	65 (06.0)	02 (66.7)	01 (33.3)	03 (2.4)	25 (62.5)	15 (37.5)	40 (19.0)
51-60	64 (71.1)	26 (28.9)	90 (6.4)	22 (68.8)	10 (31.2)	32 (02.9)	04 (80.0)	01 (20.0)	05 (4.0)	26 (54.2)	22 (45.8)	48 (22.7)
>60	56 (80.0)	14 (20.0)	70 (5.0)	07 (63.6)	04 (36.4)	11 (01.0)	05 (71.4)	02 (28.6)	07 (5.6)	28 (53.9)	24 (46.1)	52 (24.6)
Total	1055 (75.1)	350 (24.9)	1405 (49.6)	710 (65.0)	383 (35.0)	1093 (38.5)	102 (80.9)	24 (19.0)	126 (04.4)	85 (40.3)	126 (59.7)	211 (07.4)

Table 4: Rural Vs Urban Distribution of Unnatural Deaths

Cause of death	URBAN		RURAL		TOTAL	
	No.	%	No.	%	No.	%
RTA	804	78.21	224	21.79	1028	100
Poisoning	370	62.18	225	37.82	595	100
Burns	271	52.22	248	47.78	519	100
Violence	56	60.87	36	39.13	92	100
Hanging	59	54.63	49	45.37	108	100
Electrocution	28	73.68	10	26.32	38	100
Drowning	08	27.59	21	72.41	29	100
Falls	22	78.57	06	21.43	28	100
Strangulation	10	55.56	08	44.44	18	100
Disease	71	33.65	140	66.35	211	100
Others	91	53.85	78	46.15	169	100
Total	1790	63.14	1045	36.86	2835	100

Fig 3: Prevalence Of Poisoning



Age and Sex wise Distribution of unnatural deaths: (Table 3)

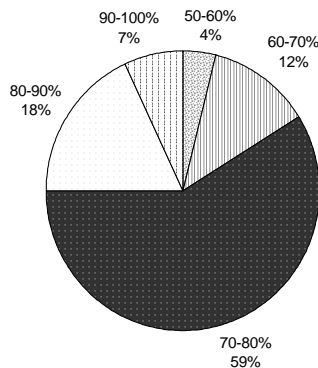
Young adults belonging to the age group of 21-30 years constituted the majority among the victims of accidental deaths (673/1405), as also of suicides (565/1093). A male predominance was observed among the overall percentage of unnatural deaths, the male: female ratio being 2.2:1. The male: female ratio of various modes of unnatural deaths was 2:1 for suicides, 3: 1 for accidents and 4: 1 for homicides.

Rural Vs Urban distribution: (Table 4)

The majority of those committing suicide were from rural background. The urban: rural ratio of various unnatural deaths amongst the two groups was 1.7: 1.

A substantial number of unnatural deaths, (75/2835) following drowning, electrocution, fall from height etc., could not be attributed to any specific manner of death i.e., suicidal, homicidal or accidental and accordingly were grouped under the head 'INDETERMINATE'. However, based on

Fig 4: Extent Of Burns



the information gathered from the investigating agencies these cases were attributed to the head 'ACCIDENTAL (*itefakia*)' as used by the agency for disposal of these cases.

In 211 cases of unnatural deaths, some disease processes were found to be the cause of death on histopathological examination of the samples preserved at autopsy. However, autopsy was conducted in these cases as the death occurred under suspicious circumstances and the police registered the cases under section 174 CrPC.

DISCUSSION

Unnatural death is one of the indicators of the level of social and mental health. Responsibility for prevention of violence in our society does not rest only on the law- enforcement personnel. Public health and other human service agencies must assist in preventing primary violence as they have done to prevent other major causes of morbidity and mortality. The present study reveals that poisoning was the commonest method employed for suicides and there was an appreciable increase in the percentage of suicide from 24.68% in 1994 to 51.9 % in 2003. Different reports published from time to time have reported a suicide rate in India as 43 per 100,000 [17], 28.57 per 100,000 [18], 38 per 100,000 [19], 29 per 100,000 [20] & 22.83 per 100,000 [21]. The age group, 16-30 years, was most prone to suicide, accounting for 73 % suicidal deaths. This is in conformity with the various studies conducted at different places [22-25]. The high

suicide rate among the adolescents and young may be attributed to various socio-economic factors viz. lack of employment opportunities, urbanization, break-up in the family support system, economic instability etc. Different agrochemicals especially Aluminium Phosphide marketed as tablets, has emerged as a dangerous weapon to human lives on account of its easy availability, non availability of an effective antidote, being cheap, efficacious and easy to use and is now the single most frequent suicidal method in Northern India [26].

In the present study, the higher incidence of unnatural female deaths due to burns in the age group of 21 - 25 years, helps to emphasize the fact that the burn fatalities in India go beyond the meaning implied in the term 'accident' to be aptly termed as a 'Social Calamity'. These deaths in general and homicidal and suicidal burn deaths in particular have genuinely been termed as 'Bride Burning' or 'Dowry Deaths [7]'. The high incidence of burn deaths, especially among the young females is often attributed to cooking on open unguarded flames. Loose, voluminous, highly inflammable, synthetic garments / saris of the victims are alleged to catch fire suddenly while cooking. Kerosene oil, match sticks, and other cooking material, being easily available in houses, is usually preferred by Indian women to commit suicide, and as for killing, it helps to hide not only the torture and other means of violence but also helps to tamper with or even destroy the circumstantial evidence.

The other means of unnatural deaths include drowning for suicidal purposes and constituted about 2% of the total suicidal deaths. This is so because methods used by individuals bent on self-destruction depend upon the availability of the lethal instrument that varies from place to place and community to community. Major part of India having rural population with agriculture as the main employment, agrochemical poisoning is more prevalent.

India being a poor country with a high unemployment and illiteracy rate, the crime rate should have been very high. But, the results of the present study show a negligible percentage of homicidal deaths. This perhaps, could be attributed to the religious and traditional God fearing values passed on from generation to generation.

The ongoing revolution of evolving faster and better means of transport, the world over, has brought along with it an important and unwelcome guest - road traffic accidents. These have taken an almost epidemic form in the recent past. This is particularly true of our country where one person becomes victim of this man made dragon in less than every five minutes [8]. The decrease in the number of road-traffic fatalities, from 14% in 1994 to 8% in 2003, observed in our study is in contrast to the reports from other parts of India that have registered a regular increase [27-29]. The main reason for this welcome improvement in Chandigarh is perhaps the strict implementation of the traffic rules by the authorities, and the citizens abiding-by the rules imposed on them. Wide and well-maintained roads have also played an important role in bringing down the accident rate in the city.

CONCLUSION & SUGGESTIONS

Unfortunately but realistically, there is little that the autopsy surgeon can contribute to the elucidation of factors leading to the unnatural deaths. The most energetic efforts of physicians, other members of the health team, families, friends, social organizations and the authorities may never eliminate such deaths. However, in an attempt to at least try to decrease its toll the following suggestions are made:

- Strict implementation of traffic rules, with special attention to be paid to:
 - Drunken drivers
 - Unskilled or semiskilled drivers
 - Use of mobile phones and smoking while driving
 - Use of high beam lights & music system at high volume, while driving within the city limits.
 - Reckless and rash driving, etc.
- Educating the general public about the road safety measures. Media, particularly, can play a more active role in this area.
- Encroachment of roads by shopkeepers and hawkers should be dealt with strictly. Parking at unauthorized places should be penalized heavily. Stray animals should be removed from the roads and placed in govt. cattle sheds.
- Properly planned and maintained wide roads can go a long way in preventing accidents.

- Various socio-economic factors responsible for the high incidence of suicidal poisoning need a practical and early redressal on the Govt.-front, by properly and honestly framing the policies and implementing the same in such a manner that their benefits reach the needy. The prevailing evil of dowry system in this part of the world, despite the existing stringent laws (Sec. 498A, 304B Indian Penal Code) to curb the menace, has shown an upward trend. There has also been some feminist movement in the society and at present, one finds women's organizations struggling for their rights and protesting against the atrocities on them. But the movement has not yet been much successful in correcting the wrongs at the grass root level and needs to be further strengthened.
- Marriage counseling, discouraging costly and ostentatious marriage rituals, strict implementation of anti-dowry laws may help in decreasing or preventing the tensions of day to day married life.
- Most common victims of suicidal deaths were the adolescents and the young adults of the age group of 16-30 years. Serious deliberations and thought should be put into the various reasons cited above and ways and means to decrease the burden of stress related to the modern life need to be evolved.
- The NGOs and Social Organizations can contribute their bit by building a satisfactory interpersonal relationship between the young and the elders in the society.
- The storage and sale of commonly used agrochemicals should be controlled through strict regulations passed and implemented by the concerned authorities.
- Popularizing vocational courses as per the caliber of the individuals will go a long way in decreasing the insecurity of the unemployed, thereby boosting their self-confidence and will power.

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ROAD SAFETY AT CROSS-ROADS

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ABSTRACT

With increasing population and increasing vehicular density and with meager infrastructural amenities the 21st century is plagued by yet another important issue Road Traffic Accidents which had in fact become a slow modern pandemic and following a pattern of a secular trend.

Road Traffic Accidents (RTA) and Road Traffic Injuries (RTI) consequent to it are on the rise and are a matter of concern as far the loss of life and limb and psycho-socio-economic impact of the event aftermath, on the affected person and his family. The present review article is based on RTI and road safety and brings into focus the theme of the World Health Day (WHD) 2004 which is dedicated to Road Safety.

KEY WORDS: Road Traffic Injuries (RTI), Road Safety, High Income Countries (HIC), Low and Middle Income Countries (LMC)

INTRODUCTION

Every year the World Health Organization (WHO) hosts an event, usually on 7th April, to celebrate the anniversary of its founding in 1946. Each year the event focuses on one health issue. It promotes awareness, understanding, discussion and debate about the issue and it mobilizes action to address the issue, through prevention or treatment [1].

In response to a growing concern about RTI; the WHO Director – General, Dr. Lee Jong – Wook has, for the first time in the history of WHO devoted a WHD specifically to Road Safety, this year [2].

RTI are a global problem affecting all sectors of society. To date road safety has received insufficient attention at the international and national levels. This has resulted in part from: a lack of information on the magnitude of the problem and its preventability; a fatalistic approach to road crashes; and a lack of political responsibility and multi-disciplinary collaboration needed to tackle it effectively. However, much can be done to reduce the problem of road crashes [3].

THE PROBLEM STATEMENT

RTI are the leading cause of death by injury, the 10th leading cause of all deaths and the 9th leading contributor to the burden of the disease worldwide [4,5]. Of the total deaths from RTI, 1,029,037 or 87.9% were in Low and Middle Income

countries (LMC) and 1441,656 or 12.1% were in High Income countries (HIC). Deaths from RTI per 100,000 population were 20.7% in LMCs and 15.6% in HICs [5]. RTI death rates were consistently higher in all LMCs than in HICs in the same regions [6]. They constitute a rapidly growing problem, with deaths from injuries projected to rise from 5.1 million in 1990 to 8.4 million in 2020. Rapid urbanization and motorization in developing countries will account for much of the rise and the rise will be steeper due to lack of appropriate road engineering and lack of injury prevention programmes in public health sector [7].

VICTIMS OF RTI

The numbers and rates of RTIs vary by region, age, and gender and road user type [3]. The burden of RTI falls disproportionately on people in LMCs. Although the number of motor vehicles per capita is considerably higher in HICs, LMCs have the highest burden of injuries and fatalities due to road crashes. For e.g. in 2000 RTIs killed more than 1 million people in LMCs (90% of the global mortality resulting from motor vehicle crashes) and 1,25,000 (10%) in HICs.

The magnitude of the road traffic injury problem varies considerably according to geographical region .Of the 1.26 million annual road crash deaths in 2000, more than a third (435,000) occurred in South East Asia. Although South East Asia has the highest proportion of global road

fatalities, Africa has the highest road traffic death rate, 28 deaths per 100,000 population. The ill health, or morbidity, that results from RTI also differs widely by region with South East Asia accounting for more than one third of the morbidity resulting from RTI each year. When comparing fatalities by level of motorization, the regional variation is different. For example, Sweden has a relatively low rate of 1.3 deaths per 10,000 vehicles, whereas in some African countries the rate is more than 100 deaths per 10,000 vehicles.

Road traffic injuries involve issues of equity. They disproportionately affect the poor in developing countries, where the majority of road crash victims are vulnerable road users (pedestrians, cyclists, children, passengers). In more developed countries too, there are steep social class gradients in figures on pedestrian injury, with children of lower socioeconomic status being more likely to die in collisions involving pedestrians than their affluent counterparts. A further inequity issue is that poorer socioeconomic groups have less access to medical services, leading to disparities in chances of recovery or survival. An important inequity is the trend of investing increasing resources in the building and maintenance of an infrastructure for private motorized transport of the larger part of the population.

Road traffic injuries disproportionately affect young people. More than 50% of global mortality due to road traffic injury occurs among young adults, aged 15-44. Similarly, morbidity is highest among this age group, whose members account for about 60% of worldwide morbidity each year as a result of RTIs.

Globally, the road traffic injury mortality rate for males is almost three times as high as it is for females. Males in South-East Asia and Africa have the highest RTI mortality rates worldwide. Similarly the rate of morbidity that results from road traffic injuries is higher for men than for women, with males in China and India suffering disproportionately from this cause of ill health.

Fatalities as a result of road traffic injuries differ by road user type (e.g., pedestrians, cyclists, motor vehicle occupants, motorcyclists and users of public transport). The impact of RTIs on these user types varies considerably between HICs and LMCs. For example, in most HICs, the majority of road traffic deaths relate to car occupants (drivers

and passengers). However, in developed countries road traffic fatalities occur mostly among people who do not own or have access to a car: pedestrians, motorcyclists, cyclists and users of public transport. For example, according to an ECA study conducted in a number of African countries in 1997, pedestrians were the victims of 75% of road collisions in Abidjan, 65% in Nairobi and 89% in Addis Ababa.

Current and projected trends in motorization signal, that the problem of RTIs will get worse, becoming a global public health crisis. Data from many countries show a clear relation between increasing levels of motorization and the number of road deaths. The rapid rate at which motorization is taking place in many LMCs means that these countries will take less time to address the problem of increasing RTIs and to mitigate their adverse consequences. WHO estimated in 1996 that by 2020, road traffic crashes would be second leading cause of mortality and morbidity in developing countries. This is in contrast to HICs, where long term development means that vehicle use evolves at a slower pace, allowing road safety campaigning on road safety have led to a 50 % decrease in the number of fatalities, despite a tripling of road traffic volume .

SOCIAL AND ECONOMIC IMPACTS [3]

RTIs have enormous health, social and economic impacts on individuals, families, communities and Nations.

Besides the direct physical and psychological impact on those directly affected by RTIs, road crashes also place a heavy burden on those involved with the victims. Family, friends and communities of those directly affected by RTIs can also experience short and long term adverse social, physical and psychological outcomes. For example, every year in the European Union more than 50,000 people are killed and more than 150,000 disabled for life by road traffic crashes. This leaves more than 200,000 families bereaved or with family members disabled for life. It is frequently the bread winner of the family who is disabled or killed as a result of a road crash. Therefore, in addition to the emotional impacts, those affected must cope with reduced family incomes, and frequently have to deal with criminal and /or civil justice systems.

There are also considerable indirect effects of RTIs: members of the public may be affected by RTIs even when they or their family are not directly involved in road crashes. For example, fear of road traffic injuries can prevent old people from venturing outdoors. In many HICs, increasing use of cars has led to a general decline in walking and increases in sedentary life styles, which in turn has had adverse consequences in terms of increasing obesity and cardiovascular health problems.

The injuries and disability resulting from road traffic crashes put a significant drain on economies, typically consuming between 1-3% of a country's gross national product per annum. Globally, estimates suggest that the economic costs of road traffic injuries amount to 518 billion per annum. In developing countries, the cost is estimated to be 100 billion, twice the annual amount of development assistance to developing countries. These costs include direct medical costs, as well as indirect and longer-term costs. The economic impact of road traffic injuries is especially damaging, particularly for countries struggling with poverty alleviation and the overall challenges of development, because economically active age groups are the most vulnerable to such injuries.

The issue of road traffic safety is relevant to countries that are trying for sustainable development. Recently at 2002 World Summit on Sustainable development, it has been recommended that in developing countries where there is rapid motorization, urban development and transportation planning is integrated and that reliance on mass transit and alternative modes of transport be increased. Such efforts should help to mitigate the adverse impacts of increased motorization.

RISK FACTORS FOR ROAD TRAFFIC CRASHES AND INJURIES [1]

Factors influencing exposure to road traffic

- Economic factors such as level of economic development
- Demographic factors such as age, gender and place of residence
- Land use planning practices which influence how long people travel and by what means
- Mixture of vulnerable road users and high speed motorized traffic

- Lack of consideration of the ways in which roads will be used when determining speed limits, road design and lay out

Risk factors influencing being involved in a crash

- Inappropriate and excessive speed
- Presence of alcohol and other drugs
- Fatigue
- Being young and male
- Being vulnerable road user in an urban or residential area
- Traveling in darkness
- Poor vehicle maintenance
- Road design, layout and maintenance defects
- Inadequate visibility due to weather conditions
- Poor eyesight

Risk factors influencing the severity of a crash

- Individual characteristics such as age which influence the ability of a person to tolerate crash
- Inappropriate and excessive speed
- Non use of seat – belts and child restraints by vehicle users
- Unforgiving roadside objects such as concrete pillars
- Insufficient vehicle crash protection such as air bags for occupants and vehicle soft fronts for those who may be struck by vehicles

Risk factors influencing the consequences of injuries sustained as a result of a crash

- Delayed crash detection and transport to a health facility
- Rescue and evacuation
- Lack of appropriate care prior to arriving at a health facility
- Post collision fire
- Leakage of hazardous materials

PREVENTIVE STRATEGIES [1]

Reduce exposure to road traffic

- Plan communities so the places where people live, work, go to school, and shop are close together and people do not have to travel long distances every day.

- Plan road networks so that different types of traffic are channeled along different roads specifically designed for each type. For example, roads through residences and shopping areas should be designed both to discourage through traffic (that neither originates in nor is destined for those areas) and to inhibit the speed of local traffic.
- Provide safe crossings and sidewalks or separate paths and lanes for pedestrians and cyclists.
- Provide convenient and affordable public transportation, operating in safe conditions.

Reduce the occurrence of crashes

- Provide an environment conducive to safety.
- Design or improve roads to separate road users going at different speeds and in different directions.
- Improve the visibility of roads, road signs, vehicles, and road users during both day and night. Visibility should be a priority when roads are designed. On existing roads, shrubbery and other obstacles that obscure views should be removed and prohibited. Good lighting, highly visible colors and reflective surfaces on signs as well as highly visible clothing and reflectors on pedestrians and cyclists also improve visibility.
- Pass and enforce laws that set maximum blood alcohol content levels for drivers. This can reduce the occurrence of crashes that result in death by as much as 40%. Experience shows drivers will obey drunk-driving laws if they fear being caught, so intensive enforcement is necessary.
- Control speed with traffic calming road design such as roundabouts and enforce speed limits consistently, using devices such as speed cameras. As
- A car's speed increases from 50km/h to 80km/h, it becomes eight times more likely to become involved in a crash that kills a pedestrian. Decreasing speed by 1 % can reduce the occurrence of crashes by 2% to 3%. Traffic calming

measures are very effective at reducing the incidence of road crashes in urban areas.

- Require daytime running lights on motor cycles and mopeds. These lights are a low-cost way of reducing the incidence of crashes by 10% to 15%.
- Implement a graduated driver licensing system whereby novice drivers are restricted initially to driving while accompanied by an experienced driver, then to driving unaccompanied only during daylight hours, then to driving with a limited numbers of passengers, and so on, until they are fully experienced and competent.
- On highways where people are traveling long distances, provide opportunities for rest stops to help prevent driver fatigue.

Reduce the harm done when crashes occur

- Require that there be seat belts available for all drivers and passengers of cars and other four wheel vehicles. Require that drivers and passengers use seat-belts all times when motor vehicles are in motion. Since seat –belts are especially effective in motor vehicles traveling at relatively low speeds on urban roads; attention should be paid to the enforcement of seat-belt laws on those roads.
- Encourage the inclusion of airbags in new cars, since they protect drivers and passengers automatically, even when they fail to use seat-belts.
- Require that children sit in rear seats only, when they are known to be safer. (Children should not be carried in laps, where adults in crashes can crush them.) In case of small children, require that they transport in special child seats.
- Require helmets on all riders of bicycles, motorcycles and mopeds. Head injuries are the ones most likely to result in death or disability of riders. Efficient helmets are not necessarily costly.
- Design road signs and other furnishings so they are crash protective, yielding to

impacts or cushioning them. On highways, design barriers between lanes of traffic going in opposite directions and design shoulders so as to minimize impact when motor vehicles crash into them. Stone or concrete walls at the side of highways should be avoided.

- Design all motor vehicles, including buses and Lorries, so that their fronts and other surfaces do the least possible damage should they crash with the pedestrians and other road users. Road safety experts agree that far too little attention has been paid to this aspect of motor vehicle design, even in those countries with the best of safety records.

Reduce the post-crash harm

- Design motor vehicles so as to minimize the likelihood that crashes will result in fires or leakages of hazardous material and, also, to make it easy for drivers and passengers to escape or for emergency crews to rescue them.
- Detect and respond to crashes in a timely manner, with good systems of emergency communication and transportation.
- Provide appropriate first aid at the scene of crashes, appropriate medical care in emergency rooms and appropriate post-emergency medical care and rehabilitation.
- Provide specialized training to health professionals who may handle trauma cases, in recognition of the fact that such cases have unique complications with which many health professionals are unfamiliar.

IMPORTANT ELEMENTS TO IMPROVE ROAD SAFETY

- **Surveillance:** This is to provide basic data on numbers of RTIs, the nature of injuries, the characteristics of the people injured, the nature of the motor vehicles and roads involved, and the trends.

- **Research:** This is to identify the risk factors that contribute to road crashes and injuries and to measure how each risk factor contributes. Since the risk factors vary from country to country, location to location and circumstance to circumstance, much of the research has to be country-specific, location – specific and circumstance-specific.
- **Identification, Implementation and Evaluation** of known interventions which are risky and find out new and effective interventions.

WHO STRATEGIC VISION OF RTI PREVENTION

This WHO strategy aims to integrate RTI prevention into public health programmes around the world in order to reduce the unacceptably high levels of RTIs. Special emphasis will be laid on LMCs. The strategy is presented in three areas where the WHO can add value, i.e. epidemiology, prevention and advocacy [7].

CONCLUSION AND RECOMMENDATIONS

The present article has highlighted the enormous impact of RTIs in terms of mortality, morbidity and social and economic costs. It is the responsibilities of the governments to make road safety a political priority, set road safety targets, develop multi-disciplinary approach to road safety, set and enforce strong and uniform vehicle safety standards, enforce safety laws already in existence. Public Health should include road safety in health promotion and disease prevention efforts strengthen pre-hospital and hospital care as well as rehabilitation services for all trauma victims, invest in medical research to improve the care of trauma survivors. Vehicle manufacturers should ensure that all motor vehicles meet minimum safety standards and manufacture vehicles with safer vehicle fronts so as to cause least damage to vulnerable road users. The communities, civil society and individuals encourage governments to make the roads safe, encourage safety programmes for school children, demand safety features, like seat belts and air bags in cars and above all this behave responsibly.

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CONVERSION TO HIJRAH (EUNUCH) IS IT NEED BASED OR A CRIME

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ABSTRACT

Young boys were allegedly kidnapped and kept under illegal custody for months together. After demoralization had set in due to prolonged confinement, surgery was done on their private parts and female hormones were given to the persons. The converted person were made to wear female garments and performed in groups as a female dancers and earned money while in captivity. After a few years the person approached the police that this heinous crime had been done against their will.

KEY WORDS: Hijrah, Eunuch, Castration.

INTRODUCTION

In the 8th century BC Chinese emperors kept eunuchs to guard their harems and also used them as domestic servants. [1]. In the Mughal dynasty, the Hijrahs were officially employed to take care of harems as they were castrated males, which could not exploit the females sexually, but were able to carry out all the domestic work. Hijrahs were synthesized by castrating the males at young age and as such, they were neither physically declared as males nor females. With the decline of the Mughal dynasty this system of preparing Hijrahs and using them as source of earning persisted in the society of Hijrahs. Since long there has been a tradition in India that at the auspicious occasions eunuchs go to houses where celebrations are being held. They go to such houses, sing and dance and collect money as "shaguns". Now-a-days they are also seen amusing in trains and asking for money. Usually they take away the child who is born as eunuch from the parents. They train the child to sing and dance. Some unemployed persons also join the group as instrumental musician.

When the old Hijrah is unable to amuse the public by dancing, immediately they keep eye on some vulnerable child, castrate him illegally and then assemble that child in their group by either

threatening the parents of that child or by luring them with money and other daily needs of life. In majority of the cases, if every thing goes alright mutually, then there is hardly any dispute which is reported to the police or legal authorities. But at times the synthesized Hijrah or his parents might report the matter to police or legal authorities contesting the cruel action on their child or it may be money dispute, which brings the matter on the surface.

Some perverted males may join this profession deliberately for earning as well as by transvesting their sex to satisfy their mental aberration of becoming a female. There is another set of perverted males who are called as *Zananas*. They are basically males having intact male organs but behave like females in their garments and habits and even they attract males for sodomy. In metros both Hijrahs and *Zananas* are professionally working as catamites for earning their livelihood.

CASE REPORT - I

On 10.3.04 a case U/S 367, 377, 326, 34 IPC FIR no 51 of dated 5/3/04 of P.S. Phagwara city District Kapurthala, Punjab was referred to the Department of Forensic Medicine and Toxicology, Govt. Medical College, Amritsar with the request to ascertain following queries:

1. Whether the person in charge was castrated or not? Since how long the castration was done?
2. Whether before castration he was male or Hijrah by birth?
3. Whether the act of sodomy has been done or not?

On Examination, Height was 178 cm, scalp hair were brownish black coloured 32 cm long in form of pony tail; small hairs which were brownish in colour above upper lips (Fig. 1), well developed breast (Fig. 2), nipple prominent, brownish black coloured areola, no hair was present on chest and abdomen, brownish colored hair present in axilla. Voice was hoarse in character, and all teeth in both jaws were erupted.



Fig.1



Fig.2



Fig.3

Local Examination of Genitalia (Fig.3): Brownish black coloured coarse hair present in pubic region in the shape of inverted triangle. Penis and testis were not intact. Circular shape urethral opening was present in the pubic region 2.5 cm below pubic symphysis fibrosis and stenosis of urethral opening was present. Irregular, pale, non-tender scar 5 x 1.7 cm with keloid formation was present 1.7 cm below urethral opening.

Examination of anal region: Brownish black hairs were present on anal region. No mark of external injury was present. Two folds of skin in the form of external anal tags were present at 6 O'clock and 12 O'clock positions. Anal sphincter was lax and admitted tip of finger with ease. No tenderness was present, no foreign body or stain was present on anus.

Following investigations were carried out:

1. X-ray shoulders, elbow, wrist, medial end of clavicles, iliac crest and sternum for age estimation.
2. Ultrasound scans for evidence of intra abdominal gonads / other organs of reproductive system.
3. VDRL and HIV
4. Nuclear sexing
5. Karyo-typing and DNA profiling
6. Hormonal assay

The findings were as follows:

- From Radiological Assessment age was between 22-25 yrs.
- Ultra sound scan of abdomen – No sonographic evidence of intra abdominal testes or other reproductive organs of female were seen. Normal prostate and seminal vesicles seen.
- VDRL – Reactive

- HIV – Non-reactive
- Nuclear sexing for sex determination – No drum stick in neutrophils seen. No Barr bodies seen.
- Karyo typing and DNA profiling - reports awaited.
- Hormonal assays – reports awaited.

Provisional Opinion from the available data:

1. Castration was done on the subject.
2. Duration of castration was 6 months to few years.
3. The person was a male before castration.
4. Findings suggested possibility of sodomy

CASE REPORT II

On 30/7/2004 a case was referred to the department of forensic Medicine by DG police to examine a person who was kidnapped from a lonely place and was kept in confinement in a lonely house. He was given intoxicants and after he was demoralized after a long confinement, he was given an overdose of intoxicant. He became unconscious and was taken to a nursing home. There he was castrated. When he regained consciousness, to his horror he found himself castrated. Later he resigned to his fate and learnt dancing and singing. He was also given some female hormones to change his body looks like a female. He remained with the group for three years. One day he had the chance to run away from the captivity and reported to the police.

On Examination: he had 68 long scalp hairs. He was also having beard and moustaches which were 1 mm long. He was wearing *salwar* and *kameez* and *chunni*; a female attire (Fig.4). There was male distribution of hair on chest and abdomen but there was evidence of plucking below the umbilicus. There was moderate development of breasts with prominent nipples and areolae. Areola was 2.5 cm in diameter (Fig.5)

A 7 cm long scar mark with 2 intact stitches in subpubic region was present in midline. Urethra was present in the upper 1/3rd of the scar mark. Scar mark was non-tender and white (Fig.6,7). There was no scar mark on the front of abdomen indicating that no surgery had ever been done to remove the uterus or ovaries.

Ultrasonography was done and no structure resembling ovaries or uterus was seen. An oval hypo echoic structure resembling prostate was



Fig.4



Fig.5



Fig.6



Fig.7

seen inferior to the base of bladder and it measured 30.9 mm x 20.4 x 18.3 mm.

Barr bodies in the buccal smear were negative. Drum sticks on the nuclear lobe of polymorphs were –ve.

Opinion was given that the examined person was a male and he was castrated.

DISCUSSION

Castrating males in such a manner is a heinous crime and invites punishment under section 326 IPC. Of course eunuchs have their own problems in old age when they are unable to earn. Government should take care of them financially so that they do not resort to such horrible crimes to increase their tribe. Whenever somebody is found guilty of such crime that person should be punished to prevent repetition of such crimes. Otherwise we will always find such sporadic cases where castration is done of innocent gullible persons.

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SUDDEN DEATH – A CASE OF HYPERTROPHIC CARDIOMYOPATHY

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ABSTRACT

A 21 year old male fell down suddenly while jogging in the morning of 27th December 2000 at 7.30 a.m. and was rushed to the nearby hospital by his colleagues. On arrival at the hospital, he was declared dead by the doctor on the duty. The case was brought to the mortuary for medicolegal postmortem examination at 10.30 a.m. on the same day. Various aspects of the case are discussed in this paper.

KEY WORDS: Young, Hypertrophic cardiomyopathy, Sudden death.

INTRODUCTION

Everybody of us must have heard about unforeseen and sudden death of a healthy young person – sometimes a known athlete, who collapses suddenly during workout or a game. The death in such cases is often stated as ‘inexplicable’. Hypertrophic cardiomyopathy has been found to be the likeliest explanation of such deaths. It has been found to be a common cause of death in otherwise young healthy persons than previously thought.

Cardiomyopathy is a disease that involves primarily the myocardium but is not the result of hypertension or any valvular, congenital, arterial or pericardial abnormalities. It is classified on the basis of differences in pathophysiology and clinical presentation into four types:

- 1) Dilated (Congestive) Cardiomyopathy
- 2) Restrictive Cardiomyopathy
- 3) Hypertrophic Cardiomyopathy
- 4) Arrhythmogenic Right Ventricular Cardiomyopathy

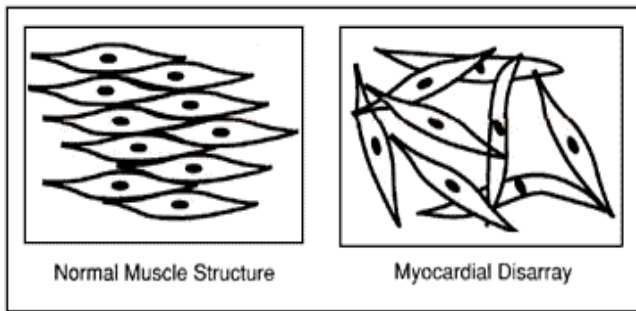
Hypertrophic Cardiomyopathy is a genetic disease with an autosomal dominant inheritance. It has also been reported under the terms such as Asymmetric cardiac hypertrophy, Idiopathic hypertrophic sub aortic stenosis, Hypertrophic obstructive cardiomyopathy and hereditary cardiac dysplasia (BMJ, 1971). The exact cause of Hypertrophic Cardiomyopathy is not yet known. In the majority of cases the condition is inherited. It occurs in at least one in 1000 to one in 500 of the general population in United Kingdom. There is still insufficient information about the individual's family to assess inheritance. Majority of the patients with hypertrophic cardiomyopathy have at least one

other affected first degree relative. It affects males rather more than females. Nine genes have been implicated; other genes may be uncovered with continued research. In approximately 50-60% of families, affected individuals are found to have a mutation in the gene for myosin, troponin T, alpha tropomyosin, cardiac myosin binding protein-C, or the essential and regulatory light chains. These are important proteins for the contraction of the heart.

The first clinical presentation of the disease may be unfortunately sudden death or sudden death may be the only indication of the disease occurring frequently in children & young adults (annual incidence being about 6% in U.K.), often occurring during or after exertion.

Characteristic feature of the disease includes left ventricular hypertrophy, usually of a non-dilated chamber, without any obvious antecedent cause. Majority of the people demonstrate disproportionately thickened ventricular septum as compared to the free wall. The pathophysiologic abnormality is diastolic dysfunction, characterized by increased stiffness of the hypertrophied muscle. The stiff muscle relaxes poorly, requiring higher pressures than normal to expand with the inflow of blood. One fourth of the patients demonstrate left ventricular outflow tract pressure gradient due to narrowing of the sub aortic area. On histopathology, the thickened septum shows bizarre and disorganized arrangement of myocardial fibers.

The abnormality of the heart muscle interferes with normal electrical activity. In abnormal segments of the heart, the electrical signal may



These diagrams contrast the regular, parallel alignment of muscle cells in a normal heart with the irregular, disorganized alignment of muscle cells or myocardial disarray found in some parts of the heart in Hypertrophic Cardiomyopathy

become unstable as it crosses the areas of fibrosis (scarring) and disarrayed cells. This in turn leads to disorganized electrical impulses that generate fast or erratic heart rhythms. These cardiac arrhythmias are responsible for sudden death in these individuals.

Diagnosis mainly depends on echocardiogram, which shows left ventricular hypertrophy often with septum 1.3 or more times the thickness of the high posterior left ventricular wall.

CASE REPORT

On the 27th December 2000 at 10.30 a.m., dead body of a 21 year old boy was brought to the mortuary of GMC & NCH, Surat for medicolegal autopsy with history of sudden fall while jogging in the morning at 7.30 a.m. and declared dead on arrival in the causality department.

On interrogation with the relatives, history was given that the boy was absolutely normal since childhood and there was no history of cardiac or related disease or of any specific treatment for disease of cardiac origin.

According to the investigating officer, the history of case was the same as narrated by the friends who were with him in the morning.

On external examination, the body was of a young male, wearing white T-shirt, black colored trouser stained with dry sand, well built and nourished. The body was warm. Rigor mortis was present in the lower jaw while rest of the body was flaccid. Postmortem lividity was in the early developmental stage and only few discreet patches were visible on posterior aspect. Eyeballs were donated. Mouth, ears, nostrils, external genital and

anal opening revealed no discharge. An abrasion was present on the left side of the face at outer angle of left eye, due to the fall, 2x1 cm. sized, red in color, dry and fresh. No fracture was palpable.

Internal examination revealed diffuse sub-arachnoid hemorrhage all over brain surface, more over frontal regions. Heart chambers contained clotted & fluid blood. Left ventricular wall was 2.8 cm thick while interventricular septum was 2.5 cm. thick and showed old patches of fibrosis. Heart weighed 300 grams. All other organs were found congested and no gross pathology was detected.

Viscera were preserved for chemical analysis and histopathological examination with cause of death being kept pending for above reports.

Histopathological report of heart showed thickened left ventricular wall of 3.0 cm on anterior aspect and 1.2 cm on posterior aspect. Interventricular septum was also thickened of size 2.5 cm with areas of fibrosis on gross examination. Microscopic examination revealed hypertrophy of myosides with hyperchromatic big nucleus and disarray of myocardial fibers and interstitial fibrosis all suggestive of Asymmetric Hypertrophic Cardiomyopathy. Interstitial hemorrhages were found in the spleen. Liver had sinusoidal dilatation and portal tract infiltration with mononuclear cells. There was congestion in Lungs, kidneys, liver, spleen and heart. Chemical analysis report was negative.

Final cause of death was given as Death occurring due to Cardiac Failure as a result of Asymmetric Hypertrophic Cardiomyopathy.

DISCUSSION

Cases of sudden death now-a-days are common and frequently brought for medicolegal autopsy. Presence of sub-arachnoid hemorrhage created a doubt whether it appeared first and then the person fell or was it the result of fall? Sub-arachnoid hemorrhage is common in this age group occurring as a result of rupture of congenital berry aneurysm. Therefore careful search was made for any ruptured congenital berry aneurysm but could not be located at autopsy.

The deceased was a 21-year young adult so first suspicion was of a ruptured berry aneurysm. Still to rule out other pathology in view of the thickened myocardium at such an early age, the viscera were sent for histopathological

examination. The result was rewarding. Myocardium showed presence of bizarre and disorganized arrangement of muscle fibers suggestive of hypertrophic cardiomyopathy.

Premature & sudden death is common in patients with hypertrophic cardiomyopathy that too during childhood and young adulthood. Recent studies in USA have suggested that this disease is more common nowadays than previously reported.

Teare (1958) and Marshall (1970) have described cases of hypertrophic cardiomyopathy producing sudden death. The prevalence of hypertrophic cardiomyopathy in general population in U.K. has been found to be from 0.2% to as high as 4.9% with echocardiographic screening. The mortality rate has been reported to be 0.5 - 3.6% per year with the risk of sudden death of 1-2% in the hypertrophic cardiomyopathy population. Most important factors that have been found to be determining a person's risk for sudden death from hypertrophic cardiomyopathy are young age (< 35 years), family history of sudden deaths (defined as cluster of two or more sudden deaths in family members) and an episode of previously aborted sudden death. So with evidence of increased prevalence of the disease nowadays, the diagnosis of hypertrophic cardiomyopathy should be kept in mind while evaluating cause of sudden death in a young symptom free individual.

CONCLUSION

The disease, though not very common in general population mostly presents with sudden death in a young and otherwise healthy individual. There has been an increased incidence of hypertrophic cardiomyopathy found than as previously thought and very commonly, sudden unexpected death is the only presentation or indication of the condition. Therefore it should be kept in the mind to be a cause of sudden death in a perfectly normal individual, as was observed in this case. Forensic experts along with the clinicians can work as a team to elicit these types of diseases, which remain latent in general population. Moreover with information available regarding genetic transmission of the disease and precipitating factors identified for sudden death in such cases, counseling of the patients and their relatives can help a great deal in preventing sudden deaths from this disease. Echocardiography should be advised

in the first-degree relatives to find out the prevalence and if found, they should be advised to avoid physical exertion because of high risk of sudden death. There is no cure available for the disease; so the emphasis is on treating the symptoms and avoiding risk factors for the sudden death.

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ETHYLENE DIBROMIDE POISONING HOMICIDE OR SUICIDE

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ABSTRACT

A married lady was admitted to the hospital with the history of forcible ingestion of grain preservative by her in-laws prior to the three days of admission. Symptomatic and supportive treatment was given the lady passed away after two days.

The viscera were sent to the institute for chemical examination. The presence of bromide was determined in the viscera and it was finally decided as a case of Ethylene dibromide poisoning.

The history given by the deceased and the circumstances of admission to the hospital after three days of incidence evolve the suspicion whether it was a case of homicide or suicide. The details are discussed in the paper.

KEY WORDS : Ethylene Dibromide, Poisoning, Silofume, Homicide, Suicide

INTRODUCTION

Ethylene dibromide is a colorless liquid with a distinctive odour usually described as sweet. It has used as soil fumigant for nematodes and to control insects for citrus fruits and grains. It is also used as lead scavenger in gasoline refinement.

It is sold in the market with different names as silofume EDB in the 5 ml glass ampule. The toxic dose varies from 5-10 ml. It causes severe liver and renal damage. Treatment is supportive. Bromide can be identified in urine also.

CASE HISTORY

The deceased was a young lady aged 26 years. As per the dying declaration she was forcibly ingested with the ampule used for wheat preservation by her husband, sister-in-law and Mother-in-law on June 5th 2000 in the morning at 10.30 a.m. After that the sister-in-law of deceased called local doctor who prescribed Digene. The Digene syrup was given to the deceased; she had vomiting and diarrhoea and took rest for 2 hours. In afternoon at 2.30 p.m. the uncle of deceased came to the house and took her with him in car to the Jabalpur, from Bhopal, the place of incidence. They reached Jabalpur on June 5th 2000. But she remained asymptomatic up to June 7th 2000 i.e. for 2 days nearly 48 hours. She was admitted to the hospital at Jabalpur where she recorded her evidence, was treated for ethylene dibromide

poisoning but as the condition deteriorated, she was referred to the main hospital where she expired on June 9th 2000 at 11.30 a.m.

MATERIAL AND METHOD

The viscera consisting of stomach and its contents and pieces of tissues of liver, lung, spleen, kidney, heart and brain was received for analysis.

POSTMORTEM FINDINGS

Lungs edematous and mildly congested. Heart, trachea, brain healthy. Liver spleen and kidney mildly congested. Stomach highly congested having about 200 cc clotted blood. Foecal matter present in duodenum. Time passed since death 24 hours since postmortem, cause of death unknown poisoning- cardio-respiratory arrest.

RESULT AND DISCUSSION

The viscera were found for ethylene dibromide poisoning. Ethylene dibromide in a case of fatal human poisoning resulting from ingestion of 4.5ml of ethylene dibromide, massive centrilobular necrosis of liver and proximal tubular damage in kidney were observed. None of these findings were reported in the present case. EDB also found to rapidly produce highly malignant gastric squamous cell carcinoma in rats and mice.

The cases of ethylene dibromide poisoning are observed for the last 5 years in the state of

Madhya Pradesh especially in Bhopal region. The trend however found in increasing order.

As the number of cases increased drastically from 1 to 11 in preceding years. It indicates that it may further go high with the time.

CONCLUSION

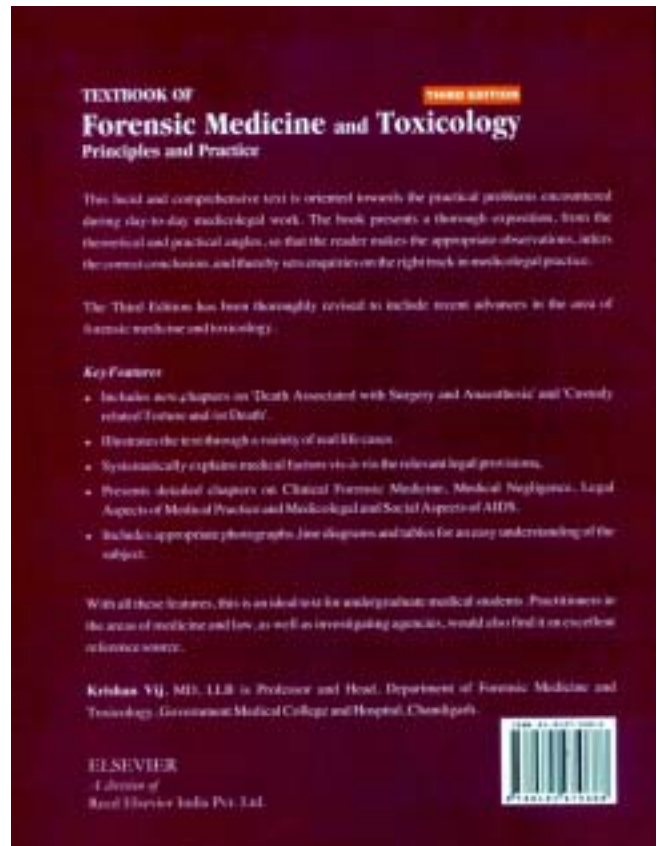
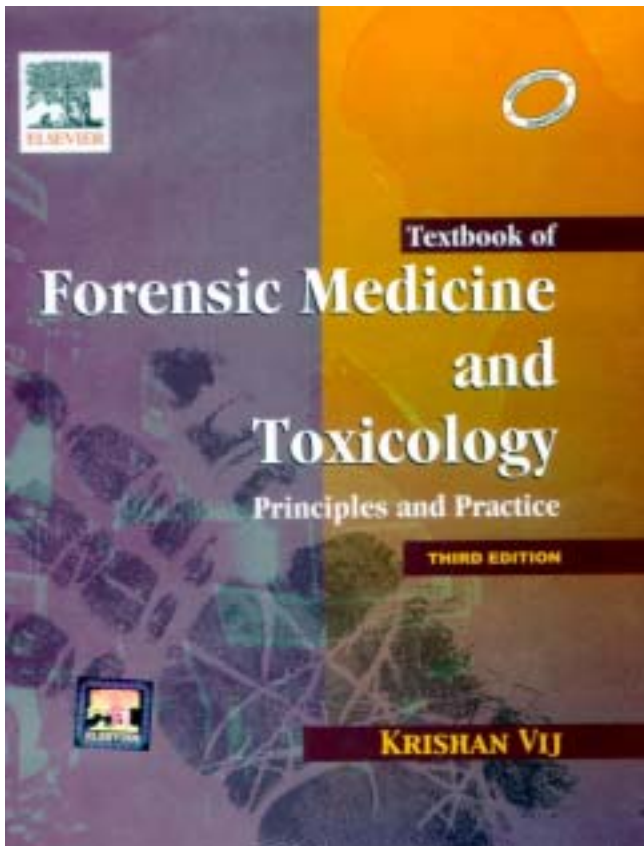
In the present case, the deceased was traveled eight hours from Bhopal to Jabalpur by road and remained asymptomatic for complete two days raise suspicion on the history given by the deceased. It appears rather more convincing that she might have had scuffle with her in-laws at Bhopal and called her uncle and tried to go away, but her in-laws took away her 9 month old son and she alone left for Jabalpur. This may lead to the circumstances which might have provoked her for taking poison afterwards after reaching Jabalpur.

Considering all the facts, results and analysis, it excludes the possibility of forcible ingestion of ethylene dibromide at Bhopal five days prior to the death. Deceased was not treated for poisoning neither at Bhopal nor at Jabalpur up to 2 days. In-laws act may be the cause of provocation for her suicidal attempt but this is not homicidal to the extent as reported.

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BOOK REVIEW



Text Book of Forensic Medicine & Toxicology (Principles and Practice)

The book written by Prof. Krishan Vij, Head of Forensic Medicine & Toxicology, Govt. Medical College & Hospital, Chandigarh, is a distinct departure from the other available books on the subject and is oriented towards practical problems encountered during day-to-day medico legal work. It is an embodiment of author's experience of more than two decades and his knowledge of law has enabled him to present the subject matter in such a way as to help the readers to unfold intricacies required in responding to queries of the Investigating Agencies.

It carries exclusive chapters on Clinical Forensic Medicine, Medical Negligence, Legal Aspects of Medical Practice; Medico legal & Social Aspects of AIDS etc. constitute another vital feature of the book, needed so acutely in the existing scenario. Inclusion of chapters on Torture Medicine, Deaths related to Anesthesia & Surgery, Anaphylactic Deaths and detailed medico legal discussion on Transplantation of Human Organs Act, Pre-conception and Pre-natal Diagnostic Techniques (Prohibition of Sex Selection) Act, Medical Termination of Pregnancy Act, Drugs and Cosmetics Act speaks of author's concern for disseminating information about recent advances in the field.

Enriched with all such features, this is an ideal text book for undergraduate medical students. Postgraduate students, In-service doctors, Solicitors, Investigating agencies and the Judiciary would also find it an excellent reference source.

Dr.R.K.Gorea

INSTRUCTIONS TO AUTHORS

CONTRIBUTIONS:

Unpublished original manuscripts, written in English should be sent to: Dr. R.K.Gorea, Editor, JIAFM

THE PUBLICATION PARTICULARS:

The JIAFM is the official publication of the Indian Academy of Forensic Medicine, Published quarterly (Jan, April, July, Oct.) from 1991.

THE CONTENTS OF THE JOURNAL:

The journal accepts a range of articles of interest, under several feature sections as follows:

- Original Papers: Includes conventional observational and experimental research.
- Commentary: Intended for Reviews, Case Reports, Preliminary Report and Scientific Correspondences.

Letter to the Editor:

Designed to be an avenue for dialogue between the authors of the papers published in the journal and the readers restricted to the options expressing reviews, criticisms etc. It could also publish letters on behalf of the current affairs in the field of Forensic medicine in the country.

Editorial:

Intended as a platform for the Editor-in-Chief and for others with a keen interest in forensic medicine that wished to comment on the current affairs.

Special Features:

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General Principles: The text of observational and experimental articles is divided into sections with the headings Introduction, Methods, Results, and Discussion. This so-called "IMRAD" structure is not simply an arbitrary publication format, but rather a direct reflection of the process of scientific discovery. Other types of articles, such as case reports, reviews, and editorials, are likely to need other formats. Double spacing of all portions of the manuscript - including the Title Page, Abstract, Key Words, Introduction, Methods, Results, Discussions, Conclusion, Acknowledgements, References, Tables, Figures and Legends - and generous margins with numbering all of the pages of the manuscript consecutively, beginning with the title page. Limits specified are Original Papers and Review Papers: 3000 words. Special Features and News & Notes 500 words. All other sections 1500 words. Submit ONE Original Typed copy in 8" x 11" Bond paper and TWO carbon copies on typing paper along with THREE sets of illustrations / Figures and Tables.

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2. Authors' names and institutional affiliations with each author's highest academic degree.
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4. Disclaimers, if any and any details about the grants for the research.
5. Corresponding authors. The name, mailing address, telephone numbers, and e-mail address of the author responsible for correspondence about the manuscript.
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Mention clearly to which feature section the manuscript is sent for.

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Introduction: Provide a context or background for the study (i.e., the nature of the problem and its significance). State the specific purpose or research objective of, or hypothesis tested by, the study or observation; the research objective is often more sharply focused when stated as a question. Both the main and secondary objectives should be made clear, and any pre-specified subgroup analyses should be described. Give only strictly pertinent references and do not include data or conclusions from the work being reported.

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Statistics: Describe statistical methods with enough detail to enable a knowledgeable reader with access to the original data to verify the reported results. When possible, quantify findings and present them with appropriate indicators of measurement error or uncertainty (such as confidence intervals). Avoid relying solely on statistical hypothesis

testing, such as the use of P values, which fails to convey important information about effect size. Define statistical terms, abbreviations, and most symbols. Specify the computer software used.

Results: Present your results in logical sequence in the text, tables, and illustrations, giving the main or most important findings first. Do not repeat in the text all the data in the tables or illustrations; emphasize or summarize only important observations. When data are summarized in the Results section, give numeric results not only as derivatives (for example, percentages) but also as the absolute numbers from which the derivatives were calculated, and specify the statistical methods used to analyze them. Use graphs as an alternative to tables with many entries; do not duplicate data in graphs and tables. Avoid non-technical uses of technical terms in statistics, such as "random," "normal," "significant," "correlations," and "sample."

Discussion: Emphasize the new and important aspects of the study and the conclusions that follow from them. Do not repeat in detail data or other material given in the Introduction or the Results section. For experimental studies it is useful to begin the discussion by summarizing briefly the main findings, then explore possible mechanisms or explanations for these findings, compare and contrast the results with other relevant studies, state the limitations of the study, and explore the implications of the findings for future research and for clinical practice. Link the conclusions with the goals of the study but avoid unqualified statements and conclusions not adequately supported by the data. In particular, authors should avoid making statements on economic benefits and costs unless their manuscript includes the appropriate economic data and analyses. Avoid claiming priority and alluding to work that has not been completed. State new hypotheses when warranted, but clearly label them as such.

References: References to review articles can be an efficient way of guiding readers to a body of literature; review articles do not always reflect original work accurately. Small numbers of references to key original papers will often serve as well as more exhaustive lists. Avoid using abstracts as references. For the reference style and format the uniform requirements of the International Committee of Medical Journal Editors are used. Should be numbered singly in the order in which they are cited (using numerical in square brackets in the text and listed in numerical sequence on a separate sheet. Reference to journals, book and multi author volumes should accord with following examples.

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Personal Communications, Unpublished Papers etc. are not allowed as references.

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