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Prevelance of Burn Deaths: A Retrospective Study

B.R. Chandra Hasini

Abstract

Introduction: Burns is one of the most common and the most devastating forms of trauma among the people, leading to severe morbidity and mortality. The causes of burns differ in different communities and a proper understanding of this could probably lead to the prevention of burn incidences and thereby lowering the rate of mortality. *Materials and methods:* This retrospective study was done on 155 patients whose cause of death was due to burns. The postmortem reports, inquests, panchnama of the scene of offence, other reports which were collected based on the information of friends and relatives were taken. The treatment history, suicidal tendency of the patient, were pursued and the data obtained was analyzed thoroughly. *Results:* The number of females (56.8%) that were affected were significantly higher than the males (43.2%). The predominant age group that was affected was between 21-30 years of age, followed by 31-40 years. Suicides accounted for the majority of the causes of deaths due to burns (50.9%), closely followed by accidental burns (44.5%). A total of 5.8% of the patients died on the spot and could not be resuscitated. Majority of the patients (46.5%) could not survive beyond 24 hours. *Conclusion:* Proper education regarding the care to be taken to prevent burns as well as the immediate care and first aid to be given to such patients should be given to prevent severe burn injuries and death.

Keywords: Burn deaths; Accidental burns; Suicides.

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Introduction

Burns is one of the most common and the most devastating forms of trauma among the people, leading to severe morbidity and mortality. Hence, it's one of the major global concerns of health [1,2]. According the World Health Organization, about 300,000 deaths occur due to burns annually and 57% of these occur in the South east Asia alone, with >95% being in the developing countries [3]. In India, burns is the second largest cause of injuries after road accidents. Around 7 million incidences of burns take place annually every yearin our country alone [4,5]. There is a high mortality rate among the people with >40% burns, with a survival rate of only 50%. Even in case of survival, the pace of recovery is very slow and painful. There may be a high rate of consequences such as disfigurement leading to sub-optimal working of the patient [6].

The causes of burns differ in different communities and a proper understanding of this could probably lead to the prevention of burn incidences and thereby lowering the rate of mortality.

This study was therefore conducted to understand the factors that may be the cause for burns and the outcome of these incidences.

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Materials and Methods

This retrospective study was done by the department of Forensic Medicine at Kakatiya medical college and Gandhi medical college over a period of two years. This study was cleared by the Institutional Ethical Committee. Case sheets of 155 patients whose cause of death was due to burns were included into the study. The postmortem reports, inquests, panchnama of the scene of offence, other reports which were collected based on the information of friends and relatives were taken. The treatment history, suicidal tendency of the patient, were pursued and the data obtained was analyzed thoroughly.

The percentage of burns on the patients and the artifacts found in the body were also analyzed.

Results

The number of females (56.8%) that were affected were significantly higher than the males (43.2%). The predominant age group that was affected was between 21-30 years of age (34.8%), followed by 31-40 years (20%). Children were the least affected and those who were accidentally affected (2.5%) (Fig. 1)

Suicides accounted for the majority of the causes of deaths due to burns (50.9%), closely followed by accidental burns (44.5%). 4.5% of the burn deaths were due to homicides (Fig. 2).

Majority of the patients were illiterate (45.8%), while 46 (29.7%) of them had more than high school education. Only 5 of them had primary level education all these 5 were children below the age

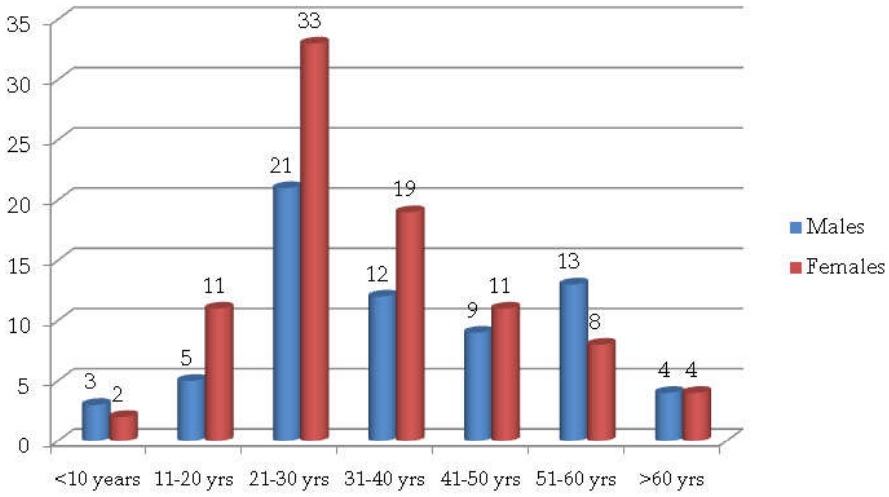

Fig. 1: Age and sexwise distribution of patients

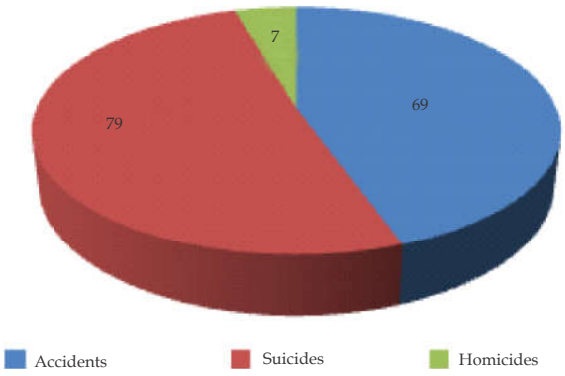

Fig. 2: Causes of death

of 10, with accidental burns. Many of these patients were suicidal cases, probably due to love failures or problems in marriages. Most of them were married (55.5%),while 67 (43.2%) were unmarried. Most of the patients belonged to the lower economic strata (73.5%), while most of the rest were from the middle income group (25.2%) (Table 1).

Table 1: Educational, Marital and socioeconomic status of patients

Status	Male	Female
Educational status		
Illiterate	30	41
Primary	3	2
High school	11	22
Post High school	23	23
Marital status		
Married	28	58
Unmarried	36	31
Widowed	4	1
Socioeconmic status		
Low income	43	71
Middle income	22	17
Upper income	2	0
Sophisticated	0	0

A total of 9 patients (5.8%) of the patients died on the spot and could not be resuscitated. Majority of the patients (46.5%) could not survive beyond 24 hours. Of these, most of the patients had more than 70% burns. 38 patients (24.5%) survived for 24-72 hours and most of these patients had 50-70% burns. Very few patients (7.7%) survived for >7 days and all these patients had <50% burns (Table 2).

Table 2: Period of survival in relation to burns

Period of survival	<30%	30-50%	50-70%	70-90%	>90%	Total
Spot death	0	0	0	3	6	9
<24 hours	0	2	9	34	27	72
24-72 hours	0	2	21	11	4	38
3 to 7 days	2	14	8	0	0	24
>7 days	1	11	0	0	0	12
Total	3	29	38	48	37	155

Discussion

In the present study, a higher percent of females were observed to be affected compared to the males. This was probably a more number of accidents occurred in the kitchen during cooking. A higher incidence of females involved in burn injuries was observed by Karaddi et al., who observed a 3:1 female to male ratio [7]. A study by He et al. observed 51% of the population to be females compared to the males [8]. Bansali et al. reported a male to female ratio to be 0.6 [9]. This high preponderance of females is mainly due to unsafe cooking practices and stoves. Other similar studies by Kumar et al. and Ahuja et al. also reported similar results [10,11].

The most common age group to be affected was 21-30 years of age followed by 31-40 years. This was the age, where people were more independently mobile and active. Women were more inexperienced near the fire. Similar results were observed in other studies such as with Buchade et al. [11], Karaddi et al. [7] and Das et al. [12]. Bansali et al. reported the majority of the age group to be affected by burns to be 12-26 years, Singh et al. reported two thirds of the fatalities to be in the 21-40 years age group. In some of the studies done earlier, it was observed that majority of the burns in children below the age of 4 occurred at home due to accidental burns near heating appliances especially in the colder seasons. These burns were typically on the upper arms and chest areas [14]. In joint families in countries such as in India, the incidence of burns among the children and the elderly was found to be lesser as there was a supervision by the other members of the families. Ages 15-35 were found to be more prone to burns than the other age groups [13]. 43% of the population in the study by He et al. was between 25 to 64 years [8]. However, most of the fatalities was seen below the age of 10 years and above 65 years.

Suicides accounted for the majority of the causes of deaths due to burns with 50.9% of the cases, closely followed by accidental burns in 44.5%. 4.5% of the burn deaths were due to homicides.Majority of the patients were illiterate (45.8%), while 46 (29.7%) of them had more than high school education. Only 5 of them had primary level education all these 5 were children below the age of 10, with accidental burns. Many of these patients were suicidal cases, probably due to love failures or problems in marriages. Most of them were married (55.5%), while 67 (43.2%) were unmarried. Most of the patients belonged to the lower economic strata (73.5%), while most of the rest were from the middle income group (25.2%). In a study by Castana et al on suicide deaths, it was observed that most of the patients were females and most were in low income status [15]. In many of the cases, a previous psychiatric history was observed while in our study, majority of the patients were either in depression or the suicide was preceded by an argument with family members [15].

A study by He et al. reported most of the burn patients to be married as in our study [8]. They observed that most of the burn injuries, both fatal and non fatal occurred in the kitchen during cooking. As in the present study, this study also

found most of the patients belonging to the lower economic status. A study by Edelman et al. reported that persons with low economic income, lack of proper education, overcrowding in the residential areas and unemployment were some of the risk factors which would cause an increase in the burn injuries [16]. In a study in Bangladesh, it was reported that the children form the low economic status were more often to die due to burn injuries than the other income groups [17]. In other studies in India and other Asian countries, unsafe practies of cooking such as those in open fire, unsafe stoves, using coals or petroleum, and butane were found to be the cause for burn injuries [18-21].

A total of 9 patients (5.8%) of the patients died on the spot and could not be resuscitated. Majority of the patients (46.5%) could not survive beyond 24 hours. Of these, most of the patients had more than 70% burns. 38 patients (24.5%) survived for 24-72 hours and most of these patients had 50-70% burns. Very few patients (7.7%) survived for >7 days and all these patients had <50% burns.

A study by Bansali et al. reported that in 37-53% of the patients, there were 97% of burns on the total body surface. 75% of the patients in this studies died within 5 days of burns, while 90% of them died within 8 days [9]. This increase in mortality among the patient with incresase in the total body surface burns was seen in other studies also [22-24]. Among children who had >45% of body surface burns had a higher rate of mortality than others [25]. Lack of appropriate health case and a delay in hospitalization was also a significant factor in death [18,22]. Similarly, total body surface area burns of 40-50% saw a death in 80% of the patietns in India, Albania and Saudi Arabia [10,26,27].

Conclusion

The present study shows the female population especially in the age group that involves domestic cooking to be the most prone to burn injuries followed by children and elderly who are not supervised. It seems to be more common among the lower economic strata persons. Thus, proper education regarding the care to be taken to prevent burns as well as the immediate care and first aid to be given to such patients is the need of the hour to prevent severe burn injuries and death.

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Original Article

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Profile of Victims in Alleged Cases of Child Sexual Assault

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Abstract

Sexual assault is the most common and threatening behavior calculated to induce fear in women of all age group. Child sexual assault has existed in almost all societies throughout history in one or another form. Since 1971 up to 2011, the number of registered rape cases in India increased by 873.3%. The present study was carried out at Department of Forensic Medicine and Toxicology of B.J.G.M.C and S.G.H. Pune, from November 2015 to September 2017. The study has underscored different aspects of child sexual assault in relation to incidence. We have found out that among the total study population, the majority of the victims were females. Most of the cases were contributed by the victims of age group 15 years to <18 years with a mean age of the victim as 14.38 years. Literate victims outnumbered the illiterate one and most of the victims are in secondary high school. The maximum number of incidents occurred during the afternoon and was highest in the summer season. Them history regarding voluntary sexual intercourse revealed that majority of the victims denied the history. The rented rooms were the commonest place of assault in the maximum number of the incidences.

Keyword: Child sexual assault; Victims; Voluntary sexual intercourse.

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Introduction

According to the National Crime Records Bureau [1], since 1971 up to 2011, the number of registered rape cases in India increased by 873.3%. Sexual assault is the most common and threatening behavior calculated to induce fear in women of all age group [2]. Child sexual abuse has existed in almost all societies throughout history in one or another form. The Protection of Children from Sexual Offences Act, 2012 [3] define a child as any person below the age of 18 years. In a shocking revelation, a government-commissioned survey [4] in the year 2005 has found that more than 53% of Indian children are subjected to sexual assault i.e. four out of every ten persons. Under the POSCO Act, the numbers of child abuse cases registered for the year 2014 were 8,904 which rose to 14,913 in the year 2015 [5]. In spite of such bleak statistics, there are only a few organizations in India working on the issue in a focused manner [6]. All these information available annually are available only at the crime data maintained by NCRB. Hence, to understand the extent of the problem, its dimensions as well as its intensity at present, this study was undertaken.

Aims and Objectives

The study is carried out to know different aspects of child sexual assault in relation to incidence of

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most common age group and sex suffered, most common season and time of assault, religion, most common place of assault, history of voluntary sexual intercourse, and history of conceiving after the incidence of assault.

Materials and Methods

The present study was carried out at Department of Forensic Medicine and Toxicology of B.J.G.M.C and S.G.H. Pune, during November 2015 to September 2017 after obtaining clearance from ethical committee written and informed consent from the consenter. The study population involved a total of 534 alleged victims of sexual assault who gave written and informed consent and were of age less than 18 years. A standard proforma was filled after obtaining the information from victim and investigating officer, accompanying relatives and records which included the details regarding the preliminary information such as stated age, sex, educational status, economic status, religion, marital status, complaint at time of admission, details of incidence such as place of assault, the time of assault, etc. were noted into predesigned proforma.

Results

A total of 948 cases of alleged sexual assault were registered at B.J.G.M.C. AND S.G.H. Pune during the study period (November 2015 to September 2017). Out of those 948 cases, 571 cases (60.23%) were less than 18 years of age. (Table 1). Out of 581, a total of 534 victims gave consent for examination and participation in the study.

The study revealed that, out of 534 sexually assaulted victims, the majority of victims were females (92.88%) whereas males accounted for 7.12% of the total study population (Table 2).

The age wise distribution of the cases illustrated that majority of the cases were contributed by victims of age group 15 years to <18 years (62.55%), followed by victims of age group 12 years to <15 years (22.66%). The mean age of victims in the present study was 14.38 years (Table 3).

The maximum number of incidents occurred during the afternoon (50.75%) whereas 8.24% of cases had a history of incidence at night. In 14 cases, the victim does not remember the time of assault due to the history of unconsciousness or due to significantly delayed in registering the case. (Table 4).

The incidence of sexual assault was highest in summer (May – July) which constitute 28.65% of the total cases (153 victims) and least in autumn comprising 20.04% of the cases (107 victims). (Table 5).

The Community wise distribution of cases highlighted the fact that the incidence of sexual

Table 1: Distribution of total cases of sexual assault registered during the study period

Sr No	Total sexual assault cases	Percent of Age <18 yrs (n = 948)	Percent of age >18 yrs (n = 948)
1	948	60.23 (571)	39.77 (377)

Table 2: Distribution of cases according to Sex of victims

Sr No	Sex	No of Victims	Percentage (n = 534)
1	Female	496	92.88
2	Male	38	7.12

Table 3: Distribution of cases according to the Age of the victims

Sr No	Age	Number of victims	Percentage (n = 534)
1	< 6 years	08	1.5
2	6 to <9 years	21	3.93
3	9 to <12 years	50	9.36
4	12 to <15 years	121	22.66
5	15 to < 18 years	334	62.55

Table 4: Distribution of cases according to time of Assault

Sr No	Time	No of Cases registered	Percentage (n = 534)
1	Morning (6 am - 12 pm)	78	14.61
2	Afternoon (12 noon - 6 pm)	271	50.75
3	Evening (6 pm - 12 am)	127	23.78
4	Night (12 am - 6 am)	44	8.24
5	Don't remember	14	2.62

Table 5: Season wise distribution of sexual assault cases.

Sr No	Season	No of Cases	Percentage (n = 534)
1	Winter (Nov - Jan)	129	24.16
2	Spring (Feb - April)	145	27.15
3	Summer (May - July)	153	28.65
4	Autumn (Aug - Oct)	107	20.04

Table 6: Religion-wise distribution of cases

Sr No	Religion	No of the cases	Percentage (n = 534)
1	Hindu	390	73.03
2	Muslim	121	22.66
3	Christian	23	4.31

assault was highest in the Hindu community (73.03%) (Table 6).

Out of a total of 534 victims examined, 516 victims (96.63%) were literate and illiterates were 18. (Table 7A and Fig. 2). Among those literate, the majority of victims were studying in secondary school standard which contributed 43.99% in the total literate victims (227 cases) (Table 7B and Fig. 3). The School dropouts were more in secondary school standard (13.78%) as compared to others.

Table 7 (A): Distributions of the cases according to Educational status

Sr No	Education Status	No of Cases	Percentage (n = 534)
1	Literate	516	96.63
2	Illiterate	18	3.37

Table 7 (B): Distribution of cases according to Education status of the Victims

Education Status (n =516)	Studying	Percentage
Pre-primary (< 1st std)	14	2.71
Primary (1st - 4th std)	46	8.91
Middle (5th - 7th std)	70	13.57
Secondary (8th - 10th std)	227	43.99
High school (11th - 12th std)	50	9.70
Graduation pursuing (>12th std)	2	0.39

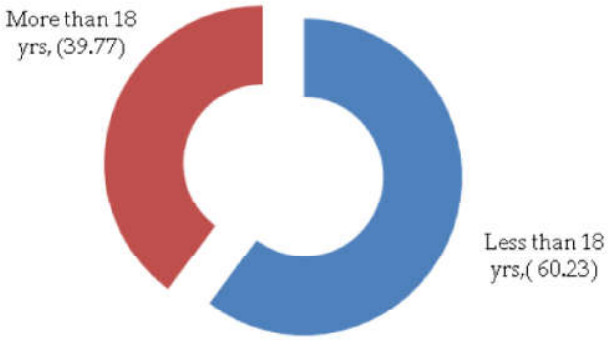

Fig. 1: Distribution of total cases of sexual assault registered during the study period

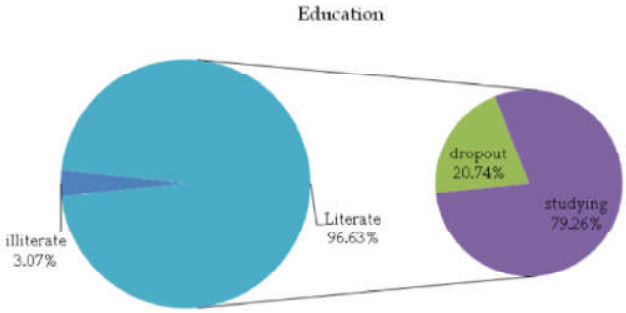

Fig 2: Distributions of the cases according to Educational status

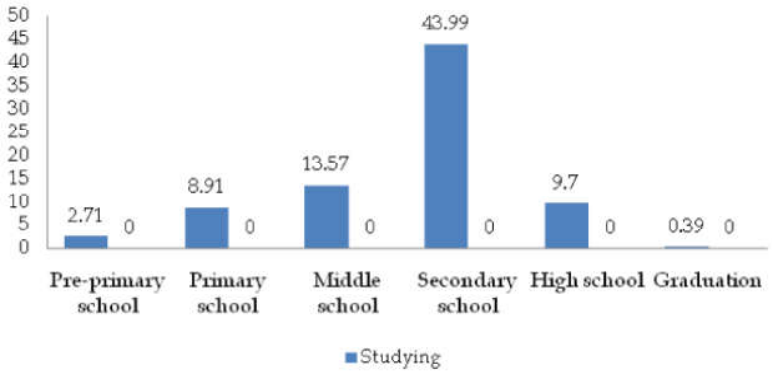

Fig 3: Distribution of cases according to Education status of the Victims

Table 8: Distribution of cases according to the history of voluntary sexual intercourse

Sr No	H/o voluntary sexual intercourse	No of cases (n= 534)	Percent
1	Present	175	32.77
2	Absent	359	67.23

Table 9: Distribution of cases according to a positive pregnancy

Sr. no	Pregnant	No of cases (n= 497)	Percentage
1	Yes	44	8.85
2	No	453	91.15

Table 10: Distribution of cases according to Place of Assault

Place	No of victims	Percent (n=534)
Victim's home	112	20.97
Assailant's home	116	21.72
Rented room (hotel)	141	26.40
Open place	52	9.73
Vehicle	19	3.56
School & hostel	24	4.50
Unknown place	18	3.38
Other (offender's friend, offender's relative)	52	9.73

The history regarding voluntary sexual intercourse revealed that 175 victims (32.74%) had voluntary sexual intercourse whereas 67.23% cases (359 victims) denied the history (Table 8). Out of total cases studied, 44 victims (8.85%) got pregnant following the incidence of sexual assault (Table 9).

The study revealed that the rented room was the commonest place of assault in a maximum of the incidences (26.40%), followed by the assailant's home (21.72%) and victim's home (20.97%) (Table 10).

Discussion

Sexual assault is as old as mankind yet remained the most obnoxious human right violation. The reporting of sexual assault cases corresponds to the tip of an iceberg [7]. The incidence of child sexual assault in the present study is quite closer compared to those observed in studies 'Child Abuse: India 2007' [8] and Marring S.K. et al. [9] i.e. 51%. However, it contradicts to year wise cases registered in the study by Bijoy T.H. et al. [10] (11.54% in 1996) due to the rise in reporting of such social stigma during the past few years because of the public and media awareness.

In the present study, female child victims (92.88%) have outnumbered their male counterparts (7.12%). This female preponderance is consistent with other studies done [9,11-17]. However in the study 'Child Abuse: India, 2007' by Kacker L. et al. [18], out of the total reported sexual assault cases, 52.94% were male and 47.06% were female. The reason for more incidence of sexual assault in female than males can be attributed to the fact that women are disproportionately the victims of gender violence, which happens in different forms in different social contexts throughout the world.

Even though it is said that no age is safe from sexual assault, in the present study, majority of the cases are contributed by the victims of age 15 years to <18 years (62.55%) which is consistent with findings by other researchers [19-22]. However, few studies show that the majority of victims were from age group 12 to < 15 years [23,24,11,25].

The mean age of the victims in the present study is 14.38 years which is slightly higher to those observed in studies by Maring S.K. et al. [9] (12.4 years) and Emmert C. et al. [26] (11.9%).

In the present study, the majority of the cases occurred during the afternoon (50.75%), followed by incidences in the evening (23.78%) and in the morning (14.61%). The findings are in accordance with findings by other researchers [9,27,28].

The reason for the occurrence of most of the cases in the afternoon can be attributed to the fact that most of the family members and guardians go for work during these times of the day. The children are left at home without the vigilance of parents, which dole out the good opportunity for the assailants.

In the present study, the incidence of sexual assault is highest in summer (May–July) constituting 28.65% of the total cases (153 victims), followed closely by the season of spring where it is 27.15% (145 victims). This observation is consistent with the observation of other Indian studiesl [10,29]. However, the observation in the present study is in contrary to statistics of another Indian study by Tamuli R.P. et al. [30] which observed winter (October, November) as the most common season of sexual assault.

The reason for our observation can be accentuated as at this season most of the school have vacations and many of the females elope with their boyfriend which result in more number of sexual assault cases. Staying alone at home in scorching weather of summer gives the prospect to the assailants.

In the present study, the incidence of sexual assault is highest in the Hindu community (73.03%) followed by the Muslim community (22.66%) and Christian community (4.31%). This observation is in

agreement with other studies [12,31,32]. The reason for more incidence of sexual assault in Hindus can be explained by the fact that the majority of the population belongs to Hindu religion in this part of the country.

In the present study, 516 victims are literate which contributed 96.63% of the total study population. 18 victims (3.37%) are illiterate. This finding is consistent with the observation of the study by Barek A. et al. [33]. On the other hand, Islam M.N. et al. [24] (69.9%) and Ganguly R.P. et al. [34] (43%) reported that the majority of the victims were Illiterate.

In the present study out of the total 516 literate victims, 410 victims (79.46%) are students and 106 victims (20.54%) are dropouts. This observation of literate victim is consistent with studies of Bhoi S.B. et al. [35] and Kumar-Pal S. et al. [32].

Amongst total literate population, the majority of the victims (227 victims) are studying in secondary school standard which accounts for 43.99%. The study by Das I. et al. [31] in contrast to the present study showed that the majority were studying in middle school standard (25.4%). Tamuli R.P. et al. [30] also showed findings in contrast to the present study and noticed that the majority of victims were high school students (19.90%). This observation of our study proves the fact of several other studies wrong, which says that "more highly educated (secondary schooling and higher) are less likely to be victims of sexual violence compared to less educated victims" [36,37,38].

In the present study, the history of voluntary sexual intercourse is present in 32.74% of cases (175 victims). This is quite closer to the observation by Sarkar S.C. et al. [12] where 43.33% of the victims had a history of voluntary sexual intercourse. The reason for voluntary sexual intercourse in minor age can be attributed to the fact that, in most of the cases, assailant gives false assurance to the female victims to marry her and due to stinginess the victims give consent for sexual intercourse. However, it is sad to note that this false assurance compiles the victim and her family to launch the complaint against the assailant.

In the present study, 8.24% of victims became pregnant after the incidence of sexual assault. The observation in our study is quite closer to that of Tamuli R.P. et al. [30] where 5% of cases were pregnant at the time of examination. Sukul et al. [29], on the other hand, noted the highest incidence of pregnancy after sexual assault (16.09%) and Barek A. et al. [33] noted the lowest incidence (1.17%).

In the present study, the rented rooms are the commonest place of assault in a maximum of the cases (26.40%), followed by the assailant's home (21.72%) and victim's home (20.97%). This is in agreement with the study by Tamuli R.P. et al. [30] (19.89%). However, this is in contrast to the study by Bhoi S.B. et al. [35] (assailant's home 38.52%), Sarkar S.C. et al. [12] (victim's home 41.1%). The victim's home as the most common place of assault was reported by Grossin C. et al. [15] (41%) and Vadysighe A.N. et al. [11] (34%). The assailant's home as the most common place of assault was observed in the study by Maring et al. [9], Ononge S. et al. [27], and Kumar Pal S. et al. [32].

The reason for rented rooms being the most common place for sexual assault can be attributed to the fact that the victim elopes with the assailant and start living separately at the distant place.

Conclusion

Child sexual abuse is the most common and threatening behavior calculated to induce fear and depression. It has existed in almost all societies throughout history in one or another form. However, recognition of child abuse as a social problem is of recent origin and is on rising. To make social awareness about the fact in society, sensitization and protection programme should be a high priority. Young girls should receive special attention and guidelines should be made by considering the most common age group suffered. Singular policies should be made for allowing the rented rooms to younger visitors, e.g. age verification, ID proof etc. Guidelines and education of girls and parents should be made available for early detection and reporting of such cases. The person in a position of trust and responsibility should be available with children who are alone at home. Working parents should be made aware of the safety and security of their children through agencies like CCTV surveillance, security etc.

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Original Article

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Death Due to Road Traffic Accidents: A Forensic Study

B.R. Chandra Hasini

Abstract

Introduction: One of the most common non communicable epidemic of the world are accidents, which are a major cause for morbidity and mortality. The most vulnerable part of the body which is affected by the road accidents is the head. This study was done to observe the incidence of vehicular trauma and the pattern of injuries which lead to fatal outcome. *Materials and methods:* This study was done on 256 patients of all ages, who had a history of Road Traffic accident and death occurred due to head injury within 15 days of admission. The age, sex, time of death, history and type of the accident were noted. Type of head injury, site of injury and other organs involved, were also observed. *Results:* A predominance of males was seen over the females in 73%. The most common age group to be affected was between 21-40 years of age with 63.5% people affected. Contusions on the sclap, membrane and brain were 97.2%, 90.2% and 100% and lacerations were 36.3%, 28.9% and 35% respectively. 70.7% of the patients had injury at the base of the skull which was the most common part of the head to be involved, followed by the involvement of the temporal bone in 60.2% of the patients. Most of the patients (92.6%) had a subdural hemorrhage while 82.4% had a subarachnoid membrane hemorrhage also. *Conclusion:* Improper roads and traffic disciple not to mention high traffic and vehicles are the main reason. Proper education to the people, importance of the speed limits and following the traffic regulation, wearing helmets for two wheelers and seat belts for the 4 wheelers have to be emphasized.

Keywords: Road traffic accidents, death, head injury

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Introduction

One of the most common non communicable epidemic of the world are accidents, which are a major cause for morbidity and mortality. This is the price we pay for the progress in technology [1]. As there is an increase in urbanization and modernization, there is an increase in motorization also [2]. Broad roads, with heavy traffic, high speed vehicles and low traffic discipline. There has been tremendous increase in the urbanization and motorization in India as well. Four wheelers, three wheelers and Two wheelers are very economical as well as easily available [3]. This increase in the motorization has shown a boom in the rural development as well as adverse effects such as RTA [4].

Injuries due to road traffic accidents rank 4th among the leading causes of death in the world [5]. It is estimated that 2.1% of the global mortality are caused by Road Traffic Accidents. A larger share of this is borne by the developing countries where in 85% of the deaths are due to RTA [2]. India accounts for around 10% of the fatalities due to RTA worldwide. 30.2% of natural and unnatural deaths were due to RTA in India [6]. This number may not be exact and may increase because most of

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the times, the deaths die to RTA are not recorded[7]. Some of the important factors for fatalities in RTA is the increase in motor vehicles, increase in population and poor access to health care.

The most vulnerable part of the body which is affected by the road accidents is the head [8]. A head injury is defined as a morbid state resulting from the gross or subtle changes in the scalp and/ or the contents of the skull, produced by mechanical sources [9]. In India, since the two wheelers contribute to the major portion of the traffic, these are the more common causes of accidents.

There have not been many studies which have correlated the head trauma with the road traffic accidents. This study was therefore done to observe the incidence of vehicular trauma and the pattern of injuries which lead to fatal outcome.

Materials and Methods

This descriptive study was performed by the Department of Forensic Medicine at Kakatiya medical college over a period of two years. This study was done on 256 patients of all ages, brought to our hospital, who had a history of Road Traffic accident. In all these patients, death occurred due to head injury within 15 days of admission. All the bodies were sent to the mortuary for postmortem and head injury as the cause of death was confirmed.

Non fatal cases of RTA, patients who died with causes other than head injuries, those not involved in RTA were excluded from the study. The inquest reports were analyzed in detail and the age, sex, time of death, history and type of the accident were noted. Type of head injury, site of injury and other organs involved, were also observed and duly noted. In case of details which could not be identified on the body, they were obtained from interviewing the eye witnesses, friends and relatives, as well as from the cooperation of the police.

Results

Out of the 256 patients, 201 were males (78.5%) and 55 (21.5%). A predominance of males was seen over the females (Fig. 1).

The most common age group to be affected was between 21-30 years of age with 91 people affected accounting for 35.5%. This was followed by 72 patietns in the 31-40 years age group (28.1%). 39 (15.2%) were in the 41-50 years age group, 21 (8.2%) were between 11-20 years (Fig. 2).

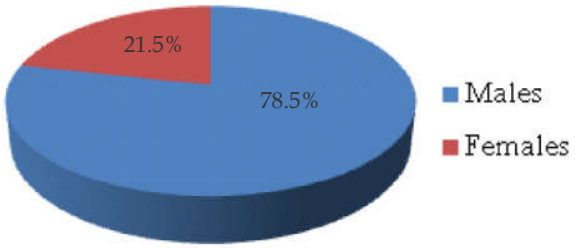

Fig. 1: Sexwise distribution of patients

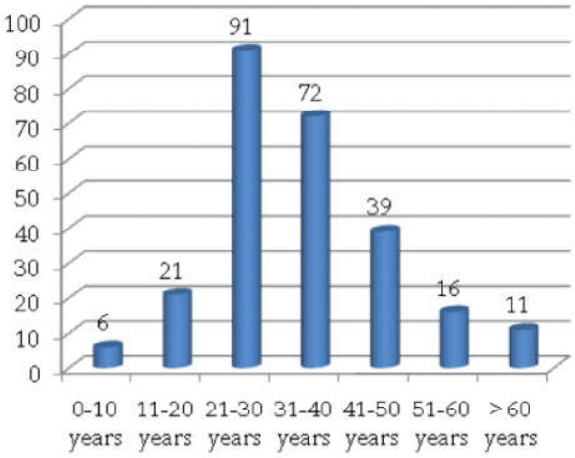

Fig. 2: Agewise distribution of patients

Out of the 256 patients 249 (97.2%) had contusions on their scalp, 231 (90.2%) on the membrane and all of them (100%) had contusions in their brain. 93 (36.3%) of them had laceration on their scalp, 74 (28.9%) had on membrane also and 87 (35%) had lacerations on the brain (Table 1).

Table 1: Contusion and lacerations in the patients

Type of injury	Scalp	Membrane	Brain
Contusion	249 (97.2%)	231 (90.2%)	256 (100%)
Laceration	93 (36.3%)	74 (28.9%)	87 (34%)

One Hundred eightyone (181) (70.7%) of the patients had injury at the base of the skull which was the most common part of the head to be involved, followed by the involvement of the temporal bone in 154 (60.2%) of the patients. 129 (50.4%) of them had occipital bone injury while 111 (43.4%) 92% had a frontal bone involvment (Table 2).

Table 2: Bone involved

Bone Involved	Number	Percentage
Temporal	154	60.2%
Occipital	129	50.4%
Frontal	92	35.9%
Parietal	111	43.4%
Sphenoid	76	29.7%
Base of skull	181	70.7%

Most of the patients i.e. 237 (92.6%) had a subdural hemorrhage while 211 (82.4%) had a subarachnoid membrane hemorrhage also. Intracerebral hemorrhage was seen in 62 (24.2%) of the patients while 43 (16.8%) had extradural hemorrhage (Table 3).

Table 3: Intracranial damage

Type of haemorrhage	Number	Percentage
Subdural	237	92.6%
Subarachnoid	211	82.4%
Intracerebral	62	24.2%
Extradural	43	16.8%
Intraventricular	37	14.5%

Lungs were the most common soft tissue to be affected with 79 (29.9%) followed by liver in 64 (25%) of the patients. Ruptured spleen was seen in 45 (17.6%) ov the patients while kidneys were affected in 39 (15.2%) of them. Out of the bones other than the skull, 106 (41.4%) patients had fractures in one or both of the upper limbs. Fractured ribs were seen in 98 (38.3%), lower limbs were effected in 92 (35.9%), facial bones in 66 (25.8%), clavicle was effeted in 62 (24.2%) of the patients (Table 4).

Table 4: Other associated injuries

Injuries	Number	Percentage
Soft tissue injuries		
Lungs	79	29.9%
Heart	22	8.6%
Spleen	45	17.6%
Liver	64	25%
Gastrointestinal system	36	14.1%
Kidney	39	15.2%
Bony Injuries		
Ribs	98	38.3%
Clavicle	62	24.2%
Sternum	43	16.8%
Facial Bones	66	25.8%
Spine	31	12.1%
Pelvis	48	18.8%
Upper limbs	106	41.4%
Lower Limbs	92	35.9%

Thirty nine (39) patients (15.2%) died on the spot of the accident, while 51 (19.9%) were brought dead on arrival. 48 (18.8%) patients died in less than an hour of hospitalization while the predominant time of death was in less than 24 hours of hospitalization with 69 (27%). 22 patients (8.6%) of the patients survived for more than 1 week (Table 5).

Table 5: Survival period

Time	Number	Percentage
Death on spot	39	15.2%
Death on arrival	51	19.9%
<1 hour of admission	48	18.8%
1-24 hours of admission	69	27%
1 day to 1 week of admission	27	10.5%
>1 week	22	8.6%

Discussion

India is a developing country. Some of the cities of our country has shown tremendous development while many other cities are also in the process of urbanization. One of the result of this urbanization is underdeveloped traffic system, unplanned roads, and overpopulation of people and vehicles. Irregular and reckless driving has resulted in danger on roads [10].

The majority of the persons deceased in our study were males accounting for 78.5% of the cases. This preponderance of males in road traffic accident deaths was reported in a study by Arvind Kumar et al., where a huge number of around 88% involved were males [11]. They reported the cause to be due to the greater presence of the males on the urban roads. A 7.33:1 male to female ration was observed in another study by Shivakumar et al. [12]. A study by Jain et al. reported an 83% of predominance of the males in deaths in RTA in Mangalore [13]. Another study by Pate et al., the male to female ratio was 2.05:1 [14]. Similar results were reported by researchers such as Thumbe and Patil [15,16].

Most of the people affected were between 21-40 years of age accounting to more than 60% of the cases. In a similar study by Pate et al, maximum victims were observed in the 21-30 years age group followed by the 31-40 years age group, corroborating our study [14]. Similar results were observed in other studies also [17-20]. However, Akang et al. and Adeyole et al. reported the 41-50 years age group to be the predominantly affected age group [21,22]. Jain et al reported most of the deaths to be among the 18-44 years age group [13]. The younger age group are most commonly affected as they are normally the earning members of the family and most of the times on roads. Those between 21-30 years are probably more affected as many of these consist of students who are more reckless and adventurous in their driving, leading to accidents.

Contusions and lacerations were present on the scalp, membrane and brain in the cases. Contusions were present on the brain in all the cases, in 97.2% of the scalp and 90.2% of the membranes, while lacerations were present on 36.3% of the scalps, 28.9% of the membranes and 35% of the brains. Skull fractures were detected in 88.1% of the cases

in a study by Sharma et al., and cerebral contusions and lacerations were seen in 23.7% of the cases [23]. In yet another similar study by Shivakuamr et al., a contusion of 98% 94% and 100% in the scalp, membrane and brain was reported which was in accordance to the present study [12]. The laceration in this study was also reported to be 38%, 32% and 26% respectively. In contrast to our study, studies by Khajuria and Chaudhary reported a higher laceration incidence in the brain compared to the contusions [24,25].

The base of the skull was the most affected part in all the head injuries, followed by the temporal bones. 50.4% had occipital bone injury and 43.4% had a frontal bone involvement. In a study by Menon et al., fractures of the vault were observed in 88% of the cases, while the base of the skull was involved in 35.97% of the cases. Of them fissured fractures were seen in 23% of the cases [26].

Most of the patients (92.6%) had a subdural hemorrhage while 82.4% had a subarachnoid membrane hemorrhage. Intracerebral hemorrhage was seen in 24.2% of the patients while 16.8% had extradural hemorrhage. Intracranial hemorrhage was observed in other studies [14]. In this study, subarachnoid was the most common type of hemorrhage reported, followed by subdural, as was observed in another study by Chandra et al. [27]. Subdural hemorrhage was reported to be the most common type of intra cranial hemorrhage in a study by Sharma et al., in 62.4% of the cases, with the second highest being subarachnoid hemorrhage in 23.5% of the cases, although the number were lower than that of our study. Subdural and subarachnoid hemorrhage was found in 61.6% of the cases in a study by Chattopadhyay and Tripathi [28].

Lungs were the most common soft tissue to be affected as in 29.9% of the cases, followed by liver in 25% of the patients. Ruptured spleen was seen in 17.6% of the patients while kidneys were affected in 15.2% of them. Out of the bones other than the skull, 106 (41.4%) patients had fractures in one or both of the upper limbs. Fractured ribs were seen in 98 (38.3%), lower limbs were affected in 92 (35.9%), facial bones in 66 (25.8%), clavicle was affected in 62 (24.2%) of the patients.

Thiry one (39) patients (15.2%) died on the spot of the accident, while 51 (19.9%) were brought dead on arrival. 48 (18.8%) patients died in less than an hour of hospitalization while the predominant time of death was in less than 24 hours of hospitalization with 69 (27%). 22 patients (8.6%) of the patients survived for more than 1 week. In a study by Khadim et al., 70.1% of the people died on spot, while the others were alive for only 1 hour to 2 weeks [29].

Conclusion

The major causes of mortality in our society is due to Road traffic accidents. Most of the mortalities are due to two wheelers. Improper roads and traffic disciple not to mention high traffic and vehicles are the main reason. It is essential that the proper authorities take up this menace and due the needful to curb such incidents. Proper education to the people, importance of the speed limits and following the traffic regulation, wearing helmets for two wheelers and seat belts for the 4 wheelers have to be emphasized.

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Histopathological Spectrum of Fungal Infections in a Tertiary Care Hospital

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Abstract

Context: Infections caused by funguses are increasing at a steady rate worldwide. Elderly individuals and who are at an immunocompromised state are at risk of developing this disease. Though fungal infections which either manifest as cutaneous or invasive type, Cutaneous lesions are very common. Fungal diseases are diagnosed usually by correlating the clinical findings with histopathology and confirmation is done based on culture. *Aim:* The current study was aimed at categorizing the spectrum of fungal infections diagnosed in the histopathology specimens and their distribution according to age, sex and site of involvement. *Settings and Design:* This was a cross sectional analysis, conducted over a period of one year from September 2016 to August 2017. *Methods and Material:* A total of 60 cases were enrolled in the study. Clinical findings inclusive of age and sex parameters were noted from hospital registrars. Specimens were fixed in formalin and processed under standard procedure protocols. Slides were prepared and stained with routine H & E stain; special stains like PAS and GMS stains were used wherever necessary. *Statistical analysis used:* Data analysis was using IBM Statistical Package for the Social Sciences Software version 21. Significance of the statistical tests at P value less than 0.05 was based on 95% confidence interval. *Results:* Out of 60 cases, 18 cases turned out to be positive for fungal infection. The mean age of the studied population was 49.11 years (SD 11.02). The male female ratio was found to be 0.8:1. The mean age of male population was found to be 53.375 years (SD 7.44), mean age of female population was 45.7 years (SD 12.54). The commonest fungal infection encountered in our study was Rhinosporidiosis. *Conclusions:* Histopathological examination provides reliable diagnosis in individuals with uncertain clinical findings of fungal infection.

Keywords: Immunocompromised; Cutaneous; Rhinosporidiosis; Histopathology; periodic acid– Schiff.

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Introduction

Infections caused by funguses are increasing at a steady rate due to increased exposure and also because of the advanced treatment modalities that allows longer survival of at risk population, these at-risk populations include patients who underwent transplant surgeries, those who are on chemotherapeutic and immunosuppressive drugs, AIDS patients, diabetic and elderly individuals, etc [1, 2]. Some of the fungal infections are associated with changes in the climatic conditions and human habitats, frequent travel and population relocations [3, 4].

Fungus can cause infections which can be either cutaneous or invasive lesions. Cutaneous infections are very common when compared to deep or invasive mycosis which are rare and usually occur in immunocompromised individuals. Majority of the cutaneous mycosis is caused by dermatophytes and candida. Aspergillosis, chromoblastomycosis, pheohyphomycosis and eumycosis causes deep cutaneous mycosis [5,6].

Diagnosis of fungal infections is usually based on correlating clinical findings with histopathology and confirmation is done by culture in selective media. Histopathological examination of specimens is required in all cases in which deep and cutaneous fungal infection. Dermatophytes are not easily identified with histopathological analysis, since the hyphae of dermatophytes are stained pale blue by routine Hematoxylin & eosin (H&E) stains. For invasive fungal infections histopathological analysis remains cost-effective, rapid and gold standard diagnostic modality for a presumptive definitive diagnosis [7,8].

Histopathological diagnosis of fungal elements is definite challenge even in the hands of experienced histopathologists, to facilitate the process of visualization; the fungal elements are stained by using special stains such as periodic acid– Schiff (PAS) which gives hyphae red colour and Grocott's methenamine silver (GMS) which stains the hyphae black. The current study was proposed to categorize, the spectrum of fungal infections diagnosed in the histopathology specimens and their distribution according to age, sex and site of involvement.

Materials and Methods

The current study was a cross sectional analysis, conducted in the department of pathology for a period of one year from September 2016 to August 2017. All clinically suspected patients and incidentally detected fungal infections were sampled. Institutional ethics committee approval was obtained and a total of 60 cases were enrolled in the study.

Relevant clinical data was obtained from hospital registry; the specimens received were fixed in formalin and processed under standard procedure protocols. Slides were prepared and stained with routine H&E stain; special stains like PAS and GMS stains were used wherever necessary..

Statistical analysis

Data analysis was performed by using IBM Statistical Package for the Social Sciences (SPSS) software version 21.0. Univariate analysis was carried out to find out frequency, mean and standard deviation (SD). Multivariate analysis was performed for sex and age. Significance of the statistical tests at p value less than 0.05 was based on 95% confidence interval.

Results

Out of 60 cases, 18 cases turned out to be positive for fungal infection. The mean age of the studied population was 49.11 years (SD 11.02). The male female ratio was found to be 0.8:1. The mean age of male population was found to be 53.375 years (SD 7.44), mean age of female population was 45.7 years (SD 12.54). Difference in the mean age was found to be statistically significant (p=<0.001). Increased proportion of the disease was seen among sixth decade followed by fifth decade of life. Age clustering with sex distribution of individuals positive for fungal infection was shown in table 1.

The commonest fungal infection encountered in our study was Rhinosporidiosis (5 cases), followed by Aspergillosis and Dermatophytosis (3 cases each). Distribution of fungal lesions was shown in table 2.

Table 1: Distribution of fungal lesions

Fungal Lesions	No of cases (%)
Maduro mycosis	2 (11.11%)
Pheohyphomycosis	3 (16.67%)
Dermatophytosis	2 (11.11%)
Aspergillosis	3 (16.67%)
Chromoblastomycosis	2 (11.11%)
Cryptococosis	1 (5. 55%)
Rhinosporidiosis	5 (27.78%)
Total	18 (100%)

Table 2: Age and sex distribution of fungal infections

Age	Male	Female	Total
21 - 30	0	1	1
31 - 40	1	1	2
41 - 50	2	3	5
51 - 60	3	4	7
61 - 70	2	1	3
Total	8	10	18

In the study, most common site involved were extremities, followed by nasal cavity and lung. All cases of Rhinosporidiosis presented with nasal obstruction with polypoid mass. Microscopic examination revealed mixed inflammatory inflammation with numerous thick walled sporangia.

Both the cases diagnosed with maduramycosis presented with discharging sinuses in the foot. Histologically both these cases showed brown fungal filaments surrounded by granulomatous inflammation with abscess formation.

Three cases of pigmented fungi (phaeohypomycosis) were diagnosed in the study and all the three cases presented with a cystic swelling in the extremities. Histopathological examination showed granulomatous inflammatory response composed of lymphocytes, histiocytes, gaint cells and one case showed microabscesses formation. The organism was found in the cyst wall in the form of pale brown pigmented budding yeasts and dematiaceous hyphae. Special stain with PAS highlighted the fungal elements in magenta colour [Fig. 1]. Two cases of superficial dermatophytosis diagnosed in the study showed histologically neutrophilic infiltrate with thin fungal elements in stratum corneum.

Cases with aspergillus presented with otomycosis and nasal obstruction. Histopathological examination showed thin filamentous, septate hyphae with acute angle branching and spores surrounded by lymphoplasmacytic infiltrate, eosinophils and foreign body giant cells [Fig. 2]. Single case of Cryptococcus presented with lung mass and histopathology of bronchial brush specimen showed numerous round encapsulated fungal organisms surrounded by chronic inflammatory cell infiltrate.

Two cases of chromoblastomycosis presented with nodular lesions in the foot with a history of trauma. Microscopically there is epithelial hyperplasia and lymphohistiocytic infiltrate, fungal elements were seen as sclerotic bodies and as pigmented hyphae.

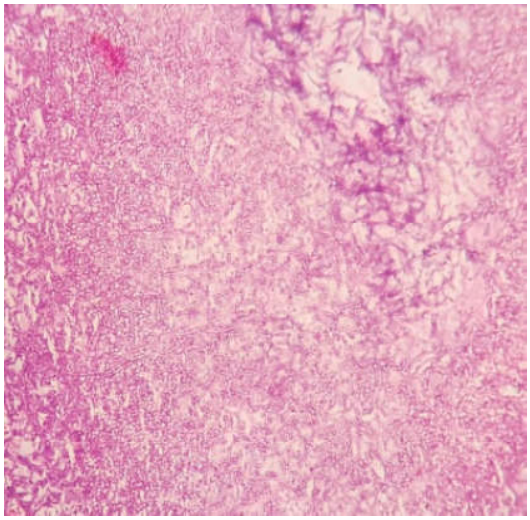

Fig. 1: H & E showing thin acute angled septate hyphae

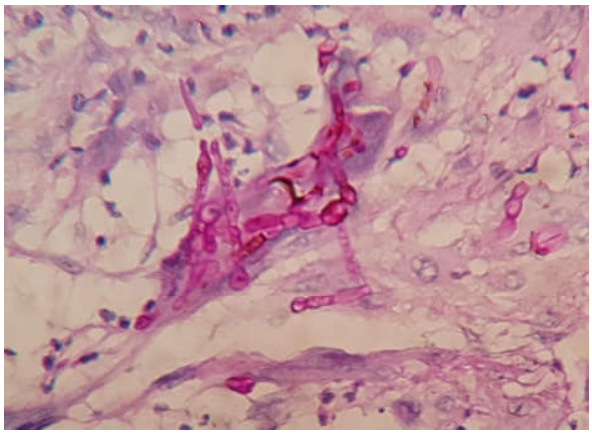

Fig. 2: PAS staining showing pigmented hyphae and yeast forms

Discussion

Infections due to fungi are in the rise in developing countries like India, because of multiple demographic factors like low socioeconomic status, overcrowding, poor hygiene and other cultural practices. There are very minimal studies available about the clinical pathological aspects and incidence of various fungal lesions in south India. In the current study we made an effort to categorize various fungal diseases in clinically suspected cases from the histopathological specimens received in the department. In two cases the fungal elements were incidentally made out. All the fungal lesions identified in this study were localized without any evidence of immunosuppression [9,10].

In the study Rhinosporidiosis is the commonest fungal lesion diagnosed. This finding is in accord with the other similar studies carried out in various regions of south India and Srilanka [11,12] but contradictory to the other studies done in other parts of the world [12,13]. This is might be because of the fact that people belonging to this geographic regions use stagnant water bodies like pond and well for bathing and swimming.

Aspergillosis was the second commonest lesion encountered in the study. Among the three cases of aspergillus two cases presented with otomycosis and the organism was seen as fungus ball. Aspergillus was diagnosed based on presence of septate, thin acute-angled branching hyphae. The hyphae were usually deeply basophilic, and it will be eosinophilic in appearance when the hyphae are degenerated or necrotic. Similar studies done by authors Muniyappa Usha, et al. and Jeannette Guarner et al. showed chronic pulmonary aspergillosis or aspergilloma, bronchopulmonary aspergillosis and invasive aspergillosis are the most

common lesions, our study findings are in contrast with these studies [8,14].

Among the fungal infections reported in our study, Phaeohypomycosis comprise a remarkable fraction. Phaeohyphomycosis is a group of heterogeneous fungal infections caused by dematiaceous fungi. These funguses cause progressive superficial, subcutaneous and deep visceral infections and it is diagnosed by the presence of pigmented dark brown yeast/hyphae forms. When left untreated this often leads to life-threatening disease especially in immunocompromised individuals. Similar studies done by Ponnuswamy et al. and Kaliyamoorthy S et al demonstrated all cases of phaeohypomycosis presented with cystic swelling, our study results were in concurrence with these findings.

In our study two cases of Maduramycosis were reported and both the cases had discharging sinuses in the extremities. Maduramycosis can present as actinomycotic or eumycotic mycetoma. Morphologically it is characterized by draining sinus tracts with brown to black pigmented grains comprising of fungal elements. Our study findings were similar to the study done by Sidhalingreddy et al. and Kaliyamoorthy S et al. [15,16]. There were two cases of Dermatophytosis demonstrated in the study and both these cases on histopathology revealed spores and branched, septate hyphae invading the stratum corneum. This is in concurrence with the other similar study done by sridevi et al. [17].

A single case of Cryptococcus demonstrated in the study was a male patient presented with chronic cough, dyspnoea and chest pain. Bronchial brushing and biopsy confirmed the diagnosis. Study done by Kanjanapradit et al. also showed similar findings [18].

Conclusion

Histopathological examination provides valid diagnosis in individuals with uncertain clinical findings of fungal infection. Diagnosis of fungal infections on histopathology is based on the appearance of fungal elements on H & E stain and Special stains and also by the presence of host response like granulomatous reactions, foreign body giant cells and eosinophilic infiltrates.

Key Messages:

The diagnosis of fungal infections on histopathology is based on the appearance of fungal elements on H & E stain and Special stains and also by the presence of host response like granulomatous reactions, foreign body giant cells and eosinophilic infiltrates.

Conflict of Interest: No

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Profile of Homicidal Deaths in Jamnagar Region

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Abstract

Wilful killing of human being as result of conduct of the other human found in all civilization. In spite of all available law there is increase rate of homicidal death day by day due to modernization, life style change, industrialization etc. No matter what is the pattern of homicide but object for these are financial conflict, love affair, revenge, arguments and property conflict. This study done from Jan 2013 to Dec 2015 for a period of 3 years in the forensic and toxicology department M.P. Shah Govt. Medical College, Jamnagar studied in various aspect like vulnerable age group, sex, time of death, seasonal variation, survival period, type of injury, organ involvement etc. This study we found that homicidal deaths incidence was 2.25% of autopsies and male to female ratio was 2.4:1 and most affected age group was 3rd decade constituted 35% of cases. In 13.75% of cases police did not suspect homicide prior to autopsy. Maximum homicides took place at victim's residence (28.5%) and remote from public (23.75%). The main motive was financial conflict (26.25%). Physical assault by sharp weapon injuries (45%) was the commonest pattern followed by blunt weapon injuries (27.5%) and 63.75% of victims died on the spot. The common site of body part involved was chest region (26.25%) followed by head and face (21.25%) injuries. The most common cause was haemoorhagic shock followed by asphyxia.

Keywords: Homicidal Death; Cause of Death; Survival Period; Sharp Weapon.

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Introduction

There is blinking headlines about the rising incidence of social crimes and violence taking place in different parts of the country especially in cities areas. Level of violence in the society reflected by homicidal rate per year. Wilful killing of one human being by another human being is homicide [1-4]. Homicide is grave crime against society and is as old as origin empire and is one of the leading causes of unnatural deaths [2-3]. To commit murder, two elements ("Mens rea" which means preplanning or afore thought and "Actus reus" which means the actual execution) should work together to constitute the crime [3,4]. The various patterns of homicidal deaths include physical assault by sharp weapon, blunt weapon, firearms, strangulation, burns, poisoning, homicidal hanging, smothering, drowning, etc. The rate homicide is increasing worldwide and the pattern is also changing because of modernization, increased population, life style, modern needs of the man and easy availability of various type of weapons [2-4].

Considering this increased frequency of such deaths and its impact on the society, the present study is carried out so as to find the most vulnerable age group, sex incidence, motive, pattern of

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homicide, place of occurrence of crime, period of survival, and an attempt is also made to throw light on cases which were brought with history of suicidal, accidental or natural deaths but which were registered later as homicidal deaths by the police based on autopsy report and investigation during the study period. It's very challenging for police and investigating agencies to know the exact nature of incidence and for judiciary to punish the actual guilty accused.

Material and Methods

This study done from Jan 2013 to Dec 2015 for a period of 3 years in the Forensic Medicine & Toxicology Department, M.P. Shah Govt. Medical College, Jamnagar. All the cases brought to the dept for medico legal autopsy with alleged history of homicide and also the cases which were later registered as homicide were studied. Police and accompanying person of the victims of the homicidal death were asked for the general information like age group, time of death, survival period, hospitalization, detail of incidence, type of weapon etc. The information about the time since death, type of fatal injuries, cause of death, body part and organ involvement etc were noted during post mortem finding. All data of alleged history and post mortem findings were collected and filled in the performa and analyze.

Observation and Discussion

During this study total 3542 autopsies were conducted, of which homicidal deaths constituted 80 cases (2.25%). In present study incidence of homicide in year 2013 was 2.35% which decrease from 2.31 in 2014 to 2.1% in 2015. There is no any definite correlation between number autopsies and homicidal death per year [Table 1].

Most affected age was between 21-30 (35%) followed by 31-40 (27.5) least common in extremity of age, highest incidence in the 21-30 age groups were due to stress, marrige disputes, love affairs, infidelity unemployment and dowry. Male to female ratio was 2.4:1 higher on male side is due to stress, unemployment, gang rivals were the reasons in males. Similar findings were observed in the most of the studies [5-14]. In this studies the most of the victims belonged to the age group 21-30 years and is in contrast to the observation made by by Mohanty et al. [15] where most of the victims belonged to 31-40 years, by Wahlsten et al. [16] belonged to 30-39 years and by Kominato et al. [17] where most of the victims belonged to 50-59 years. Males constituted more than half (71.25%) of the victims which can be due to the aggressive nature and stress of male than females. Similar observation made by most of authors [8,9,12,13,17] while in a study conducted by Mohanty et al. [18] male to female ratio of the victims was 1:1. [Table 2].

Maximum number of cases were seen in summer 51.25%. this is due to festival, marriage and family gathering. Similar findings observed in the study conducted by [5-10,19] [Table 3].

Maximum number of the homicides took place in the evening (38.75%) and late night (15%) which can be attributed to the factors like night fall or in darkness the chances of assailant being recognized is reduced, at evening and night family and friends gathering are high. A similar observation made in studies conducted by Shah P et al. [5], Vinay et al. [8], Angam et al. [9] and Prajapati et al. [19] where as in study conducted by Nayak et al. [10] and Aggrawal et al. [20] maximum number of cases (26.9%) occurred during noon [Table 4].

Most of the victims (82.5%) died on the spot. This could be due to weapon lethality and determination on the part of assailant to kill the victim, since most of these cases were premeditated [Table 5].

Of the 80 cases in the study, 61 cases (76.25%) were registered as homicides at the time of autopsy. 6 cases (7.5%) were registered as accidental deaths as the victims were found dead by the road side or by the railway tracks with injuries and in 4 cases the reasons were the history of natural death and absence of external injuries lead them to register it as natural death and in 8 cases the investigating officer suspecting foul play based on the alleged history by the deceased relatives or the injuries present on the body but later upon autopsy were registered as homicides, which indicates the importance of scene examination and meticulous autopsy. In a study done by Bamdale et al. [21] police did not suspect homicide prior to autopsy in 2.5% of the cases. [Table 6].

Maximum number of victim (28.75%) were died at their residence only, which implies that these homicides were mostly premeditated as the assailants were aware of the victim's routine and followed by remote from public place in 23.75% of cases which were due to revenge murders and arguments arising while under the influence of alcohol followed by those in shared residence which were mostly infidelity related. This study is similar to the study conducted most of the authors [6-9,13,20]. where in desert area or place close to agricultural side was place of occurrence

in majority of homicides accounting for 46.2% and Mohanty et al. [18] majority of homicides took place out doors. [Table 7].

In most of the homicides (30%) the motive was any form of revenge. Financial conflicts were responsible for the 18.75% of homicides, most of them occurring in the domestic homicides and dowry related. Similar observations were made by Vinay et al. [8], Prajapati et al. [19] where in the main motives were conflicts (23.1%) and revenge (23.1%) Mohanty [18], where in the revenge (29.2%) was the commonest motive followed by argument (17.1%) and is in contrast to studies conducted by Bamidale et al. [21] and Gangale et al. [22] where in the argument was the most frequent cited circumstance among those that were known. [Table 8].

In most of the cases alleged accused was the near relative. Least number of homicides was committed by strangers (7%) for the robbery or argument. This is similar to observations made by Vinay et al. [8] and Mohanty [18] while contrast to Wahlsten et al. [16], where in the stranger committed maximum number of homicides. Death due to sharp weapon injuries (45%) was the commonest pattern followed by blunt weapon injuries (27.5%) which can be due to the easy availability of various sharp weapons.

Most of the sharp weapon injuries were planed and mainly involved in revenge or love affairs whereas most of the blunt weapon injuries were unplanned and assailants used the blunt weapon available at the scene of occurrence. 5 (6.25%) cases were of asphyxia death. Only 3 (3.75%) cases were due to fire arm injury as the law in India is strict as compared to western countries where gun licensing is taken easily. This study is in similar to the studies conducted by Wahlsten et al. [16] where in sharp weapon injury was the most common cause of death (39%), Buchde et al. [12] where in sharp weapon injuries accounted for 57.4% of homicides and is in contrast to the studies by Kaminato et al. [17], where in Firearms were the most common means used for homicides [Table 9].

The common site of body part involved was chest region (26.25%) followed by head and face (21.25%) injuries this site are the common as they are easily assessable and injuries to them cases fatal injuries to vital organs. Similar findings were observed by most of the author [6,7,9,14] While in Kaminato et al. [17], Aggrwal et al. [20] and Ghangale et al. [22] head and face involve more than 1/4th cases followed by chest. [Table; 10, 11]

Table 1: Year wise distribution of case

Sr. No.	Year	Cases	%	Total Autopsy
1.	2013	27	2.35%	1147
2.	2014	24	2.31%	1166
3.	2015	29	2.1%	1229
	Total	80		3542 (2.25%)

Table 2: Age and Sex wise distribution of case

Sr. No.	Age	Male	Female	Total	%
1.	0-10	0	2	2	2.5%
2.	11-20	3	1	4	5%
3.	21-30	22 (27.5%)	6 (7.5%)	28	35%
4.	31-40	17	5	22	27.5%
5.	41-50	10	7	17	21.5%
6.	51-60	3	2	5	6.25%
7.	>60	2	0	2	2.5%
	Total	57 (71.25%)	23 (28.75%)	80	100%

Table 3: Season wise distribution of case

Sr. No.	Season	Cases	%
1.	Summer	41	51.25%
2.	Rainy	21	26.25%
3.	Winter	18	22.5%
	Total	80	100%

Table 4: Season wise distribution according to time of day

Sr. No.	Time	Cases	%
1.	Morning	6	7.5%
2.	Noon	15	18.75%
3.	Evening	31	38.75%
4.	Late night	12	15%
5.	Not known	16	20%
	Total	80	100%

Table 5: Distribution of case according to survival period

Sr. No.	Season	Cases	%
1.	Spot death	51	63.75%
2.	<12 hrs	12	15%
3.	12-24 hrs	6	7.5%
4.	1-2 days	3	3.25%
5.	2-3 days	3	3.25%
6.	3-7 days	2	2.5%
7.	7-30 days	1	1.25%
8.	>30 days	2	2.5%
	Total	80	100%

Table 6: Distribution of cases according to alleged history

Sr. No.	History	Cases	%
1.	Homicide	61	76.25%
2.	Accidental	6	7.5%
3.	Suicide	1	1.25%
4.	Natural	4	5%
5.	Suspicious	8	10%
	Total	80	100%

Table 7: Distribution of cases according to place of incident

Sr. No.	Place	Cases	%
1.	Remote from public place	19	23.75%
2.	Public place	2	2.5%
3.	Open field	11	13.75%
4.	Dumping area	3	3.75%
5.	Highway side	8	10%
6.	Around victim house	23	28.75%
7.	Unknown	14	17.5%
	Total	80	100%

Table 8: Distribution of cases according to motive

Sr. No.	History	Cases	%
1.	Revenge	24	30%
2.	Argument	6	7.5%
3.	Property Dispute	7	8.75%
4.	Love affair (Infedility)	11	13.75%
5.	Financial conflict	15	18.75%
6.	During robbery	3	3.25
7.	Psychological	2	2.5%
8.	Not Known	12	15%
	Total	80	100%

Table 9: Distribution of cases base on type of weapon

Sr. No.	Type of Weapon	Cases	%
1.	Sharp	36	45%
2.	Hard & Blunt	22	27.5
3.	Sharp + Hard & Blunt	6	7.5%
4.	Asphyxia	5	6.25%
	Ligature Strangulation	2	2.5%
	Manual Strangulation	1	1.25%
	Drowning	1	1.25%
	Smothering	1	1.25%
	Hanging	0	0
5.	Asphyxia + Sharp	2	2.5%
6.	Firearm	3	3.75%
7.	Burns	1	1.25%
8.	Not Known	1	1.25%
	Total	80	100

Table 10: Distribution of cases base on body part involved

Sr. No.	Body part	Cases	%
1	Only Head & Face	17	21.25%
2	Only Neck	12	15%
3	Only Chest	21	26.25%
4	Only Abdomen	14	17.5%
5	Chest+Abdomen	7	8.75%
6	Extremity	3	3.75%
7	Multiple	6	7.5%
	Total	80	100%

Table 11: Distribution of cases base on organ involved

Sr. No.	Organ	Cases*	%*
1	Brain	23	28.75%
2	Laranx & Deep Neck	18	22.5%
3	Lung	28	35%
4	Heart	12	15%
5	Spleen	3	3.75%
6	Liver	11	13.75%
7	Kidney	8	10%
8	Major Vessels	12	18.75%
9	Other	9	11.25%

*= Multiple response

Conclusion

Homicidal deaths constituted 2.25% of autopsies conducted. Maximum number of homicides occurred in the age group 21-30 years in both sexes constituting 35%. 13.75% of the cases were registered as homicides after the opinion of the autopsy surgeon, which were brought as accidental, suicide or natural deaths and another 10% of the cases were also registered as homicides after the autopsy where the police officer was suspecting a foul play or suspicion. Maximum homicide took place at the victim's residence (28.75%) and remote area (23.75%). The main motive behind the homicide was revenge (30%). Maximum numbers of homicides were committed by relatives (47%). Sharp weapon injuries (45%) were the commonest pattern followed by blunt weapon (27.5%). Most of victims (67.75%) died on the spot. Fatal injuries were mostly on chest (26.25%) followed by head (21.25%) Lung (35%) and brain (28.75) involved in more than 50% cases.

For improving the homicidal death rate in the community the affected age group should be taken care, most of affected victims were in 21-30 years age this group of people have the problems of like unemployment, education and social status. The local authorities, government and NGO should provide proper employment opportunities among youth in this community The affected youth should be proper council and teach about how to handle the stress and increase the tolerance to over come any problems. Family, friends and marital dispute should be solve by giving guidance by an appropriate counsellor. Government and NGO should be trained to social problems of their locality which are lead to violence at home and should be teach to over come of that problems. Law and order situation should be maintained for antisocial activity and possession of weapons.

In the Indian setting the investigating officer, the forensic expert, pathologist and the judiciary system work individually and not as in the western countries where the all unit is constituted in investigation who share their knowledge in solving a crime. Thus investigating officer should work along with the forensic expert and pathologist in solving homicides. There should be Psychological counselling centres for criminals and psychiatric criminals.

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Autoantibodies and Immune Expression of HBME 1 and Galectin 3 in Thyroid Nodules

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Abstract

Thyroid diseases are among the commonest endocrine disorders worldwide. India too, is no exception. According to a projection from various studies on thyroid disease, it has been estimated that about 42 million people in India suffer from thyroid diseases. Since mortality and morbidity in thyroid cancer is often measured over decades, there is a paucity of prospective clinical studies that are capable of evaluating various tests and to find out the cost and time saving methods which may significantly reduce patient morbidity and unnecessary surgery in benign thyroid disease. Objectives of present study was to study anti thyroperoxidase (AntiTPO) antibody, anti-thyroglobulin (anti TG) antibody and immune expression of HBME1 and galacten 3 in various thyroid lesions. This is a prospective 2 year study from January 2015 to December 2016. All cases referred to cytology section were included and individual on hormone therapy or antithyroid drugs were excluded from study. FNAC was done in all cases. Thyroid function test, anti TPO and anti TG antibodies were measured. Histopathology correlation of cases was done of resected thyroid tissue and immune markers HBME 1 and galectin 3 was done where ever required. 165 cases had cytological diagnosis reframed under Bethesda reporting and serum biomarkers level obtained. 71 cases had histopathological correlation and observed nodular goiter commonest non neoplastic lesion followed by lymphocytic thyroiditis and papillary carcinoma. HBME 1 is specific to differentiate benign and malignant lesions and galectin 3 is highly specific for papillary carcinoma. Auto-antibodies are markedly raised in autoimmune thyroiditis and papillary carcinoma. To conclude autoantibodies level estimation helps in clinical diagnosis and management of thyroid lesions. Immunohistochemistry plays vital role in confirmation of malignant lesions.

Keywords: Anti thyroperoxidase/ anti thyroglobulin/HBME1/galectin 3.

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Introduction

Thyroid diseases are among the commonest endocrine disorders worldwide. India too, is no exception. According to a projection from various studies on thyroid disease, it has been estimated that about 42 million people in India suffer from thyroid diseases [1].

Thyroid nodules are a very frequent finding, and their prevalence steadily increases with age. Nodular thyroid disease refers to the presence of a solitary nodule or multiple nodules, solid to one or more cystic lesions. It is estimated that 5%–7% of adults have clinically detectable nodules in

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the thyroid, and with the emergence of modern ultrasonographic (US) techniques detecting thyroid nodules of a few millimeters, the frequency of nodularity is estimated to be 16%–67% in unselected subjects. Most of the discovered nodules are benign; however, there are increasing incidence of cancers (2.4-fold increase), and this trend appears to be continuing. Recent population studies have shown that about 12% of adults have a palpable goitre. Autoimmune thyroid disease is probably commoner than iodine deficiency as a cause of goiter in areas that are now iodine sufficient [2,3].

Thyroid cancer is the most common endocrine malignancy and is the sixth most common cancer in women and the second most common cancer in women under 40 years of age [4].

Since mortality and morbidity in thyroid cancer is often measured over decades, there is a paucity of prospective clinical studies that are capable of evaluating various tests which may significantly reduce patient morbidity and unnecessary surgery in benign thyroid disease. The present study was taken to study the significance of FT3, FT4, TSH, anti TPO antibody, anti thyroglobulin antibody in various thyroid lesions. Cytological diagnosis of thyroid nodules, histopathological correlation and to study immune marker expression of HBME-1 and galectin 3 in the resected thyroid specimen in applicable cases.

Materials and Methods

This was a prospective 2 year study from January 2015 to December 2016. All patients with thyroid swelling from ENT & Surgery clinic being referred to Department of Pathology were included in the study with informed consent. Patients with thyroid swelling already on thyroid hormone therapy or antithyroid drugs were excluded from the study. Informed consent was obtained and then detailed clinical history was noted. Thorough clinical examination was carried out. 5 ml of venous blood sample was collected in plane vaccutainer and serum markers estimation which included thyroxine (T4), tri-iodothyronine (T3), thyroid stimulating hormone (TSH), anti Thyroperoxidase (Anti TPO), Anti thyroglobulin antibody (Anti TG). Collected sample was run through Vidas biochemical analyser. Fine needle aspiration cytology (FNAC) was done and cytological diagnosis was given following The Bethesda Reporting System for Thyroid Cytology (TBRSTC). Resected thyroid tissue was grossed and processed FFPE as per standard protocol and stained with routine Hematoxylin and Eosin (H&E) stain and histopathological diagnosis given and correlation between cytological diagnosis and histopathological diagnosis was also done in available cases. Immunohistochemistry for HBME1 and galectin 3 markers was carried out in required cases as per standard protocol.

The statistical evaluation of the data was carried out using the Statistical Package for Social Sciences (SPSS® version 17.0) and Microsoft® Excel for Mac 2011 programs. In the present study, descriptive statistics as well as 95% confidence interval for a single proportion, mean, P value and sensitivity and specificity of immune markers was calculated.

Results

Total samples included in the study were 165 cases, all cases serum biomarkers ie thyroid hormones and autoantibodies were measured and noted down. In present study females outnumbered males in thyroid disease with 81% and 19% male affected. Youngest patient was 12 yrs old (Table 1).

Serum biomarkers of thyroid function that is free T3, free T4 and thyroid stimulating hormone (TSH) were with in normal range. Anti thyroperoxidase (Anti TPO) and anti-thyroglobulin (Anti-TG) levels were raised in autoimmune thyroiditis and in few cases of papillary carcinoma (Table 2). P value was calculated and observed that P value was statistically significant for anti TPO and anti Tg levels in relation with thyroiditis and papillary carcinoma (Table 3).

The Bethesda Thyroid reporting was followed for cytological reporting and observed 83 cases (51%) were benign cases Bethesda category II, 9% cases were frank malignant remaining Bethesda category VI, 9.7% cases were follicular neoplasm category IV and 30.3% cases were falling in grey area Bethesda category V and category III. Histopathological diagnosis was correlated in available cases (Table 4). Seventy one cases had histopathological correlation. Commonest histopathological diagnosis was colloid goitre (21 cases), followed by 16 cases thyroiditis, 10 cases of follicular adenoma and 24 cases were thyroid malignancy.

Papillary carcinoma was commonest malignancy with 15 cases, 4 cases of follicular carcinoma, 2 cases of medullary carcinoma and 2 cases of metastatic carcinoma both were squamous cell carcinoma deposits. One rare case of mucoepidermoid carcinoma was diagnosed.

Forty eight (48) resected thyroid specimens with morphological similar features between

benign and malignancy, those cases were subjected immunohistochemistry. HBME 1 and Galectin 3 immune expression was studied. Gal-3 stained the majority of malignant cases (89%) in comparison to benign neoplasms the difference was statistically significant (p-value <0.0001). Gal-3 expression in thyroid papillary neoplasms was found to have a sensitivity of 88.2%, specificity of 89.12%, and positive predictive value of 91.22% and negative predictive value of 78.12%. HBME is more specific

Table 1: Age distribution

Sex/age	10-20	21-30	31-40	41-50	51-60	61-70	>70	Total
Female	15	45	33	15	18	6	2	134
Male	3	6	11	6	2	3	-	31

Table 2: Thyroid Hormones and Antibodies Level in Various Thyroid Diseases

Thyroid lesion	TSH 0.4-4.0 muIU/ml	FT3 3.5-7.8 pmol/L	FT4 9 – 25 pmol/L	Anti TG <20 IU/ml	Anti TPO < 35 IU/ml
Goitre (colloid/nodular/toxic)	1.62+/-0.76	3.02+/-042	1.22+/-0.24	16.63+/-3.42	35.2+/-3.23
Lymphocytic thyroiditis	20.66+/-4.05	1.42+/-0.37	.53+/-0.16	43.25+/-7.46	63.26+/-5.96
Granulomatous thyroiditis	2.22+/-0.43	6.24+/-1.56	19.45+/-6.5	26+/-3.50	35.2+/-2.50
Graves disease	0.02+/-0.01	13.3+/-3.69	30+/-4.79	34.85+/-6.76	42.28+/-5.92
Follicular neopalsm					
Follicular adenoma	0.83+/-0.16	4+/-1.73	11.3+/-1.67	12.6+/-3.77	25+/-0
Follicular carcinoma	2+/-0	3.9+/-0.1	20+/-0	12+/-1.41	17.5+/-2.42
Papillary carcinoma	2.1 +/- 0.54	4.65+/-1.16	13.8+/-4.16	30.5+/-14.53	33.3+/-17.93
Medullary carcinoma	0.9	4	13	20	39

Table 3: p value of the serum Biomarkers

Thyroid lesion	TSH	FT3	FT4	Anti TG	Anti TPO
Goitre (colloid/nodular/toxic)	0.182	0.218	0.321	0.61	0.12
Lymphocytic thyroiditis	0.245	0.03	0.001	0.05	0.002
Granulomatous thyroiditis	0.215	0.04	0.02	0.06	0.001
Graves disease	0.05	0.04	0.003	0.015	0.025
Follicular neoplasm Follicular adenoma Follicular carcinoma	0.224	0.23	0.231	0.215	0.071
Papillary carcinoma	0.251	0.25	0.32	0.02	0.04
Medullary carcinoma	-	-	-	-	-

Table 4: Bethesda cytological reporting and histopathological correlation

Bethesda system	Includes	Cytology cases	HPR correlation Cases	Final diagnosis
I	Non diagnostic Non satisfactory	Acellular/ only fluid/ blood	24	-
II	Benign	83	24	Goitre (colloid/nodular/ toxic) Lymphocytic thyroiditis Granulomatous disease Graves disease Adenomatoid nodule
III	Atypia of unknown significance (AUS)	32	13	
IV	Follicular neoplasm/ suspicion for follicular neoplasm	16	14	Follicular neopalsm; Follicular adenoma Follicular carcinoma
V	Suspicious for other malignancy	09	20	Papillary carcinoma Medullary carcinoma
VI	Malignancy	15		Metastatic carcinoma Mucoepidermoid carcinoma
Total	-	165	71	-

Forty cases had immunohistochemistry analysis with marker HBME 1 and Galectin 3.

Table 5: IHC HBME 1 & Galectin 3

HPR diagnosis	No of cases	HMBE 1	Galectin 3
Papillary carcinoma	15	Positive	Positive (15 case)
MNG with papillary like features	12	Weak positive	Positive (1case)
Lymphocytic thyroiditis	2	Negative	Negative
Graves disease	1	Negative	Positive
Follicular carcinoma	3	Weak positive	Negative

for thyroid malignancies compared to benign neoplasms with sensitivity of 91% and specificity of 95% (Table 5).

Discussion

In present study we had 165 thyroid lesion cases in which we observed female preponderance 79%, similar to study done by K Fariba et al. [5] with 66.8% females, WeiminXu et al. [6] and Howrah et al.

Cahoon KE et al. [7] had population based cohort study which measured serum Tg, urinary iodine, TSH, anti-thyroglobulin, anti- thyroid peroxidise levels and Ultrasound to assess the presence of nodules and estimate thyroid volume and concluded that serum Tg is significantly related to presence of thyroid abnormalities as well as indicators of thyroid function and iodine deficiency and, therefore, could be used to characterize the iodine status and thyroid function of individuals in the context of epidemiological study.

In spite of iodine sufficient belt the incidence of thyroid diseases are increasing, with the literature supporting with the autoimmune cause. Antibodies levels were raised in autoimmune thyroid disease and in known fact but levels were also high in papillary carcinoma and medullary carcinoma suggesting could play role in etiopathogenesis? Similar findings was also observed by Young Ah Cho et al. [8] in "Biomarkers of thyroid function and autoimmunity for predicting high-risk groups of thyroid cancer: a nested case–control study" Eun Sook Kim et al. [9], reported that TGAb was associated with an increased risk of thyroid cancer in thyroid nodules. Similarly, other studies also showed an analogous association with malignancy by considering positive thyroid autoantibodies as a whole, including TPOAb and TGAb. Present study also comments on auto-antibodies levels high in autoimmune thyroiditis and few cases of papillary carcinoma.

In present study, cytological diagnosis of all cases were categorised according to Bethesda reporting system thus signifying its importance for surgical management of thyroid nodules. Study done by Zarif, et al. [10]. demonstrates higher risks of malignancy in diagnostic categories (DC) I, DC II, DC III and DC IV than that of the original BSRTC definition, along with a higher specificity and positive predictive value for cancer diagnosis, and a lower sensitivity and negative predictive value.

Several immunohistochemical markers representing different components of the cell, such as the membrane, the cytoplasm, or the nucleus, have been studied in thyroid neoplasms. Some of the antibodies that have been examined include galectin-3, Hector Battifora mesothelial cell antibody (HBME-1), cytokeratin-19, RET, TTF-1, hTERT, telomerase, p27 and p53 to name a few. Two markers that have been extensively studied are galectin-3 and HMBE-1 [11].

Saleh HA et al. [12] studied immunohistochemical markers like galectin-3, HBME-1, CK19 and Ret oncoprotein to differentiate benign and thyroid nodules and concluded that immunomarkers are significantly more expressed in malignant tumours compared to benign lesions and may be of additional diagnostic value when combined with routine histology [13].

Study done by Arcolia et al. [14]: diagnostic performances of individual or combined thyroid markers demonstrated that gal1 is a useful immunohistochemical marker to discriminate malignant tumours from benign thyroid nodules. They further validate that gal3 is a sensitive marker for the diagnosis of thyroid malignancy, and add support for its combination with CK 19 and HBME 1 with the highest performance for the diagnosis of well differentiated thyroid cancer. Such combination of markers should be validated in a larger series of tissues including various subtypes of thyroid lesions [14].

Zhang et al. [15] observed in his study the potential of triple immunochemical staining to be used as an ancillary test to clarify cytologic diagnoses of indeterminate thyroid nodules.

Also demonstrated the diagnostic value of dual positive/colocalization of Galectin-3 and HBME-1 for thyroid malignancy [15]. Similarly present study highlights the importance of galectin 3 and HBME-1 immune markers in diagnosing thyroid malignancies.

Conclusion

Cumulative approach including thyroid serum markers and tissue immune marker study gives a complete diagnostic approach of thyroid lesions and Gal-3 is a promising marker in the diagnosis of PTC and its variants and HBME-1 differential expressions in thyroid carcinoma compared with benign neoplasms may also represent a promising target for therapy of thyroid cancers.

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Original Article

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Snake Bite Poisoning in Tertiary Care Hospital of North Karnataka

Chandrashekhar B Bhuyyar

Abstract

Total 79 cases of snakebite poisoning were studied between 1st January 2013 to 31st December 2013. Males were 58 (73.41%) and females were 21 (26.59%). Maximum sufferers were agriculturists 51 (64.55%). 51 (64.55%) were married. 74 (93.68%) victims of snake bite were Hindus. 67 (84.8%) cases belong to rural population. 51 (64.5%) cases shown the most common site of bite is lower limb. 18 cases (22.8%) were elapidae bites and 14 cases (17.7%) were viperidae bites among poisonous snakes. 37 cases (46.8%) were non poisonous bites. Maximum 39 cases (49.3%) were reported from July to September. 69 cases (87.3%) discharged after successful treatment where as 10 (12.7%) cases expired.

Keywords: Snake bite; Poisonous snakes; Lower limb bite.

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Introduction

Snake bite still stands a major cause of mortality and morbidity in resource limited counties like India [4]. Snake bite is a public health problem distributed mainly in the tropical and sub-tropical countries. India is one of the high prevalence countries [1]. Snake bite was included in the list of neglected tropical diseases by World Health Organization in the year 2009 [2,3]. An authentic measure of the global burden of snakebite envenoming remains obscure despite several attempts to estimate it and, apart from a few countries, reliable figures on incidence, morbidity, and mortality remains elusive. Globally every year, an estimated more than 5 million people are bitten by snakes [6,7]. Though no clear cut data is available due to poor reporting system and poor maintenance of hospital data in India, 35,000-50,000 people die every year in this country due to snake bite [5]. Seasonal peaks in the incidence of snake bite are associated with agricultural activities such as ploughing or to fluctuations in the activity or populations of venomous snakes. Severe flooding by concentrating the human and snake populations has given rise to epidemics of snake bite in Columbia, Pakistan, India Bangladesh and Vietnam. Penetration of jungle areas during construction of new highways, and irrigation and hydroelectric schemes may also be other cause [8].

India is inhabited by more than 60 species of venomous snakes of which only four have been popularly known to be dangerously poisonous to man; Spectacled cobra (Naja naja), common krait (Bungarus caeruleus), saw-scaled viper (Echis

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carinatus) and Russell's viper (Daboia russelii) [9]. The most common poisonous snake among them is common krait [10].

Aims and objectives

1. To assess the epidemiologic burden of snake bite including the incidence, mortality, population at risk.
2. In order to provide recent and useful data to improve the management of snake bite in this region.

Materials and Methods

This is a prospective study conducted carried out from 1st January 2013 to 31st December 2013 in department of Forensic Medicine and Toxicology of BLDEU`S Shri B. M. Patil Medical College Vijayapura, Karnataka. All the patients attending the casualty and emergency department with history of snake bite were included in the study. Scorpion bites and other bites and cases without definitive history were carefully excluded from the study. Preliminary data of each subject were entered in proforma at the time of admission. Preliminary data includes age sex, occupation educational status domicile marital status, time of bite, site of bite, signs and symptoms at the time of admission and treatment given were noted down. Results were expressed as frequency percentages. Ethical clearance was obtained from institutional ethical committee before the start of study.

Results

Table 1: Age and sex distribution of victims

Age	Male	Female	Total
Less than 10	01	00	01
10-19	04	01	05
20-29	18	09	27
30-39	19	04	23
40-49	13	02	15
50-59	02	02	04
More than 60	01	03	04
	58 (73.41%)	21 (26.59%)	79 (100%)

Table 2: Occupation status of the victims

Occupation	Male	Female	Total
Agriculture	43	08	51 (64.55%)
Student	07	01	08 (10.12%)
Housewife	00	11	11 (13.92%)
Unemployed	08	01	09 (11.39)

Table 3: Marital status of victims

Marital status	Male	Female	Total
Married	39	15	51 (64.55%)
Unmarried	19	06	25 (31.64%)

Table 4: Distribution according to religion

Religion	Male	Female	Total
Hindu	54	20	74 (93.68%)
Muslim	04	01	05 (6.32%)

Table 5: Domiciliary status of victims

Domicile	Male	Female	Total
Urban	09 (11.4%)	03 (3.8%)	12 (15.2%)
Rural	49 (62%)	18 (22.8%)	67 (84.8%)

Table 6: Site of snake bite

Site of bite	Male	Female	Total
Lower limbs	40 (50.8%)	11 (13.9%)	51 (64.5%)
Upper limbs	16 (20.2%)	06 (7.6%)	22 (27.8%)
Other sites	02 (2.5%)	04 (5.1%)	06 (7.7%)

Table 7: Type of snakes involved

Type of snake	No of cases
Poisonous	
Elapidae	18 (22.8%)
Viperidae	14 (17.7%)
Non poisonous	37 (46.8%)
Unidentified	10 (12.7%)
Total	79

Table 8: Time interval for hospital admission and bite

Interval	No of cases
0-6 hr	25 (31.6%)
7-12 hr	31 (39.2%)
13-18 hr	17 (21.5%)
>18 hr	06

Table 9: Monthly distribution of cases

Season	No of cases
Jan – mar	11 (13.9%)
April - June	13 (16.5%)
July - Sept	39 (49.3%)
Oct - Dec	16 (20.3%)

Table 10: No of cases who received anti snake venom

ASV	No of cases
Given	42 (53.2%)
Not given	37 (46.8 %)

Table 11: No of cases expired.

Final outcome	No of cases
Cured	69 (87.3%)
Expired	10 (12.7%)

Discussion

In poor rural communities living in the tropics snake bite is one of the most overlooked upon public health issue. The true global burden of snake bite is unknown due to serious misreporting/ non-reporting of the cases. South Asia has high population density and the people are indulged in widespread agricultural activities. A large number of venomous snake species are found in this region and there is a serious lack of efficient snake bite control programs. That is why it is the world's most affected region in regard to this problem.

Alirol Emilie et al. in their study in South Asia found out that the mean age of snake bite victims is around 30 years and three-quarters of the victims are in the 10- to 40-year age group. They also found a clear preponderance of males among snake bite victims. A 2:1 male to female ratio was observed [11].

Similarly, in our study too we found clear preponderance of males among snake bite victims with the male victims being thrice more than the female gender. Also, More than three-fourth of the victims come under 20-49 year age group. 30-39 year age group had the most male victims followed by 20-29 and then by 40-49 year age group. Deviating a little from these statistics the women victims had the majority in 20-29 age group followed by the 30-39 year age group. This might be because the male counterparts are more involved in the agricultural activities in the region. Also the decline in female victims in age group 30-39 and then more in age group 40 onwards might be because of marriage and household responsibilities that are taken up by women in the region predominantly.

Pandey DP in his study in Nepal found that farmers account for more than half of the victims in snakebite cases. Students and housewives are also frequently bitten [12].

Our study too was in concordance to that and found that more than half the victims were farmers followed by housewives and then students. Male victims were found to be more than four times the female ones. This might be because the males predominantly work in fields especially after dark and they are aided by their wives, if married in terms of providing them food and help in them with the agricultural activities also.

Our study also shows that married men were double the number of victims in comparison to unmarried men. This might be because of married men doing regular work in fields to get food for the family and also the unmarried youth is more indulged in studies keeping them away from the prone areas. Married women were thrice the victim compared to the unmarried ones.

Our study also showed that Hindu men were 10-14 times more the victim of snake victims compared to Muslim men while Hindu women were 20 times more the victim compared to their Muslim counterparts. This must be because traditionally Hindu men and women have been practicing agriculture in India while Muslim community is more tilted towards opening shops and doing business be it on small scale.

Further our study shows that rural population is more prone to snake biting cases. The ratio is 1:5 for urban: rural (males) and 1:6 urban: rural (females). This is because rural households and people are predominantly indulged in agriculture and fields which are more prone to be habitat to the snakes. While the urban households are situated away from fields and forests they are less prone while the rural huts and houses are situated in proximity to fields and also have kaccha foundation. Also rural people have a habit of sleeping on ground/floor which makes them prone to snake bites. Many a times the bites occur at night while the victims are asleep on the floor [13,14].

Pandey DP in his study in Nepal found that extremity bites accounted for 94%, with 66% in the lower extremities and 28% in the upper extremities [12].

Hansdak et al. in concordance with the above study found that Sixty per cent of the bites were in the lower limb (Nepal) [15].

Similarly in Sri Lanka, Ariaratnam et al. found that 82% of krait victims were bitten on their lower limbs [14].

We too in our study found similar results showing that about sixty percent of the bites were on lower limbs. Rest all were on upper limbs bar few. Bite on the head & trunk happens mostly due to the nocturnal species biting sleeping people.

In a study Bhalla et al. studied 150 patients in their hospital. Out of 150, 76 patients were of poisonous snake bite and 74 patients were of non-poisonous snake bite. Out of these 76 poisonous snake bites, 42 were viperine snake bites, 21 were neuroparalytic snake bites and 13 were locally toxic (LT) snake bites [16].

In a study done by De Silva he found that Russell's viper was responsible for 30.3% of bites with a mortality of 29.6%. Corresponding figures

for the other species were: common krait 14.8% and 33.9%, cobra (Elapidae) 17.2% and 35.4%, hump-nosed viper (Viperidae) 22.2% and 0%. Other bites were caused by mildly venomous Boiga species, Trimeresurus *trigono-cephalus* and non-venomous snakes [17].

Similarly in our study we found that poisonous cases were 18 (Elapidae) + 14 (Viperidae). 37 cases were found to be of non poisonous bites and 10 were not identified.

The bite-to-treatment delay varies greatly, ranging from 30 minutes to 15 days. Most studies show that at least 60% of victims reach a health centre within six hours but very few in less than one hour [11]. 90% of cases are presented to the hospital within 3 hrs of being bitten [15].

Our study shows that most of the cases were brought in the window period of 7-12 hrs closely followed by the 0-6 hr window. The earlier the case is brought for care more are the chances of the survival of the victim. The snake bite is treated by giving ASV to counter the venom, if any, envenomated by the snake (if poisonous). In our study it should be noted that during the care ASV was given to 42 cases and not given to 37 cases. The latter was because the bites were of non-poisonous snakes and didn't require any ASV. Poor access to health care services, difficult transportation and consequent delay in ASV administration result in high fatality. The time elapsed after the bite is of vital importance, because with the passage of time more venom gets bound to the tissues and is thus less manageable for neutralization by ASV [18].

Snakebites show a classical seasonal variation, being more common in summers and in the rainy season, when it is associated with agricultural activities [19]. Most frequently in September through November [14].

In our study we noted that July-Sept window period was the one where most cases occurred followed by April-June and Jan-March.

Conclusion

It is evidenced by this study that agriculturists are most affected population. So the people who engaged in agriculture work should be advised to wear shoes while working in the field as the most common site of bite is lower limb. Dominance with male population as sufferers is found. The time lapse between the snakebite and treatment seems to be the major concern. The people should be educated to visit the doctor at the earliest which may help to reduce the mortality to the greater extent. The incidence of snake bite found to be more in rainy season. The care should be taken to keep premises clean and avoiding working or playing in dark. The government also should take initiatives to educate the vulnerable population as to how to avoid bites and immediate measures to be taken after the snakebite.

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Core Muscles Electromyographic Analysis in Collegiate Athlete on Performing Deadlift on Different Unstable Surfaces

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Abstract

Aim: Muscle activity analysis during deadlift is an important tool for assessing the effectivity of the exercise. Some studies indicate difference in muscle activities when collegiate athletes perform it on unstable surface. *Materials and Methods:* In this study, thirty collegiate male athletes were recruited. MVIC was recorded for each deadlift exercise. *Results:* Isometric deadlift executed on BOSU ball resulted in greater % MVIC change in core muscles ($p<0.05$), i.e., transversus abdominis and multifidus while no statistical difference was found when dynamic deadlift was executed on both surfaces ($p>0.05$). *Conclusion:* Isometric deadlift exercise result in significant change in muscle activity as compared to dynamic deadlift.

Keyword: EMG; BOSU; TrA; Multifidus; Athletes.

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Introduction

Owing to the increasing usage by athletes and recreational trainers, the concept of core training has gained popularity in the recent years [1,2]. The athletes aimed at improving performance or those using therapeutic training have core exercises as the most essential component of their exercise regimen [3]. The axial skeleton along with the soft tissues originating from it constitute the core [4]. There is sequential carryover of force generated in the upper extremity through the core to the lower extremity [5,6]. Various researchers advocate the interlinkage in performance of sports specific tasks and muscles of core and limb with a decrease in performance and increased risk of injury attributed to a weak core that is inefficient in transferring the forces [7-13]. There is reported incidence of injury because of alteration of the lower extremity kinematics during maximal cycling exercises when the core was fatigued beforehand [7]. It has been proposed that a weak core is predictive of injury in the Anterior cruciate ligament and iliotibial band along with patellofemoral pain, improper landing kinematics and low back pain and an emphasis has been placed on optimising core stability for injury prevention [14-19]. There is contraction of the multifidus and transversus abdominis, 110 ms and 30 ms prior to movement of leg and shoulder respectively in healthy individuals in order to stabilise the lumbar spine [20,21]. Multifidus and transversus abdominis contract in a delayed manner before limb movement in patients with low back pain [20], with an atrophy of multifidus

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in chronic low back pain patients [22]. Training core muscle can be accomplished through any of these approaches with close chain exercises on surface with stability, surface without stability and open kinetic chain exercise on both surfaces with support [4]. Quite recently, the concept of using balls, platforms and other devices with resistance training in order to faster varying degrees of instability [23]. One such apparatus (Both Sides Up balance trainer) for balance training comprises of an inflatable rubber bladder mounted on a solid plastic base that resembles a halved Swiss ball (BOSU; Fitness Quest, Canton, OH). In contrast to traditional resistance training that makes use of floor and stable benches, larger stresses are placed on the neuromuscular structures when making use of instability resistance training owing to greater instability of the unstable platform as compared to the traditional resistance training carried out using floor and stable benches [23]. Improvements in muscle cross sectional area and neuromuscular coordination leads to strength gains [24]. Administration of instability training has been postulated to be improving the core stability nevertheless, there are mixed evidences of enhanced trunk and abdominal musculature following use of unstable surface [23]. A study comparing effects of traditional floor exercises to Physio ball training found out improvement of torso balance and trunk electromyographic activity by the latter one within five weeks [25]. In other studies by Stanforth et al. [26] , resistance balltraining was found to be more effective for back and abdominal muscle as compared to traditional floor work. There is an increase in muscle activation, with use of an unstable surface required for completion of exercises in a controlled manner [27]. There was a reported 37-54% Increase in trunk stabiliser activity during unstable base chest press in comparison to chest press using a stable base [5]. Trunk stabiliser activity was found to be increased when curl ups were performed on an unstable surface and labile surfaces led to an elevated activity of abdominals [27,28]. Contrary to above mentioned findings some of the studies demonstrated EMG findings of core and lower limb muscle to be inefficient while using an unstable surface [29,30,31].

Most of the studies mentioned above took into consideration the differences in exercises done on stable versus unstable surfaces with only a few evidences comparing the two unstable surfaces with respect to Instability Resistance Training (IRT). As per the recent updates, no study has been performed with two unstable surfaces (Rocker board and BOSU ball) in regard to Instability Resistance Training and simultaneously comparing electromyographic profile of the core muscles (transversus abdominis and multifidus). This study aims at analyzing and comparing the electromyographic activity of the core muscles during deadlift done on rocker board and BOSU ball and to find out which of the two is best suited for maximal core muscle activation.

Methodology

Subject

Recruitment of 30 collegiate male athletes was done for the study from Jamia Millia Islamia. (Height 1.69m ± 0.05m, Weight 74.7 ± 6.5 kg, Mean ± SD age 22.1 ± 1.18 years, and BMI 26 ± 1.5) (Table 1). Having completed the physical activity fitness questionnaire, all subjects were found to be healthy and identified as having a good balance by completing star excursion balance test. Healthy male subjects between the age group of 21 to 24 years with absence of any adjoining musculoskeletal disorder were included in the study. All the selected athletes were already involved in a sport- specific training atleast twice weekly and competitive play once weekly. The exclusion criteria included any musculoskeletal pain history (knee or ankle injuries and acute or chronic low back pain), pulmonary problem, neurological disorder and cardiovascular dysfunction and smokers.

Procedure

The ethical clearance for the research study was obtained from ethical committee of the university. Study was conducted in the Physiotherapy

Table 1: Descriptive statistics of Demographic Data

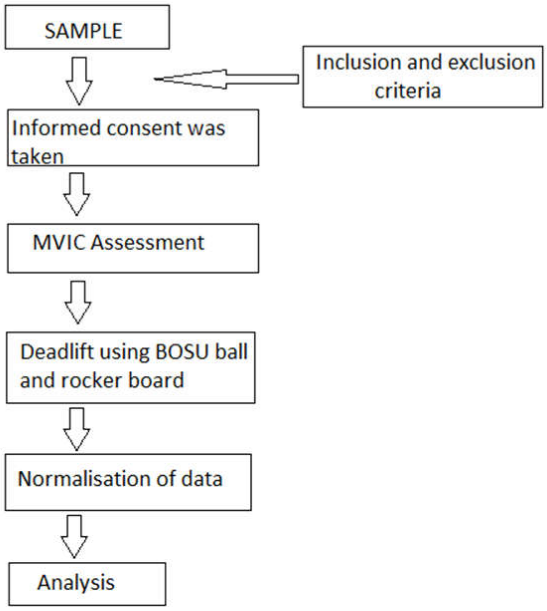
Variables	Mean (n=30)	Standard deviation (SD)
Age (yrs)	22.10	1.18
Height (m)	1.69	0.057
Weight (kg)	74.7	6.49
BMI (wt/Ht2)	26.07	1.50
60%1 RM(Kg)	66.63	14.86

SD: Standard deviation; BMI: Body Mass Index; RM: Resistance maximum; wt: weight in kg, Ht^2: height in metre square

Centre of the university. Selection of the subjects was done on the basis of inclusion and exclusion criteria. An informed consent was obtained from participants and a number was assigned for record keeping. Procedural aspects and nature of the study along with any doubts the subjects were having were cleared prior to initiation of the protocol. Stadiometer and digital weighing machine were used for measuring the height and weight of the athletes respectively.

Study design

Table 2: Study design



Familiarization

Two familiarization sessions were given to all the participants prior to the study. Sufficient time was given to the subjects to practice on rocker board and BOSU ball. A knee flexion angle of 100 degrees was emphasized at the time of deadlifts. After administering the specifically designed familiarization session, the subjects were instructed neither to perform any exhaustive exercise before 48 hours of testing nor to consume any energy or caffeine drink 2 hours preceding testing procedure.

Testing procedures

National Strength and Conditioning Association tables were used for calculation of 1 RM for the subjects before testing procedures [32]. All the subjects underwent warm-up sessions 72 hrs prior to collection of data. Warm up exercises included submaximal aerobic activity, shorts bouts of dynamic muscle stretching followed by 3 Maximal Volumetric Isometric Contraction of transversus abdominis and multifidus for a duration of 3 seconds. Subjects performed both deadlift variants (isometric and dynamic) on rocker board and BOSU ball, three days following MVIC measurement Same evaluators were strictly controlling the measurement procedure during the data collection process.

Surface EMG preparation

Before beginning the experimental phase all subjects were prepared for EMG recording. Excess hair was shaved off the skin followed by use of alcohol swab and abrasive to reduce skin resistance (≤ 10 kOhm). The SEMG was recorded with the help of AD Instruments Bioamplifier (Aust) (Fig. 1). Bipolar disposable surface electrodes (Ag/AgCl) with 1 cm diameter were attached on the right side (unilaterally) over the local trunk muscles, parallel to the muscle fibre orientation.

Fig. 1: AD instrument Power Lab

Local muscle activity was represented by inferior fibre of the internal oblique [33,34] because fibres of internal oblique and Transversus abdominis are blended at a site medial and inferior to ASIS [35]. Transversus Abdominis/Internal Oblique muscles lie 2 cm anteromedial to the ASIS [35]. Activity of the multifidus can be recorded, rostrally and caudally to a line passing through both PSIS, lateral to midline of body [37,38]. Recommendations suggest a maximum spacing of 2.5 cm between recording electrodes [39]. Ground electrode mounting of was done on bony prominence of left iliac crest over the superior aspect [40]. (Figs. 2,3).

Fig. 2: Placement of surface electrode for Transverse abdominis muscle

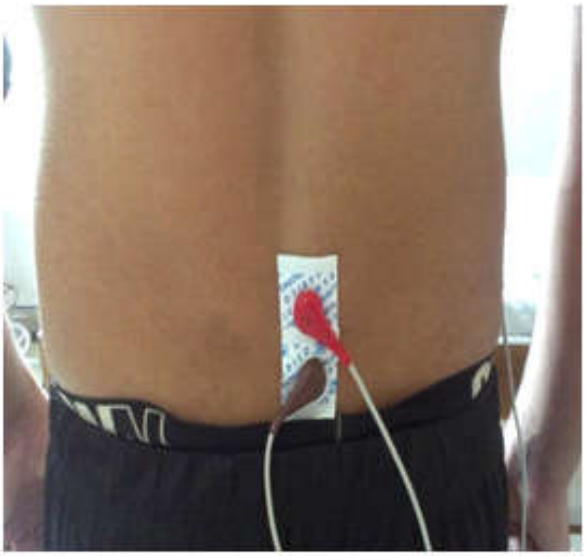


Fig. 3: Placement of surface electrode for multifidus muscle

Maximal voluntary isometric contractions (MVIC) assessment

Three experimental trials were done to provide normalisation of the muscle's MVIC [41-47]. EMG normalisation is done corresponding to the maximal EMG amplitude in order to allow comparisons of inter individual scores to maximum for each individual [48]. Compounding variables like skin impedance, electrode orientation, amount of subcutaneous fat or introduced if normalisation of EMG is not done prior to quantitative analysis [48]. Exercises were performed in two different ways that included providing verbal cues and manual resistance to elicit maximal effort. Using abdominal hollowing when performing a maximum expiratory maneuver in a sitting position recorded the maximum activation of Transversus Abdominis (Fig. 4). Performing trunk extension with the subject in prone lying position, legs strapped to table and applying maximal resistance on the dorsal aspect of scapula recorded the maximum multifidus activation [27,50,42,51,43] (Fig. 5).

Fig. 4: MVIC procedure for Transverse abdominis muscle

Fig. 5: MVIC procedure for multifidus muscle

Subjects will have a MVIC trial that needs them to sustain maximal effort for a duration of 3 seconds. A one minute rest period was used between each trial. Isometric phase of three seconds was used to collect the EMG data. The highest signal intensity in 1 sec period constituted the MVIC recording [49].

Exercise Procedures

A load of 60% of 1 RM was used to perform deadlift on two different surfaces. The choice of 60% relative load reflects the lowest load recommended to be used in strength training [50]. Furthermore, the maximum permissible load limit on unstable surface is 70% of 1 RM [4]. The sequence of exercises was isometric followed by dynamic deadlifts. In order to avoid fatigue, the order of activities in the two conditions (rocker board and BOSU ball) was counterbalanced.

Isometric Deadlift

The subjects stands with feet kept flat below the bar, performs a squat, grasping the bar with hands kept shoulder width apart with a mixed or overhead grip. A knee flexion angle of 100 degrees was used along with slight hip flexion [51]. Above mentioned exercise was performed by all subjects for a trial duration of 5 seconds under both the protocol conditions (rocker board and BOSU ball). To ensure complete recovery the subject is provided with resting time of 5 minutes between conditions [30]. (Figs. 6a, 6b).

Fig. 6a: Isometric deadlift on BOSU ball

Fig. 6b: Isometric deadlift on rocker board

Dynamic Deadlift

Maximum permitted range for knee flexion was restricted to 100 degrees [52]. The bar was kept as close to body as possible and lifted using legs and hips keeping arms and back erect. Metronome was used to control the execution speed so that each phase lasted for a duration of 2 seconds. (Fig. 7a, 7b).

Fig. 7a: Dynamic deadlift on BOSU ball

Fig. 7b: Dynamic deadlift on rocker board

A load of 60% of 1 RM was used and a set including six repetitions was performed by the subjects for both the conditions under consideration. In order for the athlete to completely recover, a rest time of five minutes was used following each condition [30].

Normalization of data

Surface EMG data collection was performed both during the dynamic and isometric deadlift exercise phases. Middle two second period of surface EMG signals of the isometric exercise were analyzed. Analysis for the dynamic exercise used surface EMG signals for the complete phase. Three successive readings were recorded for each muscle and their average taken as a whole was used for providing a basis for normalization of surface EMG amplitudes fetched in experimental exercises.

Statistical analysis

Data were analysed using SPSS version 21.0. Shapiro-wilk was used to verify the normality of variables distribution. Paired t test was used to check the difference between muscles concerning both MVIC and experimental exercises. The confidence interval used was 95% with level of significance was set at $p<0.05$.

Results

Transverse abdominis

Results showed a significant difference in activity of transverse abdominis when isometric deadlift performed on BOSU ball (mean 23.35, SD 9.42) and rocker board conditions (mean 20.84, SD 9.24) at t (29)=2.6, p= 0.014 [Tables 3,4] [Fig. 8a]. The MVIC of TrA was found to be 0.522 ± 0.227.

Results showed no significant difference in dynamic activity of transverse abdominis when dynamic deadlift performed on BOSU ball (mean 21.65 SD 8.9) and rocker board conditions (mean 22.56 SD, 9.29) at t(29)= -1.08, p=2.87 [Table 3,4] [Fig. 8b].

Table 3: Mean and standard deviation of maximal voluntary isometric contractions (MVIC) of transverse abdominis and multifidus.

	Mean	SD
Transverse Abdominis (TA)	0.522	0.227
Multifidus (MF)	0.922	0.168

SD: standard deviation; TA: transverse abdominis; MF: multifidus

Table 4: Paired t-test analysis of surface electromyography of each tested muscle between both the unstable conditions.

Variables	BOSU mean SE	Rocker mean SE	t value	P value	CI
TAIDL	23.35 1.72	20.84 1.68	2.6	0.014*	4.47 - 0.543
MFIDL	116.89 3.89	100.86 4.34	3.607	0.001*	25.12 - 6.94
TADDL	21.65 1.64	22.56 1.69	-1.08	2.87	0.803 - (- 2.62)
MFDDL	101.18 4.25	109.44 4.13	-1.89	0.068	0.645 - (- 17.16)

TAIDL: Transverse Abdominis Activity During Isometric Deadlift; MFIDL: Multifidus Activity During Isometric Deadlift; TADDL: Transverse Abdominis Activity During Dynamic Deadlift; MFDDL: Multifidus Activity During Dynamic Deadlift Activity; data are presented as Mean, SE = Standard Error; CI = Confidence Interval; * Significant difference

Multifidus

Results showed a significant difference in activity of multifidus when isometric deadlift performed on BOSU ball (mean 116.89, SD 21.32) and rocker board conditions (mean 100.86, SD 23.78) with t(29)=3.604, p=0.001 [Tables 3,4] [Fig. 8a]. The MVIC of multifidus was found to be 0.922 ± 0.168.

Result showed no significant difference in activity of multifidus when dynamic deadlift performed on BOSU ball (101.18 and SD 23.26) and rocker board conditions (mean value 109.44 SD 22.64) with t (29)=1.89, p=0.068 [Tables 3,4] [Fig. 8b].

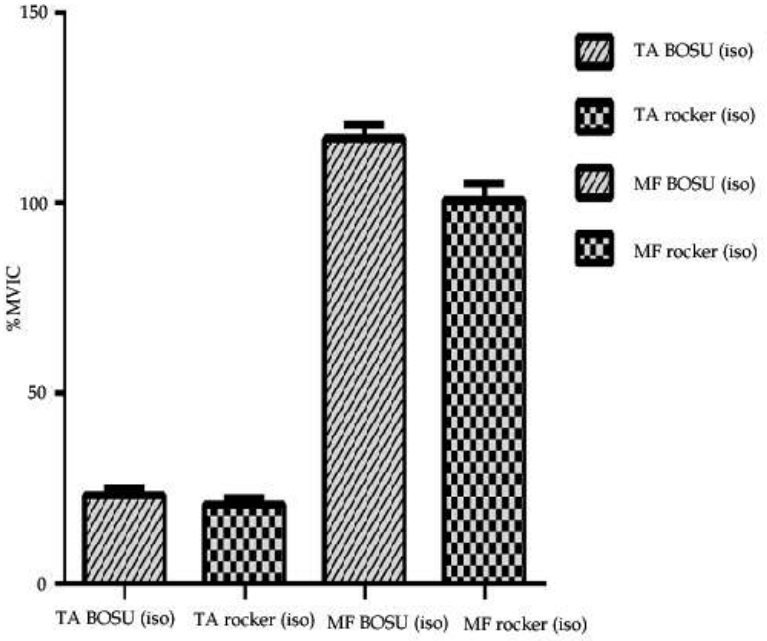


Fig. 8a: Comparisons between conditions related to the surface electromyography of each of the tested muscle. % MVIC: percentage maximum voluntary isometric contraction; iso: isometric deadlift; TA: Transverse Abdominis; MF: Multifidus. Each bar represents mean and standard error (SE). Significant difference ($p < 0.05$) between the conditions.

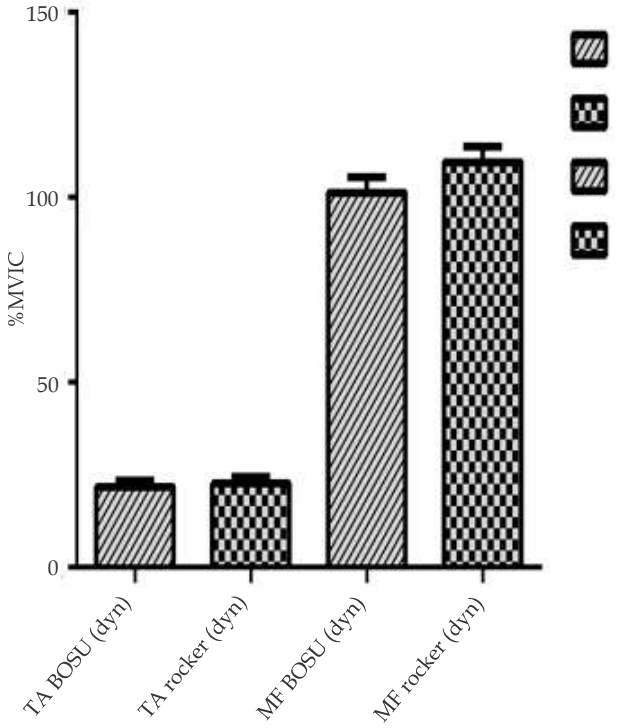


Fig. 8b: Comparisons between conditions related to the surface electromyography of each of the tested muscles. % MVIC: Percentage Maximum Voluntary Isometric Contraction; dyn: Dynamic Deadlift; TA: Transverse Abdominis; MF: Multifidus. Each bar represents mean and standard error (SE). Significant difference ($p > 0.05$) between the conditions.

Discussion

Core muscle's motor control and coordination is much necessary as compared to strength training or trunk muscle activation in low back pain patients. A number of studies report core muscle motor control deficits in low back pain patients [53]. Increased contribution of IRT is attributed to increase in stability, proprioception and balance rather than gain in strength [23]. Well designed strength training program includes deadlift as their key component [54,55,56]. This investigation suggests these exercises to be effective in promotion and maintenance of stability of the core. Earlier researches involved comparison of calisthenic exercises performed on stable and unstable surfaces or the performance of lifts on a stable surface compared to the use of unstable surface for calisthenic exercises. This is one of the few studies that compared deadlift exercise on two different types of unstable surfaces BOSU ball and rocker board.

These results are in compliance with the study by Saeterbakken et al. (2013) [57] who found that on increasing the instability condition there is an increase in EMG activity of the rectus femoris. Morinkovic et al. (2011) [58] concluded that gains in muscular outputs of 1 RM, power velocity and force were sufficient when BOSU ball was used for unstable squat training at 50% of 1 RM for 8 weeks. Another study found two unstable surfaces to be less efficient than a stable surface in generating force and EMG in core muscles, but between the two unstable surfaces BOSU ball showed greater percentage mean MVIC of paraspinal muscles on performing deadlift as compared to T – bow [30]. In one of the studies by Joshi et al., vertical jump performance and dynamic balance were improved in football players following 5 weeks of balance training on BOSU ball [59]. In accordance to the results of our study, Paterno et al. (2004) [60], showed significantly improved single limb stability following 6 weeks of balance training on BOSU ball in young female athletes.

A number of authors had demonstrated that instead of performing an exercise on stable surface, exercising on unstable surface provides a better means of increasing the activity of the core muscles [61,62,63]. Chest press while performing pushups and squat on a Physio ball increased abdominal muscle activity and perceived exertion were reported [64,65]. Another study concluded that higher degree of instability while doing squat (smith machine v/s Olympic squat v/s inflatable disc) resulted in a 20-30% greater activation of stabiliser muscles of the spine [66].

Past researches on unstable surfaces have pointed to increased importance of the inflation of BOSU ball and curvature of rocker board. The angle of deflection of the rocker board can be in the range of 20° to 90° [67].

Earlier evidences advocate that activity of core muscles increase following increased instability and hence redirects to the inference that BOSU ball creates more instability than a rocker board. One of the reasons for this may be multiplanar instability provided by BOSU ball as compared to unidirectional instability of rocker board. Instability increases in direct proportion to increase in inflation of the BOSU ball. These reasons provide justification for more effectiveness of BOSU ball in comparison to rocker board for activation of core muscles.

Clinical implication of the study

- Stability exercise for core muscles can include isometric deadlift using BOSU ball as a preventive and rehabilitative exercise in patients with low back pain and furthermore helps in reduction of injury owing to enhancement of motor control.

Limitations

- During the course of testing the degree of inflation would have been more than ten inches or knee angle be more than 100 degrees can lead to lesser activation of core muculature.

Perspective for future study

- Analysis of compressive and shear loading on the spine during isometric and dynamic deadlift activities using biomechanical model including kinematic and kinetic data.
- Load sensors should be used for actual monitoring the angles at knee and hip.

Conclusion

In conclusion, the available evidence suggests that dynamic deadlift on rocker board and BOSU ball does not have a marked effect on the activity of multifidus and transversus abdominis activity in athletic population. However isometric deadlift on BOSU ball lead to significant gain in the activity

of core stabiliser muscles Therefore, to increase the activity of local trunk stabiliser muscles, BOSU ball is more advantageous to use for execution of deadlift.

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Original Article

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Histopathological Study of MLC and Autopsy Cases in Our Hospital

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Abstract

Objectives: To study the histopathological findings in MLC and autopsy cases. *Material and Methods:* This study was undertaken in department of Pathology, Dr SCGMC, Nanded for a period of year Jan 2017 to Dec 2017 to determine the histopathological findings in MLC and autopsy cases. *Results:* Out of 220 cases, 200 cases were studied, in which 85.5% of cases were of lungs, 73% kidney, 68% heart, 67.5% liver, 59% spleen and 47.5% brain. *Conclusion:* The most common organ involved is lung in which the most common Pathology observed is pulmonary oedema. Autopsy examination of the organs and histology helps to arrive at the final cause of death.

Keywords: Autopsy; MLC; Histopathology.

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Introduction

The term "autopsy" is derived from the Ancient Greek word "autopsia", means "to see for oneself", autos ("oneself") and opsis ("eye") [1,2]. Autopsy as a word means self-study of dead body. It is an important way to find out the condition of internal organs, to evaluate disease or injury that could explain the cause and manner of person's death [3]. In a broadest sense, a medicolegal autopsies generates an evidentiary document that forms a basis for opinions rendered in a clinical trial, deposition, wrongful death civil suit, medical malpractice civil suit, administrative hearing, or workmen's compensation hearing [4]. Medical autopsies are performed at the request of and with the consent of the next of kin of a decedent and are often requested to determine the extent of a disease process or to evaluate therapy [5]. In contrast, medicolegal autopsies are performed by a forensic pathologist primarily to determine cause and manner of death but also to document trauma, diagnose potentially infectious diseases and report them to the appropriate agencies, provide information to families about potentially inheritable diseases, provide information to family members and investigative agencies, and testify in court [5]. A handful of histopathological findings unrelated to the cause of death are noticed in routine histopathological examination of medicolegal autopsies. These findings have proved to be of great academic value and serve as an eye opener to the infrequent lesions which go unnoticed when a person is alive [6]. The medicolegal autopsy provides an opportunity for studying not only medically diagnosed and treated neoplasms, but also the natural evolution of untreated disease [6]. This study emphasizes the

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various incidental lesions which otherwise would have been unnoticed during a person's life.

Postmortem Examination [7,8,9,10]

Medico-Legal Post-mortem

Autopsy is being requested by Investigative Agencies

-Police under Section 174 Cr PC and /or Magistrate under section 176 Cr P C with following objectives:

1. To find out cause of death
2. To find factual, objective, medical information for law enforcing agencies and court.
3. To allow proper recovery and preservation evidence
4. To document injuries and disease
5. To determine manner of death
6. To know time of death
7. To reconstruct Crime Scene
8. To provide correlation of facts and circumstances related to the death
9. To help in identification of victim, etc.

Materials and Methods

A retrospective descriptive study of autopsies and MLC for one year from 1st Jan 2017 to 31st Dec 2017 was conducted in the Department of Pathology, Dr Shankarrao Chavan Govt Medical College, Vishnupuri, Nanded. A total number of 220 cases were sent for histopathological examination out of which 200 cases were included in our study, where the internal organs were sent and 20 cases (10 autolysed, 6 hanging, 4 electrocution) were excluded. The organs relevant to the case concerned were sent in 10% formalin. In most of the cases they comprised of heart, liver, spleen, kidneys, brain and lungs. Representative bits from the concerned organs were processed in a routine manner. All sections were stained with Haematoxylin and Eosin (H & E) stain. Gross and histopathologic findings were noted and the salient features were studied.

Results

The present study consisted of a series of 200 autopsy cases from Department of Pathology, Dr. Shankarrao Chavan Govt Medical College, Vishnupuri, Nanded conducted over a period of one year. The internal organs of total of 200 autopsies were sent for histopathological examination. [Table 1] displays the spectrum of lesions noted at autopsy.

Table 1: Distribution of Cases According to Organs Involved

Organs Involved	Number of Cases	Percentage
Heart	136	68%
Lungs	171	85.5%
Kidney	146	73%
Liver	135	67.5%
Spleen	118	59%
Brain	95	47.5%

Out of 200 cases 136 (68%) cases shows involvement of heart, 171 (85.5)% cases shows involvement of lung, 146 (73%) cases shows involvement of kidney, 135 (67.5%) cases shows involvement of liver, 118 (59%) cases shows involvement of spleen, 95 (47.5%) cases shows involvement of brain (Table 1).

Table 2: Lung - Distribution of Cases According to Pathology Observed

Pathology Observed	Number of Cases	Percentage
Pulmonary Edema	117	68.42%
Pneumonia	112	65.49%
Emphysema	39	22.8%
CVC	23	13.45%

The most common organ involved is lung. The pathology observed is 117 (68.4%) cases of pulmonary oedema, 112 (65.49%) cases of pneumonia, 39 (22.8%) cases of emphysema, 23 (13.45%) cases of CVC lung. We noted a case of pulmonary tuberculosis and miliary tuberculosis in all organs. Also noted a case of respired lung in 24-48 hrs old baby (Table 2).

Table 3: Heart - Distribution of Cases According to Pathology Observed

Pathology Observed	Number of Cases	Percentage
Myocardial Infarction	50	36.23%
Atherosclerosis	80	58%
Myocarditis	10	7.25%
Ventricular Hypetrophy	82	59.42%

The pathology observed is 50 (36.23%) cases of myocardial infarction, 80 (58%) cases of atherosclerosis, 10 (7.25%) cases of myocarditis, 82 (59.42%) cases of ventricular hypertrophy. The most common incidental finding is atherosclerosis. Along with this we noted a case of pericarditis and myocarditis in 15 year old female (Table 3).

History: A 15 yr old female was brought by relatives with chief complaints of

Pedal oedema

Abdominal Distension

Facial Puffiness

Since 2 Days

Heart on Gross Examination: Gross-wt. 450 gms. Dilated, enlarged, Right ventricular wall: 0.4 cm, Left ventricular wall: 1.5 cm; externally: Lung adherent to the heart. Also seen, Sheath encasing lung and the heart, fixed to the heart (Fig.1).

Fig. 1: Gross Examination- Heart

Microscopic Examination: Sections reveal myocardial fibres cut across in various planes showing hypertrophy of the muscle fibres with the collection of inflammatory cells at places, granuloma composed of langhan's giant cells, lymphocytes and epithelioid cells. Also seen, areas of caseation necrosis. Surrounding pericardium seen which is thickened with fibro collagenous tissue with necrosis with inflammatory infiltrate composed of lymphocytes, epithelioid cells and langhan's giant cells.

Impression: Tuberculous Granulomatous Inflammatory Lesion with Tuberculous Pericarditis

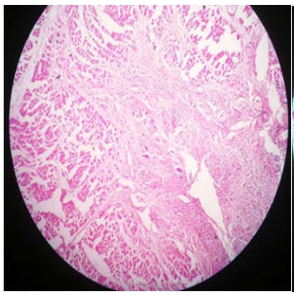

Fig. 2: Low Power View 10X

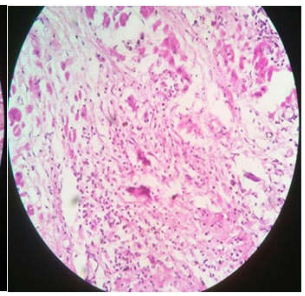

Fig. 3: High Power View 40X

Table 4: Heart-Distribution of Cases According to Age and Pathology Observed

Age (Years)	Pathology observed Number of Cases (Percentage)			
	Myocardial Infarction	Atheroscelrosis	Myocarditis	Ventricular Hypertrophy
1-20	1 (2%)	3 (3.75%)	1 (10%)	5 (6%)
21-40	13 (26%)	22 (27.5%)	3 (30%)	22 (26.8%)
41-60	20 (40%)	30 (37.5%)	4 (40%)	30 (36.5%)
61-80	11 (22%)	18 (22.5%)	1 (10%)	18 (21.9%)
81-100	5 (10%)	7 (8.75%)	1 (10%)	7 (8.5%)

Table 5: Kidney - Distribution of Cases According to Pathology Observed

Pathology Observed	Number of Cases	Percentage
Cloudy Change	102	69.86%
Pyelonephritis	31	21.23%
Glomerulonephritis	7	4.79%
Tubular Necrosis	4	2.73%

The pathology observed is 102 (69.86%) cases of cloudy change, 31 (21.23%) cases of Pyelonephritis, 7 (4.79%) cases of glomerulonephritis, 4 (2.73%) cases of tubular necrosis (Table 5).

Table 6: Brain - Distribution of Cases According to Pathology Observed

Pathology Observed	Number of Cases	Percentage
Brain Edema	38	40%
Congetion	38	40%
Encephilitis	15	15.78%

The pathology observed is 38 (40%) cases of cerebral oedema, 38 (40%) cases of congestion, 15 (15.78%) cases of encephalitis. Also noted a case of fibroblastic meningioma in 24 years old female, a case of pyogenic meningitis in 19 year old male (Table 6).

Table 7: Spleen - Distribution of Cases According to Pathology Observed

Pathology Observed	Number of Cases	Percentage
CVC	83	70.33%
Congetion	35	29.66%

The pathology observed is 83 (70.33%) cases of CVC spleen, 35 (29.66%) cases of congestion (Table 7).

Table 8: Liver - Distribution of Cases According to Pathology Observed

Pathology Observed	Number of Cases	Percentage
Fatty Change	33	24%
Portal Triditis	40	29.62%
CVC	48	35.55%
Cirrrhosis	20	14.81%
Hepatitis	22	16.30%

The pathology observed is 33 (24%) cases of fatty change, 40 (29.62%) cases of portal triditis, 48 (35.55%) cases of CVC liver, 20 (14.81%) cases of cirrhosis, 22 (16.30%) cases of hepatitis (Table 8).

We also noted a case of *Sickle Cell Disease*.

History: A 21 yrs male, brought by relatives with chief complaints of 2 episodes of convulsions

Altered sensorium

Generalised weakness & severe backache

On Examination:

1) Heart:

On microscopy-

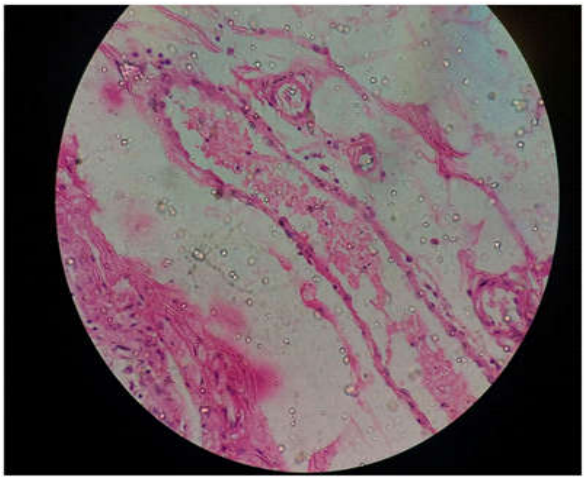

Fig. 4: Low Power View 10X

Section from right ventricle shows presence of myocardial fibres shows congested capillaries, blocked by sickle RBCs.

2) Kidney:

On gross:

Fig. 5: Gross Examination- Kidney (C/S)

Ext- Capsule easily stripped off,mildly granular,slightly lobulated, b/l enlarged kidneys with congestion, petechial haemorrhages over surface. C/S: -corticomedullary differentiation not possible.

On microscopy:

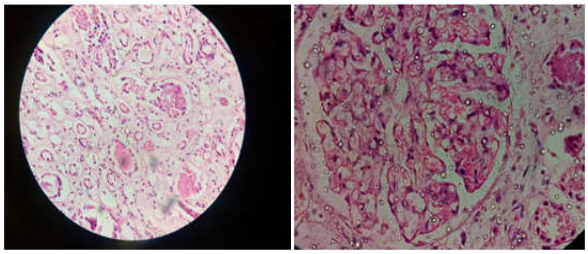

Fig. 6: Low Power View 10X High Power View 40X

Section shows enlarged glomeruli with duplication of basement membrane with blockage of capillaries by sickled RBCs. Also seen haemorrhages.

3) Spleen: On gross-

Fig. 7: Gross Examination- Spleen

Weight: 10 gms, dimensions 2x1x1 cms, E/S & on c/s : greyish white, congested, & firm(fibrotic). -Auto splenectomy specimen.

On microscopy:

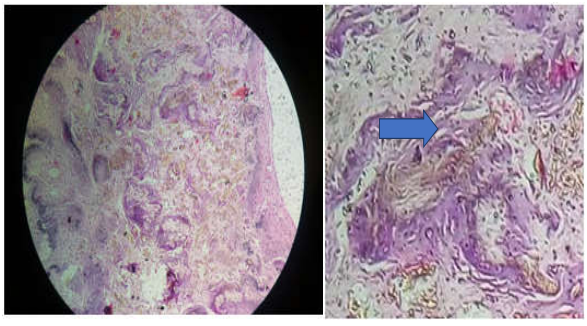

Fig. 8: Low Power View 10X High Power View 40X

Section shows loss of normal parenchyma showing fibrosis with calcification intense pigment deposition showing gamnagandy bodies. Few are bamboo like seen. And areas of haemorrhages present.

4) Intestine: On microscopy

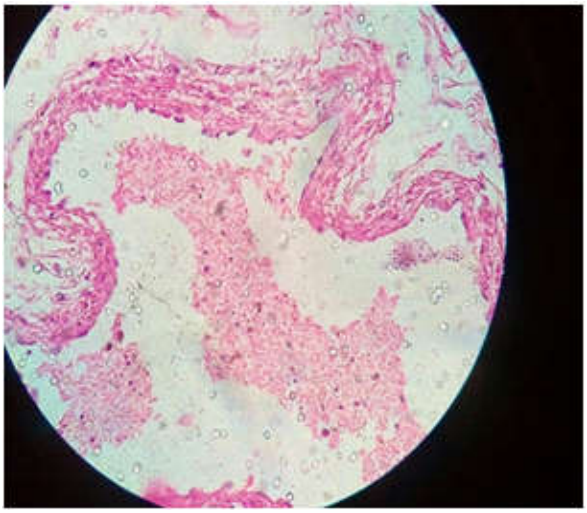

Fig. 9: Low Power View 10X

Section studied shows loss of normal mucosa at places with plenty of inflammatory cells in mucosa. The submucosa shows congested blood vessels and blockage by sickled RBCs.

Discussion

It has been reported that autopsy is the most accurate method used to confirm causes of death, clinical diagnoses [11]. In our study the most common organ involved is lung (85.5%), followed by kidney (73%), heart (68%), liver (67.5%), spleen (59%) and brain (47.5%). However study done by Nada Chettian Kandy et al. shows that in maximum cases pathology was detected in cardiovascular system (78.43%) followed by respiratory system (74.50%) [12]. The most common cause of death observed in our study is pulmonary edema (68.42%), this finding is in concordance with study done by P. Arunalatha et al., A. Sangeetha et al. [13]. this is followed by pneumonia (65.49%), emphysema (22.8%), CVC (13.45%) in lung pathology in our study. The study by Pratima Khare et al., Renu Gupta et al. on Prevalence of Lung Lesions at Autopsy: A Histopathological Study shows commonest being oedema and congestion (28.5%) followed by changes in interstitium (11.9%). There were 9.5% cases of granulomatous inflammation and 5.9% cases each of acute pneumonia and emphysema. There were 1.2% cases each of Hyaline Membrane Disease (HMD), Meconium Aspiration Syndrome (MAS) and Acute Respiratory Distress Syndrome (ARDS) in the series in their studies [14]. Zaitoun AM et al., Fernandez C et al. in their study says the most common causes of death not suspected clinically were pulmonary embolism (23%), bronchopneumonia (22%), ischemic heart disease (13%) and malignancies (10%). The clinical sensitivity of antemortem diagnoses was 25% for peritonitis and 24% for pulmonary embolism [15].

In this study, the most common pathology observed in heart is ventricular hypertrophy (59.42%), followed by atherosclerosis (58%), myocardial infarction (36.23%), and myocarditis (7.25%). In study done by Nada Chettian Kandy et al. shows that The most common incidental histopathological finding was atherosclerosis of aorta [12]. In our study age wise distribution of cases in heart pathology shows the incidence of all four conditions myocardial infarction, atherosclerosis, ventricular hypertrophy, myocarditis is between 41 to 60 years of age. In study done by FDC Bernardi et al., P H N Saldiva et al. shows the heart, pancreas, and the brain were the organs with most frequent diagnostic agreement, and interestingly, with the least diagnostic refinements after histological examination. One possible explanation for these findings is that the heart and the brain are frequently affected by vascular disorders, leading to acute or chronic ischaemic or haemorrhagic changes that are usually obvious macroscopically [16].

The most common pathology observed in our study in kidney is cloudy change (69.86%), followed by pyelonephritis (21.23%), glomerulonephritis (4.79%), tubular necrosis (2.73%). According to study done by Amandeep Kaur et al., Vijay Kumar Bodal et al. In 25 (25%) cases, the microscopic morphology was close to normal histology. Remaining 75 (75%) cases had a pathological findings at autopsy. Non glomerular nephropathies (58%) were higher as compared to that of glomerular lesions (17%) [17]. In 17 cases of renal autopsies glomerular alterations were observed such as focal segmental glomerulosclerosis, nodular glomerulosclerosis and mesengial cell proliferation [17]. In the study done by Vaneet Kaur Sandhu et al., Arun Puri et al. the percentage of nonglomerular nephropathies (60.8%) was higher as compared to that of glomerular lesions (16%). 20 (16%) cases exhibited glomerular alterations such focal global glomerular sclerosis, segmental glomerular sclerosis, nodular mesangial sclerosis,

basement thickening and mesangial cellular proliferation. Tubular and interestium lesions were observed in 34.16% which included acute tubular necrosis, chronic pyelonephritis and tubercular pyelonephritis. Renal arteriosclerosis was observed in 25% cases [18].

In our study the most common pathology observed in liver is Chronic venous congestion (35.55%), followed by portal triditis (29.62%), fatty change (24%), hepatitis (16.30%), cirrhosis (16.30%). But in studies done by Dr. M.S. Bal et al. - Maximum cases (39%) had fatty change fatty change liver followed by normal livers (30), cirrhosis (14), congestion (9), hepatitis (3), malignancy (3) [19]. Where as study done by Ph. Madhubala Devi et al., Barida Ginia Myrthong et al. Cirrhosis was the commonest liver disease (25%) followed by chronic hepatitis (22%). Hepatic steatosis accounted for 17% of the cases, portal triaditis for 15%, congestive liver and miscellaneous cases accounted for 5% each [20].

There is equal number of cases of brain oedema (40%) and brain congetion (40%) followed by encephalitis (15.78%) in our study. This is in concordance with the study done by Tanushri Mukherjee et al., Soma Mukherjee et al. that brain oedema was observed in 62 cases, Brain haemorrhage was seen in 14 patients, infarct in 10 cases, abscess in 03 cases in their study [21].

According to our study splenic pathology shows 70.33% shows chronic venous congestion and 29.66% show congestion. The most common pathological findings in this study done by Kayode A. Adelusola et al., Stephen A. Osasan et al. is haemorrhagic necrosis as a result of splenic laceration [22].

Conclusion

From our study we conclude that lungs are the most common organ involved. Pulmonary edema is the most common pathology observed in lung, can be a cause of death. The incidence of the heart disease is most common in age group of 41-60 years. The most frequently affected organs were lungs, heart, liver, kidney and brain. Autopsy examination of the organs and histology helps to arrive at the final cause of death.

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Original Article

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Estimation of Stature from Length of Little Finger in the Population from South India

B. Vasant Nayak[1], Ch. Laxmanrao[2], Nishat Ahmed Sheikh[3]

Abstract

Background: In Forensic identification, widely used is Anthropometry which deals with expressing human form in numbers. Out of these Sex and stature are the most important. Identification is also an important criterion in human remains, one of the important tasks for the forensic anthropologist is to determine the Individuality of dismembered, mutilated and fragmentary remains. Determination of stature and gender and comparison with ante mortem data is the processes commonly employed in process of Identification. *Aim and Objective:* to derive linear regression formulae from correlation of little finger length and stature and later have a comparison of correlation between stature and little finger length with the studies made by earlier researchers. *Place of Study:* Department of Forensic Medicine of Gandhi Medical College Musheerabad, Secunderabad, Hyderabad. *Material and Method:* The study is made on the Volunteers total 194 subjects were selected irrespective of their caste, religion, dietary habits & socio-economic status at Department of Forensic Medicine of Gandhi Medical College Musheerabad, Secunderabad, Hyderabad. *Observation and Discussion:* Regression equation of Male little finger length on stature is, Male Stature (X) = 86.191 + 4.3727*YRLF + 6.8783*ZLLF. Similarly for Female Stature is highly correlated to little finger length (i.e. Correlation coefficient = 0.80) with P-value is 0.0000. Therefore, Regression equation of Female little finger length on stature is, Female Stature (X) = 85.1299 + 10.2972*YRLF + 1.2561*ZLLF. The linear regression equation derived from little finger length for estimation of stature showed a statistically significant relationship in both the genders. *Conclusion:* The regression equations arrived in the study can be absolute use for south India population. Our study will help the investigating agencies to collect information about victim around the particular area while minimize the time duration of investigation. It definitely could be proved as a milestone for judiciary in the population of South India region.

Keywords: Stature estimation; Little finger length; Regression equation.

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Introduction

In Forensic identification, widely used is Anthropometry which deals with expressing human form in numbers. Various criterions like sex, age and stature of a person are included in Identification of a person. Out of these Sex and stature are the most important [1]. Identification is also an important criterion in human remains, one of the important tasks for the forensic anthropologist is to determine the Individuality of dismembered, mutilated and fragmentary remains. Determination of stature and

gender and comparison with ante mortem data is the processes commonly employed in process of Identification. This process of Identification is usually encountered in cases of mass disaster, assault cases where the body is mutilated to dismembered and establishment of identity of the victim poses a big challenge for investigating authorities [2]. Rollet [3] was the first to conduct a study in this field, studied 50 males and 50 females corpses to show the relationship between various body measurements and the stature in 1888. Later, it was Pearson [4] basically a mathematician, who used this data to derive the regression equations, and he suggested that it was population specific. Hence forth numerous advancements have been made in this particular field and this is being efficiently applied in the process of Identification. As these all study are population specific, it becomes imperative to collect data from more populations and make a comprehensive data.

Tyagi et al. [5] carried out the study on subjects from Delhi India, he concluded that a positive correlation existed between stature and finger lengths and it also stressed that the index finger was the best for prediction of stature in both sexes. As well in similar study, it was concluded that the correlation between stature and hand length was greater on the right side in both sexes [6]. Stature of an individual is directly proportional to different parts of body and definitely shows a biological and genetic relation with each other. In medico legal cases, stature is usually estimated using anatomical and mathematical techniques [7], various studies had established a positive relationship between stature and measurements of different body parts which are being represented by sue of linear regression equation derived from them [1]. It is very common that often a part of skeletal framework is encountered in various forensic cases. Also inherent population differences among the different population exist, thus it raise a point that different formulae need to be derived from different populations [8].

In regards with relation to overall weight and height of the individual the calculation and measurement of stature is based on the relative proportion of different body weight. For the stature estimation the multiple researchers had conducted studies and had derived stature from multiple parameters for example percutaneous measurement of various body parts which includes arm, forearm, leg, foot etc [9-10]. Based on the current scenario, we felt there is a strong need to determine the stature estimation from little finger Length, the current study was undertaken to estimate stature from measurement of little finger length. Our aim of the study was to derive linear regression formulae from correlation of little finger length and stature and later have a comparison of correlation between stature and little finger length with the studies made by earlier researchers.

Aim and objective

Current studyhad been conducted on the consenting volunteers whose ages fall between a range of 22 to 42 years to establish the relation of stature and little finger length along with regression formula in relation.

Materials and methods

The study is made on the Volunteers total 194 subjects were selected irrespective of their caste, religion, dietary habits & socio-economic status at Department of Forensic Medicine of Gandhi Medical College Musheerabad, Secunderabad, Hyderabad. Sufficient permissions and consents were procured before the measurements of the volunteers are taken and clearance from the Institutional Ethical committee is obtained in advance. Stature; using the Stadio-meter, the subject was made to stand barefoot in the standard standing position on its baseboard. Both feet are in close contact with each other and head oriented in Frankfurt's plane. The height was then recorded in centimeter from the standing surface to the vertex in the weight bearing position of foot.

Anthropometric measurement little finger length of both hand - It is the distance from the tip of little finger to the proximal crease of the little finger respectively. Instruments: Digital Vernirecaliper. Technique The measurement was taken in standing position with stabilization of hand on table. The caliper was horizontally placed along the ventral surface of the hand. The fixed part of the outer jaw of the caliper was applied to the proximal crease of little finger and the mobile part of the caliper was approximated to the tip of the little finger and measurement was taken and the measurement was obtained up to one decimal place. In entire course of the study for each volunteers measurement was taken twice, that is once with the spreading caliper and second with a self retracting measuring tape. To avoid diurnal variations and to eliminate any discrepancies both measurements were taken in a time slot between 1:00 to 15:30 hours of the day. Any kind of error from Instrumental, all

the instruments were verified at significant level and variation of ± 0.01 cm was observed. Value of the constant and regression coefficient was calculated using SPSS Version 19 program.

Inclusion criteria

All volunteers, both Male and Female were selected, irrespective of their socio-economic standards. The ages of these volunteers are falling between 22 years and 42 years with no history of any sort of deformity of the hand, metabolic disorders and any developmental process.

Exclusion criteria

Volunteers morphologically showing the congenital malformations, Dwarfism / Achondroplasia, features of nutritional deficiencies and injuries to extremities were not included in the present study.

Data Analysis

Data thus collected was analyzed using SPSS version 19. The mean values and the standard deviations were calculated for stature and Little finger length. Correlation of the Little Finger length with the stature was assessed. Regression co-efficient and constant was calculated for estimating stature through regression equation from little finger length. The effectiveness of regression equation was tested by significance Z test.

Results

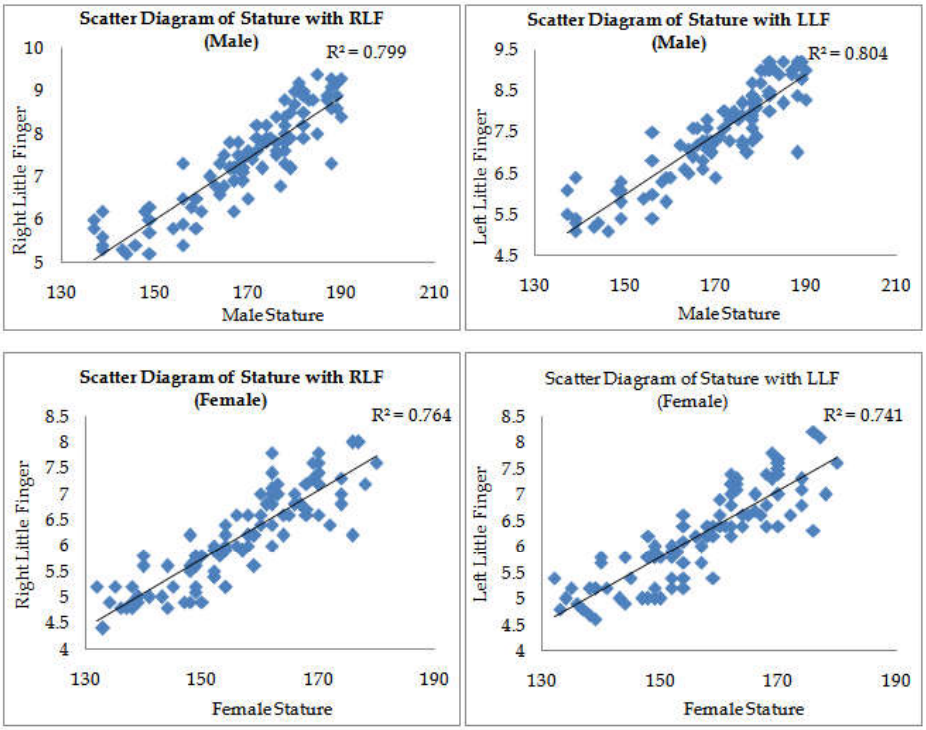

Fig. 1: Scatter diagram of stature with Little finger length for Male and Female.

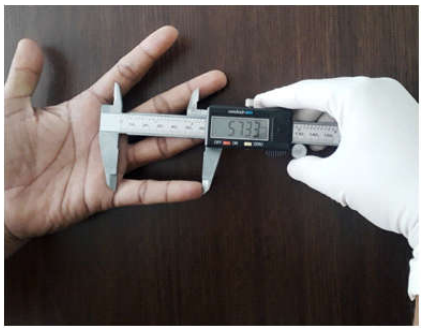

Fig. 2: Digital Vernier caliper used to measure the little fingerlength; hand placed on the plane surface, palm of the handfacing upwards.

As per Table 1 Total 194 Subjects were measured in various age groups starting from 22 years to 42 years Females and Males both were 97 each. Heights of individual are varying irrespective of age and sex.

Table 1: Sex-wise and combined Distribution of statures and little finger Lengths (cm)

Character		Male	Female	Combined (M + F)
Age	Maximum	40	40	40
	Minimum	22	22	22
Stature	Maximum	190	180	190
	Minimum	137	132	132
Right Hand Finger	Maximum	9.4	8	9.4
	Minimum	5.2	4.4	4.4
Left Hand Finger	Maximum	9.2	8.2	9.2
	Minimum	5.1	4.6	4.6

Table 2: Distribution of Stature and little finger Length in cm for both sex and combined.

Character		Mean	Std. Dev.	Confidence Interval
Age	Male	30.8	6.221	30.8 ± 1.2444
	Female	31.14	6.278	31.14 ± 1.256
Stature	Male	169.833	14.164	1.69.833 ± 2.83
	Female	156.260	11.776	156.26 ± 2.356
Right Hand Finger	Male	7.4323	1.1335	7.4323 ± 0.227
	Female	6.1521	0.8958	6.1521 ± 0.1792
Left Hand Finger	Male	7.4354	1.1356	7.4354 ± 0.2272
	Female	6.1948	0.8704	6.1948 ± 0.1741

Table 3: Relation between Stature and little finger Length, correlation coefficient.

Characteristics		Correlation Coefficient	p Value
Male Stature	Right Little Finger	0.89425	0.0000
	Left Little Finger	0.89687	0.0000
Female Stature	Right Little Finger	0.87438	0.0000
	Left Little Finger	0.86104	0.0000

Correlation Coefficient between male Stature with left, right little finger measurement, and also Correlation Coefficient between male Stature with left, right little finger measurement is highly correlated. Regression Formulae of Male and Female for prediction **Stature (X)** on **Right hand little Finger (Y)** and **Left hand little Finger (Z)** is given bellow.

$$X \text{ (Stature)} = \beta_0+\beta_1 Y+\beta_2 Z$$

β_0, β_1, β_2 are Regression Coefficient.

Male Stature (X) = 86.191 + 4.3727*Y_{RLF} + 6.8783*Z_{LLF}

Female Stature (X) = 85.1299 + 10.2972*Y_{RLF} + 1.2561*Z_{LLF}

Discussion

Stature prediction of a person had an important function in forensic investigation as well in anthropological researches. Stature of person is a characteristic feature that is based onmany factors such as sex, age, genetic makeup, ethnic and geographical radix, social stratum and physical activity [11].

The study was conducted on volunteers at Musheerabad Hyderabad GMC, belonging to various religious and regions were studied. Our attempt was to devise the linear regression equations as well as multiplication factors for estimation of stature from little finger length in both the genders. In this study little finger length is found to be good parameter for predicting stature in both the genders. The linear regression equation derived from little finger length for estimation of stature showed a statistically significant relationship in both the genders. As such Estimation of stature, as part of identification process, has a long history in physical anthropological studies. Stature plays a very important role in the description of a human population, for physical, anthropological, and biomechanical research.

In comparison a relatively less amount of work had been done as well use of statistical methods to calculate the stature from little finger Length. In our current study the observation shows that there is high degree of positive correlation in case of males and females as well combined.

Regression equation of Male little finger length on stature is, **Male Stature (X) = 86.191 + 4.3727*Y_{RLF} + 6.8783*$Z_{LLF.}$**

Similarly for Female Stature is highly correlated tolittle finger length (i.e. Correlation coefficient = 0.80) with P-value is 0.0000.

Therefore, Regression equation of Female little finger length on stature is, **Female Stature (X) = 85.1299 + 10.2972*Y_{RLF} + 1.2561*Z_{LLF}**. The males had longer little finger lengths, in comparison to females.

On the point of bilateral differences for the right and left hand measurements in both the sexes, there are no statistical significance and these findings of our study are in agreement with Zeybek et al. [1] and Uhrova et al.[12] on the contrary it was Rastogi et al. [13] and Ishak et al. [14] reported that there were statistical significance bilateral differences in

hand and foot breadth, and it was concluded that it might may be due to more physical activity of one side over the other. Hence the side with dominant activity leads to more strengthening of muscles and bone development of that particular side [15].

Estimation of stature was determined by use of calculated regression coefficient and constant values for both the sex from Index and Ring finger lengths on the population from eastern India; it gives a description of how the index and ring finger lengths can be sued to estimate stature shall be utilized to estimate sex of the individuals when multiple reliable methods of sex estimation are not available during medico legal investigation [16].

Conclusion

Stature estimation of a person is a substantial parameter in Forensic investigation as well in anthropological research, and the morpho-metery of the hands has specific evidence in crime scene examination which definitely helps in estimation of stature. In our present study, we could conclude an ultimate and powerful correlation between the stature and little finger length; it will surely assist in medico legal situations in specific for establishment of personal identification whenever only some skeletal remains are found. The regression equations arrived in the study can be absolute use for south India population. Our study will help the investigating agencies to collect information about victim around the particular area while minimize the time duration of investigation. It definitely could be proved as a milestone for judiciary in the population of South India region. There is a need to conduct more studies among people of different regions & ethnicity so that stature estimation becomes more reliable & identity of an individual is easily established. We conclude that the obtained formulas are specific to that study populations therefore application of these by the other populations might cause incorrect results. Thus necessity in creation of specific equations peculiar to populations should be taken into account by researchers.

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Original Article

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Retrospective Observational Study of Death in Partial Hanging Cases in Raigarh (C.G.) Region

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Abstract

Introduction: Hanging or self suspension is a type of violent asphyxial death which is caused by complete or partial suspension of body by the ligature material, encircling the neck and force of constriction being at least part of the weight of body. Sometimes it has been noticed that either feet or any part of body of the victim of hanging used to touch the ground or any other surface, which is known as partial hanging. The causative factors behind partial hanging are – (i) low point suspension and (ii) long ligature material. Such type of hanging cases are found in less number of cases and in most of the cases relative/ (s) of the deceased used to suspect the same as homicidal one. *Materials & Methods:* The present study was conducted in the department of Forensic Medicine & Toxicology at LAM, GMC Raigarh (C.G.) during the period from 1st April 2015 to 31st December 2017. During this period total numbers of autopsies performed were 1552, of which total number of hanging cases were 147 and partial hanging cases were 15 in number. The present study is retrospective observational study. The cases, where inquest report prepared by either police or by magistrate had clearly mentioned that either feet or any part of the body touches the ground or any other object, were only selected for the study. *Results & Observations:* In the present study 15 cases (10.20%) out of total 147 hanging cases, were partial hanging. Among total partial hanging cases, maximum number of cases (60%) belongs to 21-40 years age group. Males are more prone to commit suicide by hanging than females. In our study we have also found that suicide by hanging is more in urban (60%) than rural (40%) population. *Conclusion:* The cases of partial hanging are sometimes suspected to be homicidal in nature. Therefore before final opinion, all circumstantial evidences and chemical examiner report should be taken into consideration by the medico-legal expert. Also, in all these cases the viscera should be preserved by the autopsy surgeon, otherwise it will remain fatal to the prosecution case.

Keywords: Hanging; Asphyxia; Suicide; Partial/Incomplete hanging; Autopsy; Homicidal.

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Introduction

Hanging: Hanging is a constriction of the neck by a ligature, the constricting force being applied indirectly to the ligature through the weight of the body [1]. It is one of the most common mode of painless death. There are several mechanisms of death in hanging, but death usually occurs due to asphyxia or cerebral anoxia or vagal inhibition. The effective killing potential with mortality is 80-85% in hanging cases. Hanging is almost always

suicidal. Homicidal hanging cases are extremely rare. Suicidal hanging is more common in India. Recent trends and statistics shows hanging to be the commonest mode of commission of suicide in India followed by poisoning [2].

Partial Hanging: Sometimes it has been noticed that either feet or any part of body of the victim of hanging used to touch the ground or any other surface, which is known as partial hanging. Aggrawal (2016) [3] has defined partial hanging as- "Partial hanging is that specialised form of hanging in which some part of the body is supported either by ground or some object other than the neck". Based on body part touching the ground or any other object partial hanging can be found in several positions like (i) standing, (ii) kneeling, (iii) sitting, (iv) reclining or (v) prone/ lying down. Among the Indian authorities Mahanta (2014) [4] and Umadethan (2016) [5] had pointed out the fact of low point suspension and long ligature material respectively as a causative factor behind partial hanging. Partial hanging is used to seen in less number of cases and relative/(s) of the deceased used to point towards homicidal one, but circumstantial evidences coupled with data revealed during autopsy can assist the law enforcing agencies to determine the truth. In the cases of suicide by partial hanging, the C.O.D. is asphyxia followed by hanging. An attempt has been made to find out comparison between complete hanging and partial hanging cases by means of analysing the data found in our study and matching the same with generalized cases of hanging in other studies and suggestive methods to avoid any confrontation.

Review of Literature

In Indian scenario Ravi Rautjiat el. (2008) [6], Kuchewar S.V. et al. (2014) [7], Mappalakayil (2017) [8], Nath et al. (2018) [9], had discussed regarding the issue of partial hanging. Apart from Indian scenario Chaudhary (2018) [10] from Nepal and Moorthy (2019) [11] from Malaysia also mentioned the incidents of partial hanging. Apart from published literatures, authoritative text books like Parikh (2014) [12] and Modi (2013) [13] had also mentioned about partial hanging.

Materials and Methods

The present retrospective observational study consists of 15 (fifteen) cases of partial hanging death out of total 147 cases of hanging during the period from April 2015 to December 2017. The data were collected from police inquest reports, medicolegal autopsy reports and information gathered from relatives. In this study the subjects were included irrespective of caste, religion, dietary habits and socio-economic status.

Results and observations

Table 1: Year Wise Distribution

Year	Total P.M	No. of Hanging Cases	No. of Partial Hanging Cases	% of Partial Hanging Cases
2015	473	16	3	18.75%
2016	564	71	7	9.86%
2017	515	60	5	8.33%
Total	1552	147	15	10.20%

In our study 15 cases out of total 147 hanging cases were partial hanging i.e. 10.20% of total hanging cases (Table 1).

Table 2: Age Wise Distribution

Sl. No.	Age Group	No. of Victim
1	0-10	0
2	11-20	1
3	21-30	5
4	31-40	4
5	41-50	2
6	51-60	1
7	61-70	2
8	71 - Above	0
Total		15

Above table 2 shows that maximum number of cases (09) belongs to 21-40 years of age i.e. 60% of total partial hanging cases, while partial hanging cases were not found below 10 years and above 70 years.

Table 3: Sex Wise Distribution

Sl. No	Sex	Number of victim
1	Male	10
2	Female	5
Total		15

The study shows that males (66.67%) were more in number than females (33.33%) in partial hanging cases (Table 3).

Table 4: Distribution of Cases According to Residence

Sl. No	Trait(Urban/ Rural)	Number of victim
1	Urban	9
2	Rural	6
Total		15

In our study 60% of the total numbers of victims

were from urban, while from rural area 40% victims were found (Table 4).

Table 5: Distribution of Cases Based on History

Sl. No	History	No. of Cases
1	Illness	03
2	Family dispute	02
3	Alcohol addiction	05
4	Financial dispute	01
5	Others	04
Total		15

Above table 5 shows that alcohol addiction was the most common back ground history found in deceased followed by other reasons, illness, family dispute and financial dispute.

Table 6: Type of Ligature Material

Sl. No	Type of Ligature Material	No. of Cases
1	Soft ligature material	06
2	Hard ligature material	09
Total		15

In maximum cases hard ligature material (60%) was used, while soft ligature material was used in 40% cases of partial hanging cases (Table 6).

Table 7: Distribution of Cases According to Site of Hanging

Sl. No	Site of Hanging	No. of Victim
1	Closed Area	15
2	Open Area	0
Total		15

Maximum number of partial hanging cases were found in closed area i.e area covered by roof. No case was recorded in open area i.e. area not covered by any roof (Table 7).

Table 8: Distribution of Cases According to Point of Suspension

Sl. No	Point of Suspension	No. of Victim
1	Angle attached with roof	01
2	Ceiling fan	02
3	Hook for Ceiling fan	01
4	Iron pipe attached to roof	01
5	Wooden bar attached to roof	10
Total		15

In maximum cases (10 cases) victim had preferred wooden bar attached to roof as point of suspension followed by ceiling fan (2 cases) (Table 8).

Table 9: Distribution of Cases According to Clothing Pattern

Sl. No	Clothing Pattern	No. of Victim
1	Fully clothed	09
2	Partially clothed	06
Total		15

In our study 60% of deceased were found with complete cloth and around 40% were found partially clothed (Table 9).

Table 10: Evidence of Dribbling of Saliva

Sl. No	Trait	No. of Victim
1	Evidence of Dribbling of Saliva found	10
2	Evidence of Dribbling of Saliva not found	05
Total		15

The table 10 shows that in 66.67% of cases, evidence of dribbling of saliva was found, which is a positive proof of suicidal hanging.

Table 11: P.M.I Distribution

Sl. No	P.M.I.	No. of Victim
1	0-12 hrs	2
2	12- 24 hrs	9
3	24- 48 hrs	3
4	48-96 hrs	1
5	More than 1 week	0
Total		15

The study shows that in maximum cases (73.33%) PMI was within 24 hrs (Table 11).

Table 12: P.M. Lividity Distribution

Sl. No	Area of Distribution	No. of Victims
1	Over back except pressure points	6
2	Over extremities (Hands, Feet etc.)	8
3	CBD*	1
Total		15

*Cannot be determined

In most of the cases i.e. 53.33% P.M. Lividity was found over extremities, which is a positive corroborative sign of A.M. hanging, while in 40% cases P.M. Lividity was found over back, which suggests that the body was shifted from it's initial position (Table 12).

Table 13: Fracture of Hyoid bone and Thyroid cartilage

Sl No.	Trait	Number of Victim
1	Intact Hyoid bone	14
2	Intact Thyroid cartilage	15
2	Fracture of Hyoid bone	01
3	Fracture of Thyroid cartilage	00

In 93.33% of partial hanging cases, hyoid bone was found intact. Among 15 cases hyoid bone was found fractured in only 01 (one) case. Thyroid cartilage was found intact in all cases (Table 13).

Table 14: Type of Hanging

Sl. No	Trait	Number of Victim
1	Ante Mortem	14
2	Post Mortem	0
3	CBD	1
Total		15

In maximum number of cases (93.33%) partial hanging was found to be ante-mortem in nature. In our study one case of partial hanging was found after 48 hours and in the stage of decomposition, so it was not possible to determine whether the hanging was AM or PM (Table 14).

Discussion

In our study 15 cases out of total 147 cases of hanging were partial hanging cases i.e. 10.20% of total hanging cases. This data closely matches with the study of Nityanand Kumar et al. (2016) [14] at Ranchi, where 9 out of 77 cases of hanging were partial hanging i.e. 11.69%. The study of Dinesh Rao (2016) [15] also shows that 12% cases of hanging were partial hanging cases. In our study maximum number of cases (09) belongs to 21-40 years of age i.e. 60% of total partial hanging cases. This data also closely matches with the study of Nityanand Kumar et al. (2016) [14], where 58.44% of hanging cases belongs to age group of 21-40 years. Even in the study of Dinesh Rao (2016) [15], where 81.82% of total cases of death due to suicidal hanging (216 out of 264) belongs to age group of 21-40 years. Therefore it can safely be concluded that the persons in age group of 21-40 years are more prone to commission of suicide. The study of Nattapong Tulapunt et al. (2017) [16] at Bangkok, Thailand reveals the fact that males are more prone to commit suicide by hanging than females. The study at Raigarh (CG), also shows same trends in partial hanging i.e. males outnumbering females. The study of Rahman ZM (2013) [17] at Sir Salimullah Medical College (SSMC), at Bangladesh also projected the fact that commission of suicide by hanging is more in urban (68.27%) population than rural (31.73%), which closely matches with our study. The study of Rahman ZM (2013) [17] at Bangladesh had pointed out the causes behind suicidal hanging to be family problems, failure at examination, insanity, incurable illness and drug addiction. Long ago the study of Gupta and Singh (1981) [18] at Lucknow also pointed to the same factors considered as triggers for suicide. These factors also matches with the factors found in our study. The study of Nityanand Kumar (2016) [14] at Ranchi, shows that soft and hard ligature materials used for hanging were 48.05% and 51.95% respectively. This data also nearly matches with our study, where in soft and hard ligature material used were 40% and 60% respectively. In our study maximum number of partial hanging cases were found in closed area i.e area covered by roof, which also matches with the study of Nityanand Kumar (2016) [14] at Ranchi, where maximum number of cases (92.21%) were also found in closed area. In our study hyoid bone was found intact in 93.33% of the cases, which also matches with the observation of Rao [19], where it was mentioned that the hyoid bone remains intact in 90-95% cases of hanging. In our study most of the victims had chosen wooden bar attached to roof as point of suspension i.e. use of long ligature material, which can be corroborated with the findings of Umadethan (2016) [5].

Conclusion

It has been observed from the different partial hanging cases that the relative/ (s) of the deceased used to point out towards suspected homicide. Even in Babu & Ors. v State of Orissa [20], while acquitting the appellants on benefit of doubt Orissa High Court division bench comprising B. Panigrahi, P. Misra JJ had mentioned- "5.... In case of Partial hanging the deceased might have committed suicidal hanging in a standing position....". Therefore it can safely be concluded that all partial hanging cases always cannot be suicidal one. Therefore a medico-legal expert who had conducted autopsy should not opine the matter as suicidal one unless and until going through the circumstantial evidences and chemical examiner report. Sometimes non preservation of viscera coupled with perfunctory P.M. report may bring judicial stricture for the autopsy surgeon. Long ago Madhya Pradesh High Court at Jabalpur in Ashok Dubey (Dr.) V. State of M.P. [21] had criticized the concerned autopsy surgeon for perfunctory autopsy coupled with non preservation of viscera. Recently in Dev Kanya Tiwari V. State of U.P. [22], while acquitting the appellant from the charge of murder of her Son-in-Law, apex court division bench comprising N.V. Ramana and S Abdul Nazeer JJ. had observed that non-preservation of viscera by the doctor remains fatal to the prosecution case.

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Anthropometric Measurements of Hand Length and Breadth for Estimation of Stature in South Indians

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Abstract

Background: Anthropology is the study of humans, subdivisions are the cultural anthropology and biological anthropology, and stature estimation is an important parameterin forensic examination for identification of skeletal remains. *Objective:* To evolve a regression equation to calculate stature from hand lengths and breadths using statistical methods in the south Indian region. *Study Design:* Cross Sectional Study. *Place of study:* Study was conducted in the department of Forensic Medicine, Government Medical College Mahbubnagar State Telangana. *Methods:* The present study consists of a cross-sectional sample of 192 subjects (96 males and 96 females) aged from 19 to 26 years. *Observation and Discussion:* Stature in male was 169.98 ± 1.99 and in female was 156.07 ± 2.09. It is observed that males have greater stature than females, and it was statistically significant. In our study the stature estimated in male was 169.98 ± 1.99 cm and in female was 156.07 ± 2.09 cm. It is concluded that males have greater stature than females. This phenomenon can be explained by the genetic constitution of male's age of puberty being 2 years later in males as compared to females give them additional time for growth. *Conclusion:* In this study we have derived regression equations and multiplication factors to estimate stature from hand length and breadth for south Indian population from Mahbubnagar region.

Keywords: Hand Length; Hand Breadth; Regression equations; Stature.

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Introduction

Anthropology is the study of humans, subdivisions are the cultural anthropology and biological anthropology, and stature estimation is an important parameterin forensic examination for identification of skeletal remains. In dead unknown bodies and mass disaster scenario where few parts of bodies might be available the objective of post-mortem examination that is Identification becomes more important [1]. Stature measurement is required for assessment of child growth, calculation of nutritional indices [2] for prediction and standardization of physiological parameters such as lung volumes, muscle strength, glomerular filtration rate and resting metabolic rate and for adjustment of drug dosage as apart from Identification. However, in few cases it is being observed that stature measurement is too difficult as well in certain situation it is almost impossible, reasons may be due to deformities of the trunk or legs, lower limb amputation and in few patients who are not able to stand [3-8].

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The comparison of different population, it is essential to have stature measurements, stature represents the length of the body from the head to foot when standing. Usually it is done by measuring the length of long bones. It can also be done by measuring short bones of the hands and foots. A point of focus for various researchers, anthropologist and anatomist is the dimensional relationship between various body segments and stature for several years [9]. In this regards many sets of regression equation have been developed and the better known are Karl Pearson from Western countries and Singh and Sohal (1952) from India [10]. Earlier researchers had reported the effectiveness of using hand length and hand breadth in estimating stature [9,10]. Earlier studies on stature estimation which are available are applicable to only specific population group and hence cannot be considered generalized to other populations, it is because of variations in genetic and environmental factors, hence it becomes necessary to have stature estimation methods to the different ethnic groups.

So there is the diversity and difference in anthropometric measurements in various different geographical areas racial, ethnic variations are well-known and prominent in India, hence region wise study seems to be necessary. Various studies are done to measure the stature from foot length, limb length, and long bones but only few studies are available on hand lengths and breadth. The hand length and breadth reflects significant correlation with the stature, so in this present study we made an effort to evolve a regression equation to calculate stature from hand lengths and breadths using statistical methods in the south Indian region as there are very few studies and such data available. This study will surely be of a great value in conditions where only a hand or a part of hand is available for identification of a person.

Materials and Methods

Place of Study: Study was conducted in the department of Forensic Medicine, Government Medical College, Mahbubnagar, State Telangana.

Study Design: Cross Sectional Study

Procedure: The present study consists of a cross-sectional sample of 192 subjects (96 males and 96 females) aged from 19 to 26 years. Subjects were selected irrespective of their caste, religion, dietary habits and socio-economic status. Sufficient permissions and consents are procured before the measurements of the subjects are taken and clearance from the Institutional Ethical committee is obtained in advance. Stature; using the stadiometer, the subject was made to stand barefoot in the standard standing position on its baseboard. Both feet are in close contact with each other and head oriented in Frankfurt's plane. The height was then recorded in centimetre from the standing surface to the vertex in the weight bearing position of foot.

Hand length

Subject placed their hand in supine position on a flat hard table and the measurements were taken using digital vernier callipers. The hand length is measured from distal transverse crease of wrist to tip of middle finger [11].

Hand breadth

Subject placed their hand in prone position on the flat hard table, and the measurements were taken using digital vernier callipers. The hand was placed on a flat table with the fingers together and the thumb out to the side, with a sliding digital vernier calliper the breadth of the hand was measured at the level of the knuckles. The hand breadth was measured as a distance between the radial side of 2^{nd} metacarpophalangeal joint to the ulnar side of 5^{th} metacarpophalangeal joint [11]. The measurement of height and hand length, breadth was carried out at a particular period of time 10 am to 1 pm to avoid diurnal variations.

Inclusion criterion

Only those subjects who were born & brought up in south India were included in the study.

Exclusion criteria

Subject morphologically showing the congenital malformations, Dwarfism/Achondroplasia, features of nutritional deficiencies and injuries to extremities were not included in the present study. Subjects from other regions, NRI, those with poorly defined wrist creases, deformities of vertebral column & limbs, and history of trauma were excluded from the study.

Data Analysis

In Digital Vernier calliper, Length = reading of the main scale + Vernier coincidence x Vernier constant + mechanical error. (Here Vernier constant = 0.01 and mechanical error = 0) Calculation of stature using regression equation: Stature = value

of constant + regression coefficient x Hand length and Breadth. Value of the constant and regression coefficient was calculated using SPSS Version 19 program. The regression equation thus calculated, to find significant difference between estimated and predictive value. The statistical data so obtained i.e. Mean SD, p value and t test were compared to see validity of equations.

Results

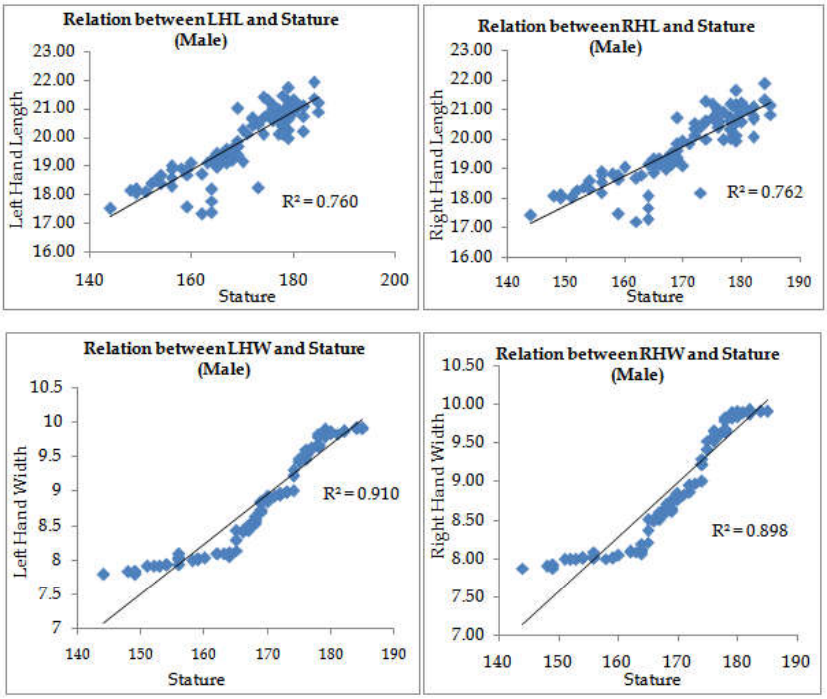

Fig. 1: Scatter diagram and regression line showing the relationship between stature and hand length and breadth in Males.

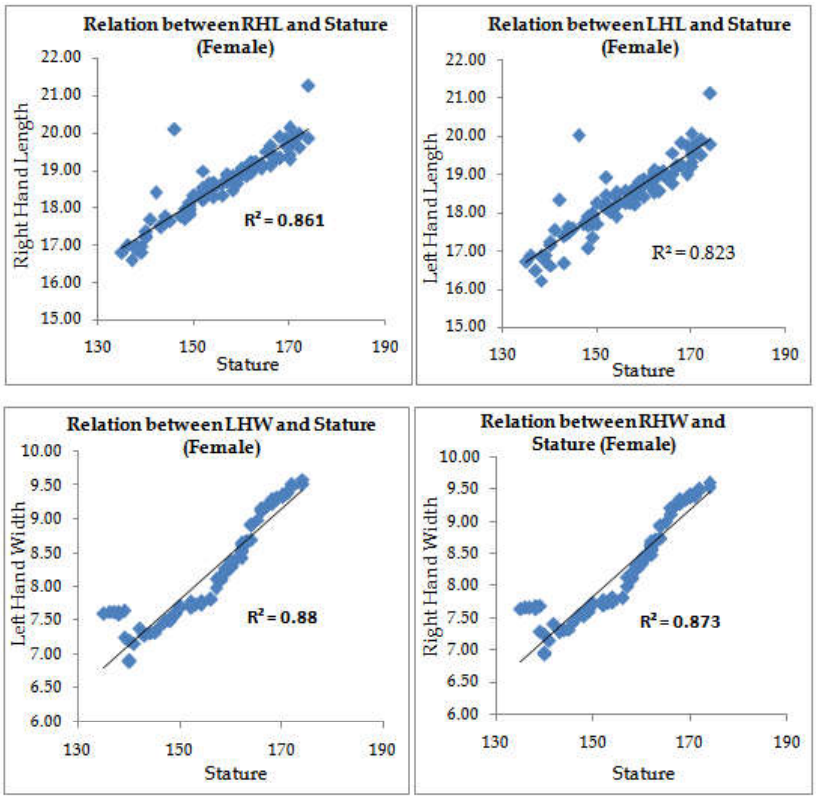

Fig. 2: Scatter diagram and regression line showing the relationship between stature and hand length and breadth in Females.

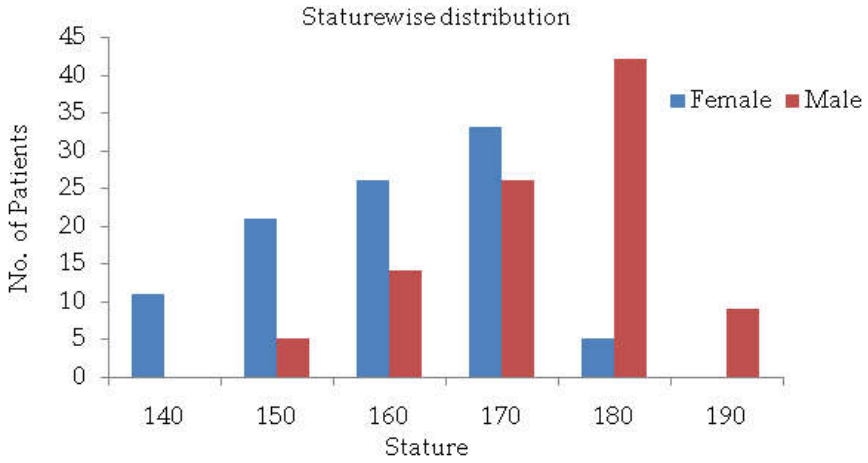

Fig. 3: Stature wise distribution

Table 1: Gender wise various parameters

Characters		Male	Female	Combine (M + F)
Age	Min	19	19	19
	Max	26	26	26
Stature	Min	144	135	134
	Max	185	174	185
Left Hand Length	Min	17.34	16.22	16.22
	Max	21.94	21.12	21.94
Right Hand Length	Min	17.21	16.59	16.59
	Max	21.86	21.25	21.86
Left Hand Width	Min	7.8	6.89	6.89
	Max	9.92	9.59	9.92
Right Hand Width	Min	7.88	6.93	6.93
	Max	9.93	9.59	9.93

Table 2: Gender wise comparison of parameters

Variables	Mean		Standard Deviation		Confidence Interval		P-Value
	Male	Female	Male	Female	Male	Female	
Age	22	22.5	2.4	2.29	22 ± 0.5	22.5 ± 0.46	0.7856
Stature	169.98	156.07	9.96	10.46	169.98 ± 1.99	156.07 ± 2.09	0.0032
LHL	19.88	18.43	1.15	0.95	19.88 ± 0.23	18.43 ± 0.19	0.04341
RHL	19.74	18.63	1.14	0.92	19.74 ± 0.23	18.63 ± 0.18	0.0412
LHW	8.96	8.22	0.75	0.75	8.96 ± 0.15	8.22 ± 0.15	0.03978
RHW	8.99	8.24	0.75	0.76	8.99 ± 0.15	8.24 ± 0.15	0.040023

Table 3: Correlation between hand length breadths with stature

Variables		Stature	p Value	p Value
Left Hand Length	Male	0.8722	3.07726E-31	0.00000001
	Female	0.9077	1.27843E-37	0.00000001
Right Hand Length	Male	0.8729	2.408E-31	0.00000001
	Female	0.9284	1.10885E-42	0.00000001
Left Hand Width	Male	0.9543	9.39338E-52	0.00000001
	Female	0.9381	1.31314E-45	0.00000001
Right Hand Width	Male	0.9476	5.63072E-49	0.00000001
	Female	0.9345	1.80578E-44	0.00000001

In our study of 192 enrolled subjects, males were 96 and females were 96. All subjects were in a range of 19 to 26 years. Stature in male was 169.98 ± 1.99 and in female was 156.07 ± 2.09. It is observed that males have greater stature than females, and it was statistically significant ($p < 0.0032$, 95% confidence interval [CI] =169.98 ± 1.99 & 156.07 ± 2.09). In males, the right HL (RHL) was 19.74 ± 0.23 cm and left HL (LHL) was 19.88 ± 0.23 cm. It is observed that LHL was more than RHL, but it was statistically significant ($p = 0.0412$). In females, the RHL was 18.63 ± 0.18 cm and LHL was 18.43 ± 0.19 cm. It is observed that RHL is more than LHL, and it was statistically significant ($p < 0.0412$). Stature is dependent on Left & Right hand length also depend on Width.

Therefore, Regression equation of Male stature on different parameters.

1. Stature = 18.86 + 4.9729*Right Hand Length + 2.6630*Left Hand Length
2. Stature = 48.8079 + 1.0284*Right Hand Length + 11.2262*Right Hand Width
3. Stature = 51.8593 + 0.6698*Left Hand Length + 11.6953*Left Hand Width
4. Stature = 58.8001 + 28.0805*Left Hand Width - 15.6323*Right Hand Width
5. Stature = 54.9582 - 0.1036*Right Hand Length + 0.5953*Left Hand Length + 26.7198*Left Hand Width – 14.9372*Right Hand Width

(Stature = 54.9582-0.1036*LHL + 0.5953*RHL + 26.7198*LHW – 14.9372*RHW)

Regression equation of Female stature on different parameters:

1. Stature = 9.7721*Right Hand Length + 0.8204*Left Hand Length - 41.1058
2. Stature = 5.5456* Right Hand Length + 7.2840*Right Hand Width - 7.2854
3. Stature = 3.7572 + 4.5571*Left Hand Length + 8.3130*Left Hand Width
4. Stature = 46.318 + 77.4558*Left Hand Width - 63.9332*Right Hand Width
5. Stature = 5.1498*Right Hand Length – 0.07043*Left Hand Length + 30.8486*Left Hand Width – 22.8656*Right Hand Width – 3.6943

(Stature = 5.1498*RHL – 0.07043*LHL + 30.8486*LHW – 22.8656*RHW – 3.6943)

For all regression equation the p-value is 0.0000001. Therefore all values of regression are significant.

Discussion

This study aimed at the estimation of stature from Hand length and hand breadth by formulating linear regression equation and multiplication factors. It is not always possible to measure all variables, so it is useful to have separate regression equation available for each variable. In the present study, a total of 192 subjects (96 males and 96 females) healthy volunteers from the age of 19 to 26 years were enrolled. Since the maximum height of an individual is attained between 18 and 24 years, we took the range in between 19 to 26 years, these individuals were selected for the study. Like our study many researchers in recent past also had the same age group subjects [12-14]. However to the contrary Pandhare et al. [15] in his study enrolled only children's in his study similarly Idegbu et al. [16] also enrolled only children's. In the research carried by Mohanty SP et al. [17] it was concluded that the age is insignificant in estimation of stature from arm span. In our study we had we had taken into consideration age as well regression equations which were derived for 19 to 26 years age group in both the genders. In our study the stature estimated in male was 169.98 ± 1.99 cm and in female was 156.07 ± 2.09 cm. It is concluded that males have greater stature than females. This phenomenon can be explained by the genetic constitution of male's age of puberty being 2 years later in males as compared to females give them additional time for growth. This also suggests that the formula for one gender cannot be applied to estimate stature for other gender.

There had been multiple studies in India in different geographical location, region or state and is to some extent different and this element can be explained by the reasoning that there is different genetic constitution, environmental factors and nutritional differences in different population groups [18,19]. The most versatile part of the body which is mostly used is human hand and it is of great importance to the researchers in the field of anthropometry. From India It was Rastogi et al. [20], Jakhar et al. [21], Pawar et al. [22], Pandhare et al. [15] who estimated stature and used hand length. In the research done by Sunil et al. [23] he observed that Right hand length was 19.6 + 1.3 and left hand length was 19.5 + 1.2, when we compared with our study his finding were comparatively more that our findings.

To estimate stature in males and females multiplication factors are used similarly various authors also used to estimate stature from various

body parameters, however the error which can be relatively large when multiplication factor is being used, It was Chhabra SK et al. [24] who estimated the stature by 3 methods and found regression equation as the best method to predict stature. In the present research we have formulated regression equations and multiplication factors for stature estimation. It is emphasized that all measurement exhibit high correlation in both the gender and hence offers a reliable tool to estimate stature for both the gender of this region. Depending upon various body parts available, estimation of stature using regression equations with multiplication factors stature can be estimated with reasonable accuracy. Stature estimated shall be useful for medico legal forensic purposes since bilateral and bisexual differences had been taken into account while deriving the linear regression equation along with multiplication factor.

Conclusion

In forensic investigation identification of mutilated dismembered remains is a challenge to Forensic and anthropological experts, hence a strong need to study on stature estimation from various body parts in different region and geographical locations and populations. Such research help in narrowing of pool of possible victim matches in cases of Identification from mutilated dismembered skeletal remains. The present study indicates that hand length and breadth can be effectively used for estimation of stature in both males and females. Several authors have insisted the need for population specific stature estimation formulae. In this study we have derived regression equations and multiplication factors to estimate stature from hand length and breadth for south Indian population from Mahbubnagar region.

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Original Article

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Prevalence of Poisoning Cases at Tertiary Care Hospital of a Rural Medical College: A one year Autopsy based Cross Sectional Study

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Abstract

Poisoning is one of the leading causes of death found among the autopsy cases. Our objective of the present study is to measure the magnitude & epidemiology of poisoning cases presented in the mortuary at MGIMS, Sevagram. MGIMS, Sevagram is situated at rural part of the Vidarbha region of Maharashtra, known for Farmer Suicide cases. This study conducted by the department of Forensic medicine of MGIMS, Sevagram include total 48 cases of poisoning on which autopsy is performed by the Authors over the period of one year. Cases were analysed under various parameters like age, sex, type of poison consumed, residential status, month wise distribution, manner of incidence etc. Data is compared with available literature and conclusion was drawn thereafter. Study clearly indicates that rural area where most of the economy is agricultural based and farmer population is mostly prone to poisoning cases and suicide is the most common manner of death.

Keywords: Medicolegal Autopsy; Poisoning; Agrochemicals; Farmer suicides; Vidarbha region.

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Introduction

Poisoning cases constitute a major public health problem, especially in rural area where most of the population have agricultural background. Poisoning is the common method of suicide adopted in India. In 2012, the state of Maharashtra, with 3,786 farmers suicides, accounted for about a quarter of all India's farmer suicides total (13,754) [1]. From 2009 to 2016, a total of 25,613 farmers committed suicide in the state. In present study, focus is on pattern of various poisoning cases coming to the mortuary of MGIMS, Sewagram for post mortem examination. Sevagram is situated in rural part of Vidarbha region of Maharashtra where more than 70% of population is depending on agriculture for their earning. So, study will be helpful for drawing various conclusions regarding pattern of death in poisoning cases. This study will provide an insight to the policymakers, law custodians & community to look into the specific aspects of the cases and to take measures accordingly for benefit of the community and people at larger scale.

Aims & Objectives

To determine the prevalence and sociodemography of the fatal poisoning cases at tertiary care centre situated at rural area.

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Materials & Methods

The study includes cases with alleged history of poisoning only, reported to mortuary of MGIMS, Sevagram and on which post mortem examination was conducted by the authors. Cases which are not reported during the rotational duty of authors & those cases having no history of poisoning are excluded from the study. Total 48 cases were observed & studied. Data is drawn from the history given by the relatives of the patient, police panchnama and post-mortem examination done on the cases. In the present study, information regarding the demographic details of the victim like age, sex, marital status, domicile, time and place of incident were gathered by interviewing the patient's attendants (parents, guardian, relatives, friends, etc.).

Observation and Results

In the present study, maximum victims (25%) were seen in the age group of 41-50 years, followed by 20.83% cases in the age group of 21-30 years. Males with 41 (85.41%) cases outnumbered the females 7 (14.58%) cases (Table 1). Among all poisoning cases, maximum cases (87.5%) were from rural areas and 6 (12.5%) cases were from urban areas (Table 2). Out of total 48 cases, 31 (64.58%) cases were farmer by occupation & 17 (35.32%) cases were non-farmer (Table 3). Out of 48 cases of poisoning, maximum cases (52.08%) occurred during July to Oct (rainy season), followed by 12 (25%) cases in March to Jun (summer season) and least number of cases 11 (22.91%) occurred in Nov to Feb (winter season) (Table 4). Commonest manner of poisoning is suicidal (85.41%) followed by accidental (14.58%), (Table 5). Maximum cases (58.33%) were of Agrochemical poisons, followed by Rodenticide 6 (12.5%) cases and in 8 (16.33%) cases, type of poison consumed remained unknown (Table 6).

Table 1: Distribution of Poisoning Cases According to Age & Sex (N=48).

Age in Years	Male	Female	Total (%)
<10	0	1	1 (2.08%)
11-20	1	2	3 (6.24%)
21-30	10	0	10 (20.83%)
31-40	6	2	8 (16.64%)
41-50	11	1	12 (25%)
51-60	9	0	9 (18.72%)
61-70	2	1	3 (6.25%)
> 70	2	0	2 (4.16%)
Total	41 (85.41)	7 (14.58%)	48 (100%)

Table 2: Distribution of Poisoning Cases as Per Residence (N=48).

Type of Medico-legal case	Urban	Rural	Total
Poisoning	6 (12.5%)	42 (87.5%)	48

Table 3: Distribution of Poisoning Cases as Per Occupation (N=48).

Occupation	Number of cases	Percentage
Farmer	31	64.58%
Non farmer	17	35.41%
Total	48	100%

Table 4: Distribution of Poisoning Cases According to Month (N=48).

Months	Number of cases	Percentage
March to June	12	25%
July to October	25	52.08%
November to February	11	22.91%
Total	48	100%

Table 5: Poisoning Cases According to Manner of Incidence (N=48).

Manner	Number of cases	Percentage
Suicidal	41	85.41%
Accidental	7	14.58%
Total	48	100%

Table 6: Distribution of Poisoning Cases as Per Type of Poison Consumed (N=48).

Type of poison	Number of cases	Percentage
Alcohol	2	4.16%
Snake	2	4.16%
Agrochemicals	28	58.33%
Phenol	2	4.16%
Rodenticide	6	12.5%
Unknown	8	16.66%
Total	48	100%

Discussion

In the present study, out of total 48 (100%) cases, majority of victims (85.41%) were males. Maximum number of victims (25%) was seen in the age group of 41-50 years and minimum number of victims (2.08%) was found in ≤ 10 years of age group. The results of studies conducted by Dash SK et al. [2], Unnikrishnan et al. [3], Jirli PS et al. [4], Shetty VB et al. [5] & Vanaja K et al. [6] show male dominance and 21-30 years age is most commonly involved group. The studies conducted by Hettiarachchi et al. [7] & Bharadwaj DN et al. [8] revealed male

dominance and common age group involved was 15-25 years. The present study along with many other studies mentioned above, gives the picture of male dominance but considering the age our study is somewhat contradictory to these study. In present study most commonly involved age group is 41-50 years. Reason for this may be that most of the studies includes majority of live cases, while our study consist of only dead cases on which medico legal autopsy is performed. Agrochemical is strong poisonous compound and which is responsible for death in majority of cases and this compound is commonly available with rural/farmer population. Present study is conducted at rural institute and obviously the cases of rural/farmer background are more. In most of this age group, it is suicidal intent rather than accident which is killing factor and which is also a big loss to any society or nation. Person belonging to this age group is sole responsible person towards various issues regarding his family and most of time he is only earning person in family of 5-6 members. Reasons seem to be many like mental instability and inability to face adverse eventualities in life like unemployment, failure of crops, draught conditions, family disputes, and education of children, health issues, and unsettled debt and so on.

It is evident from the present study and other studies, that the males are more prone for poisoning. Females are well guarded from adversities of life, starting from childhood up to old age, as daughter by parents, as wife by husband and as mother by son. The Indian society, traditionally & culturally is sympathetic to women which boosts their morality and self confidence in life. Man being the bread winner of the family in most cases, all transactions go in his name. If failed to fulfil the basic requirements for the family, due to frustrations they end their lives.

In our study, maximum cases (87.25%) were from rural areas and 12.5% from urban areas. This finding is similar to the findings of the study conducted by Dash SK et al. [2] & Shetty VB et al. [5]. As far as occupation is concerned, as per present study, 31 (64.58%) cases were farmer by occupation and 17 (35.32%) cases were non-farmer. As per study by Gupta BD et al. [9], farmers (28%) are the most common victims of poisoning cases. Many other studies also concluded the same. Our study is also consistent with this finding even more as it is conducted at rural hospital where more than 70% population is agriculture dependant and this region is known for more number of farmer suicide. Illiteracy and poverty are the main reasons for that. Another reason may be, due to either lack of water or flood, they may not be able to generate the required income for their day to day living and commitments and they may get frustrated and resort to suicide by these agro-chemicals, which are readily available in their backyard.

As far as seasonal variation is concerned, maximum number of poisoning cases (52.08%) occurred during July - Oct (rainy season), followed by 12 (25%) cases in March to June (summer season) and least number of cases (22.91%) occurred in November to February (winter season). Our results contradict to the results of studies conducted by Dash SK et al. [2], where maximum number of cases occurred in summer season. This seasonal variation with rainy season dominance can be attributed to agriculture and rain. In India, rain is the main source of water for agriculture. All agricultural activity takes place in this season only. Agrochemical, which is most commonly used suicidal agent is readily available with all farmers in this season. This is the period of investment and period of stress for the agricultural population. Failure of adequate rains has become a common phenomenon in most parts of the country with some exceptions. Monsoon failure, high debt burdens, govt. policies, public mental health, personal issues and family problems all collectively increase stress among the farmers. This drought situation is highly unsuited for cultivation. Thus, those families which are totally dependent on agriculture and rains for agriculture face the worst threat for basic needs. Finally, instead of starving to death, they cling on to this method of suicide. Obviously such people use agrochemicals present at their home.

Considering the type of poison consumed, maximum numbers of cases were due to poisoning by agrochemicals (55.08%). This result is similar to the results of the studies Hettiarachchi et al. [7], Unnikrishnan B et al. [3] & Gupta BD et al. [9]. But this result of agrochemical dominancy is in contrast with the result of the study conducted by Bharadwaj DN et al. [8] where the most common type of poisoning was Aluminum phosphide. This result is similar to the studies conducted by Dash SK et al. [2], Jirli PS et al. [4], Shetty VB et al. [5], Vanaja K et al. [6] & Prakash C et al. [10].

In the present study, out of 48 cases of poisoning, the commonest manner of poisoning is suicidal (85.41%) followed by accidental (14.58%). No homicidal case of poisoning was found during the study. Our results are similar to the results of studies conducted by Hettiarachchi et al. [7],

Bharadwaj DN et al. [8], Unnikrishnan B et al. [3], Jirli PS et al. [4], Gupta BD et al. [9] and Shetty VB et al. [5]. It is evident from the present study as well as from other studies quoted above, that in most of the poisoning cases, suicide is the main intention of poisoning. Rural farmers are most commonly involved with agrochemicals as most commonly used agents in developing countries like India and Sri-Lanka. This can be attributed to the fact that, even for trivial problems, people have found suicide as best solution by agrochemicals which are easily available and which could be easily consumed.

Agrochemicals are commonly used, as seen in the present study. This can be attributed to a number of factors like easy availability as they are sold in open market without strict vigil and also much cheaper. The occupation of most victims being agriculture, these chemicals are almost always present in home and readily procurable. These can be easily consumed orally. Another thing that was noticed upon inquiring the hospital victims was that, they were sure of mortality due to these compounds as they have seen many die the same way in their vicinity.

Conclusions

- Study clearly indicates that rural area where most of the economy is agricultural based and farmer population is mostly prone to poisoning cases. Suicide is the most common manner of death. Also the most commonly involved poison (i.e. agrochemicals) is easily available with the farmers during the rainy season.
- So our suggestion is that, government should employ the policy to improve socioeconomic status of the rural population by improving irrigation facility, educational facility, modern farming technique to improve farm production and creating employment among the youth of rural population by investing in secondary agricultural business like dairy, poultry etc.
- Government should introduce less hazardous pesticides in the market and should strictly regulate the sale of the hazardous agrochemicals by all possible methods.

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Original Article

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Pattern of Suicide Amongst Young Females in South India

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Abstract

Background: Suicide is a major public health problem and top three causes of death among youth worldwide. As per WHO, almost around one million people die every year from suicide and almost twenty times more people attempt suicide. *Place of Study:* Department of Forensic Medicine and Toxicology at Gandhi Medical College, Musheerabad, Secunderabad, Hyderabad. *Study Design:* Hospital based cross-sectional study. *Material and Method:* The materials comprised 100 autopsy cases of suicidal deaths of females of 12 to 24 years ages, out of various autopsies done in our mortuary. *Observation and Discussion:* The highest numbers of cases were recorded in the 19-24 group i.e. 49 cases (49%). Hanging was the most commonly adopted method for committing suicide i.e. 53% of deaths. The other means adopted for committing suicide in the decreasing order of percentage of deaths are as follows: self-immolation 30% deaths, poisoning 13% deaths, drowning 2% deaths, and fall from height and railway injuries sharing 1% each. As per our findings, in 24% of the death cases, the motive behind the suicide is not known. Three times higher is the suicide death rate amongst women in India in comparison with the rate globally in terms of similar geographical levels of demography index, these highlights the specific needs to understand better the various determinants of suicides among women's of India. *Conclusion:* Disproportionate high suicide rate amongst young females in south India is a public health crisis. A specific attention is required for suicides among young females in south India, as such suicide ranks and the lead cause of death amongst young adults in country.

Keywords: Females; Suicide death rate; Autopsy.

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Introduction

Suicide is a major public health problem and top three causes of death among youth worldwide. As per WHO, almost around one million people die every year from suicide and almost twenty times more people attempt suicide. 16 per 100,000 or one death every forty seconds is a global mortality rate and one attempt in every three seconds on an average. Worldwide suicide was estimated to represent 1.8% of the total global burden of disease in 1998, and it is expected that by 2020 the figure may come as around 2.4% especially in countries with market and former socialist economies [1]. It is estimated that around 55% suicides occur worldwide between the age of 15 to 44 years and suicide is the second most leading cause of death among youth [2].

The increasing suicide rates in India are similar with the global trend. Young people are a notably vulnerable group and around 34.5% suicides reported were among youth [3]. One of the Indian studies mentioned that the suicides among young people aged 15-29 years about 38 per 1,00,000

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population. Literatures suggest that attitudes, opinions, perceptions and socio-cultural differences are some of the reasons for variations in suicide rates as well as suicidal behavior [4-5].

Attitudes are the fundamental element in a socio-psychological model for predicting human behavior. They can have a positive and negative influence on behavior [6]. Suicidal attitudes and the ideology behind it are key factors in understanding pathways and mechanisms that might lead to suicide [7].

The number of suicides and suicidal behavior among adolescents are increasing rapidly. The results of a 2012 lancet study on death by suicide in India exposed a shocking trend of suicide among adolescents [8]. Adolescence is a stage of transition which needs mental capacity, personality building and social adaptation. It has been evidenced that there is often a pressure to succeed over academics, relationship and self-identity during adolescence. Failure to overcome these challenges may lead to psychological distress and suicide [9,10]. The aim of the current study was to analyze differences in the characteristics of suicide, various methods adopted and to identify precipitating causes for suicide, by young people below the age of 25 years by comparing three age groups: 12-14 years (children/ early adolescents), 15-19 years (late adolescents) and 20-24 years (young adults) [11].

Materials and Methods

The present study is hospital based cross-sectional study which was carried out in the Department of Forensic Medicine and Toxicology at Gandhi Medical College, Musheerabad, Secunderabad, Hyderabad. The materials comprised 100 autopsy cases of suicidal deaths of females of 12 to 24 years ages, out of various autopsies done in our mortuary. These 100 autopsy cases of suicidal deaths had taken as study population irrespective of race, religion and caste after taking detailed informed written consent from next to kin of the deceased. Information regarding the name, age, address, occupation, education, socio-economic status, marital status, history of death, apparent motive and the circumstances leading to such deaths of deceased were collected from the relatives/friends of the deceased, hospital records and the concerned investigating agencies. Other information like cause of death from the autopsy reports and final cause of death formed from the reports of samples and viscera, subjected to chemical analysis, histopathological examination and other investigations. Proforma for study was prepared and all collected data were put into the master-chart, which was prepared and then feed into the computer in Excel worksheet.

Inclusion Criteria

All types of suicidal deaths of females in the age group of 12-24 years which include, hanging, self-immolation, poisoning, drowning, railway injuries, jump from height, self-cut throat, self-stabbing, suicidal firearms, deliberately planned road accidents, etc.

Exclusion Criteria

Advanced decomposition cases where cause of death could not be determined, Isolated deaths where proper evidence was not procured, Properly documented homicidal and accidental deaths, Poisoning cases where Chemical Analysis Report of Forensic Science Laboratory was negative and Suicidal deaths of males and other genders were excluded from the study.

Statistical Analysis

The data obtained from the study will be evaluated and statistical analysis will be carried out by using Epi6 software.

Results

The study group has been divided into 3 sub-groups i.e., 12- 15, 16-18, 19-24 Years. As per the fig No 1 the highest numbers of cases were recorded in the 19-24 group i.e. 49 cases (49%). Followed by 16-18 Years group which recorded 38 Cases (38%) and the least number of cases were seen in 12-15 Age group with 13 Cases (13%). In further, Hindu & Muslim, highest number of cases were recorded in the Hindu group i.e. 94 cases (94%), followed by Muslim group which recorded 6 Cases (6%). During the study, most of the deaths were noted during the day time (72) compared with night time (27). Most of the deaths were noted in the Middle Class up to 57% deaths, followed by Lower class i.e., 40% and least deaths are seen among the upper class group i.e., 1%. In the present study more deaths are seen more among the persons who were single i.e., 80% deaths when compared with married women i.e., 18% deaths. Deaths were noted in students (55%) followed by Employees & House wives (13%), Laborers (9%) followed by unemployed women (7%) and 3% in Occupation not known category.

As per this study, students are the most vulnerable category to commit suicide.

According to the present study, most deaths were noted amongst Graduates (32%) which is followed by Intermediate students (22%) followed by school children (19%), the least percent was in Illiterate (9%) and 18% in Not known category. As per our observation in study most of the deaths did not have any History of previous attempts of any sort numbering up to 91%. Followed by those cases where there was a history in families (5%), the least number of deaths are seen in those who showed previous attempts on self. i.e., 2% Deaths. 7% of the suicidal deaths occurred during menstruation. Pregnant women who committed suicide were in the last position with 1% deaths. Most of the deaths were seen in Hormonal status-Not Known (NK) – 92%. Most of the cases were noted in Immediate Suicidal deaths (55%) and those who were admitted in hospital and survived between one day to one week accounted for 27%, followed by deaths that occurred in less than 01 day (13%). The least survival period was observed in more than one week category (5%). In our findings, Hanging was the most commonly adopted method for committing suicide i.e. 53% of deaths. The other means adopted for committing suicide in the decreasing order of percentage of deaths are as follows: self-immolation 30% deaths, poisoning 13% deaths, drowning 2% deaths, fall from height and railway injuries sharing 1% each. As per our findings, in 24% of the death cases, the motive behind the suicide is not known. In the remaining deaths, the leading motive behind the suicide is emotional disturbances amounting to 21% deaths. The other motives in the decreasing order of frequency are illness and love related issues sharing 13% each, failure in exams and economic problems sharing same percentage i.e. 9%, marriage related issues i.e. 6% of deaths, harassment for dowry i.e. 4% deaths and the least motive behind the suicide is death of a dear one i.e. 1% of deaths.

Fig 1: Distribution of Study Population According to Age

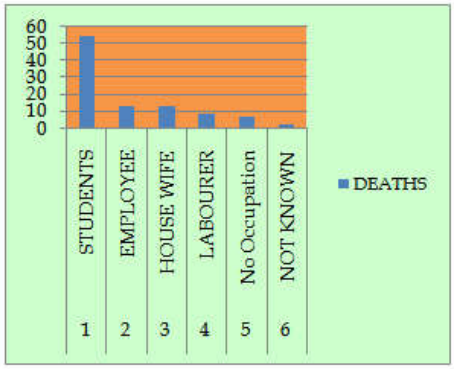

Fig. 2: Distribution of Study Population According to Occupation.

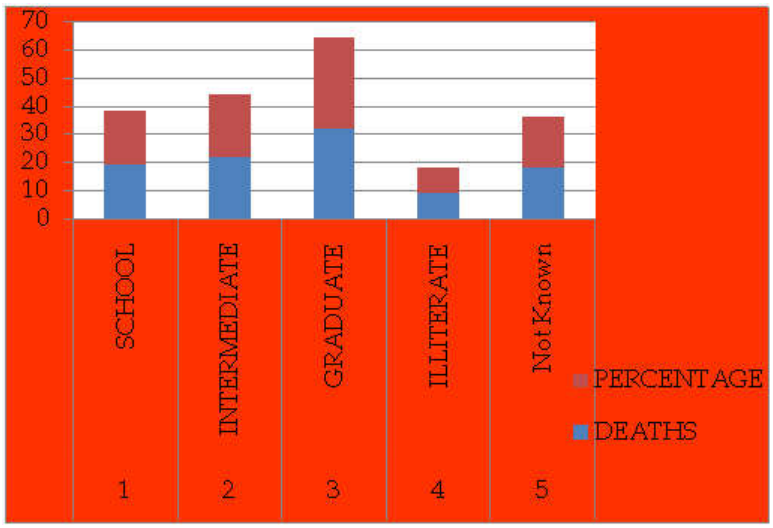

Fig. 3: Distribution of Study Population According to Education

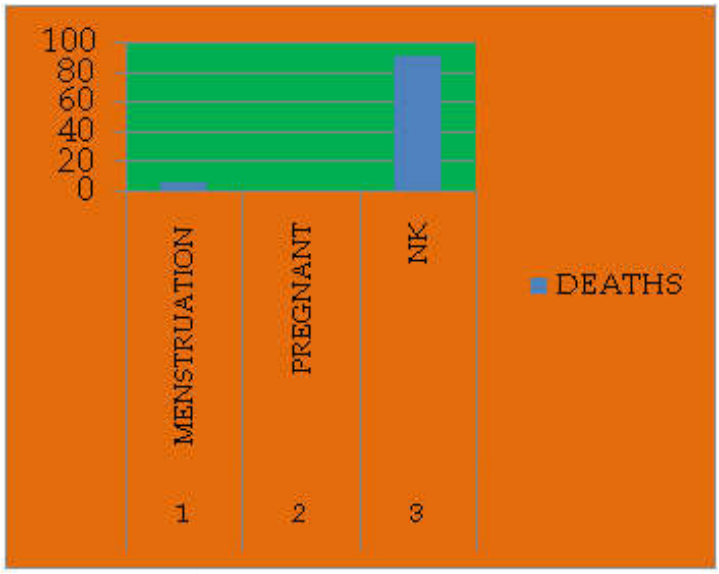

Fig. 4: Distribution of Study Population According to Hormonal Status

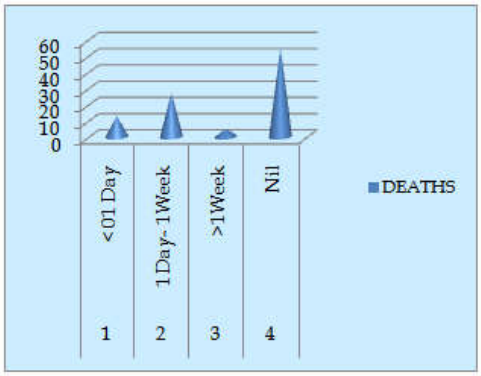

Fig. 5: Distribution of Study Population According to Survival Period

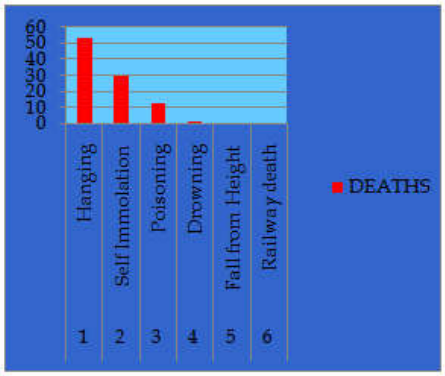

Fig. 6: Distribution of Study Population According to Cause of Death.

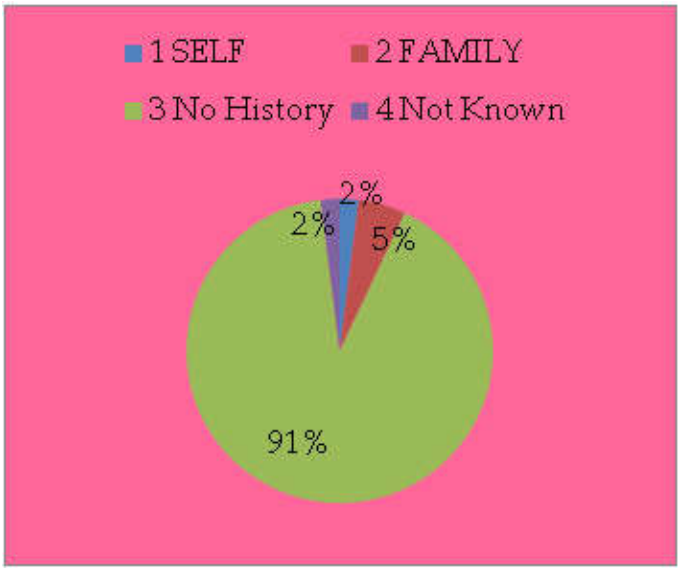

Fig. 7: Distribution of Study Population according History of Previous Attempts.

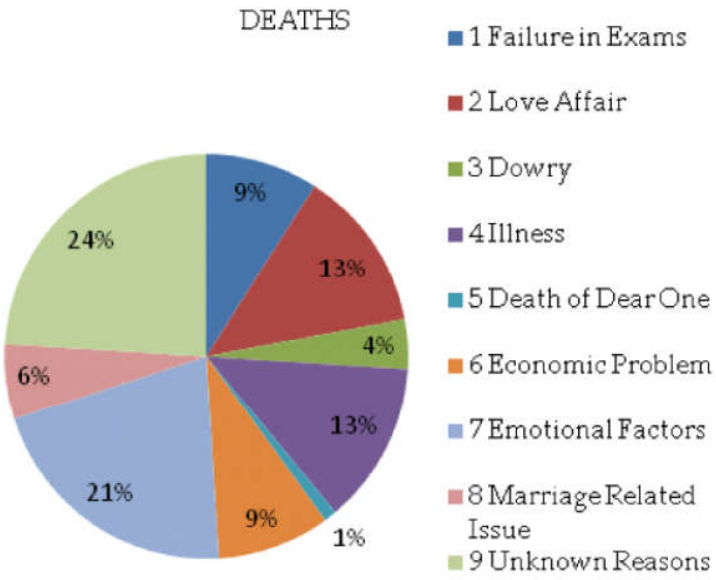

Fig. 8: Distribution of Study Population According to Motive behind the Suicide.

Discussion

In 2016 around 17.8% of the global population was from India, but it accounts nearly 36.6% of suicide deaths among women and 24.3% from men. Since 1990 the proportion of global suicide had increased for both sexes in India, but it accounted more for women in comparisons to men. Especially the young adults have been succumbing to suicide and taking their lives in alarmingly high numbers leading to a health crisis. In India suicide ranks first as the manner of death in the age groups of 12 to 29 years and 15 to 39 years.

Increasing suicide death rate is being observed among the elderly in recent years shall pose additional challenges. Suicide related death for women in India was higher in 1990s than comparison to men, which converge in 2001 and then diverging from 2002 with a decrease in the rate for women, however the rate in men continued to be stagnant.

India's men to women suicide death ratio were comparatively lower than the global ration in 2016, suicide death rate in most of the countries is higher in men in comparison to women's. Several theories had been proposed with modernization as tested globally based on the hypothesis that it affects men and women differently with conflicting results [12,13,14,15]. It is also speculated that these gender differences shall be relatively less pronounced if it be compared with the suicide attempts as women make more suicide attempts than men, but men are more likely to die in their attempts as they are more successful in accomplishing the task whereas for women's it ends mostly with parasuicide [15].

Three times higher is the suicide death rate amongst women in India in comparison with the rate globally in terms of similar geographical levels of demography index, these highlights the specific needs to understand better the various determinants of suicides among women's of India.

In India it is seen that married women accounted for the maximum proportion of suicides deaths [16,17], it is being concluded that marriage is known to be less protective against suicide for women, the reason cited are arranged and early marriage leading to young motherhood, low socioeconomic status, economic dependence and vary prominently domestic violence [12,17,19,20,21]. The introduction of Protection of Women from Domestic Violence Act PWDVA has been in place in India since 2005, and it would be prudent to understand the effect it has had on suicide prevention among married women [22].

Specifically a lesson shall be learn from china, who was once a leader in female suicide related deaths in 1990, on the contrary it reduced almost around to 70% by 2016 [1,23]. However the suicide amongst men of India did not change a much, rather remained stagnant, but it remain higher that the global average, although it is not that striking in comparison to female suicides [1]. The reason stated for the high rates of suicides and stagnancy amongst men of India could be that the suicides of farmers have received attention from the law and policy makers which had been

very well highlighted by media too. Perhaps the persistent high rate amongst men of India needs to be definitely addressed [17,18,24,25].

Conclusion

In conclusion, the cause of death profile is considered to be an important set of public health information and it forms the cornerstone of the health information system. Disproportionate high suicide rate amongst young females in south India is a public health crisis. A specific attention is required for suicides among young females in south India, as such suicide ranks and the lead cause of death amongst young adults in country. At provincial level health planning and decisions on intervention strategies is required. A low indicator of suicide death in females shall be described in favor of peace harmony and happiness in society as well in state and country. A national suicide prevention strategy is needed as a guide, which then has to be adapted at the state level to take into account the wide variations in trends between the states and the context of each state to reduce the burden of suicide deaths in India.

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Estimation of Stature from Length of Thumb in Salem Population

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Abstract

Personal identification plays an integral part of any investigation in medico-legal cases. Stature is one of the important parameter. When the body is disintegrated or mutilated, estimation of stature becomes very difficult. There are many studies where stature is estimated using hand and foot length, length of middle finger, length of index and ring finger. But, there are very few studies where length of thumb has been used to estimate the stature. And most of the studies were applicable to adolescent population only. Hence the present study was planned to estimate the stature of the person using length of thumb of both the hands and identify the degree of its reliability for identifying a person. The present study was conducted in 200 subjects, 96 males and 104 females. The mean age of male subjects is 42.16 years and of female is 38.06 years. Mean length of left thumb (7.15 cm) and right thumb (7.08 cm) length in male is significantly more than that of females (6.45 cm) & (6.37 cm). We observed a significant correlation between thumb length and stature (right thumb r=0.520 and left thumb r=0.559) and the significant level for both pair is (p<.0001).

Keywords: Forensic; Identification; Stature; Thumb Length.

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Introduction

Personal identification plays an integral part of any investigation in medico-legal cases. In this, stature is one of the most important and useful anthropometric parameter that determines person's identity [1]. Since early times, when the body is skeletonised, stature is estimation using long bones. Many factors like racial, ethnic and nutritional factors play an important role for development and growth of human being affecting the stature in different population [2].

Fixing the identity of a person especially in case of mass disasters or natural calamities like floods, hurricanes, earth-quake, tsunami, or in cases of explosion, plane crash, etc is very difficult. Even more difficulties are faced when body is disintegrated or burnt [1-3]. Hence, there is need to explore newer parameters and establish newer methods to estimate the stature of a person.

There are many studies where stature is estimated using hand and foot length, length of middle finger, length of index and ring finger [4-7]. But there are very few studies where length of thumb has been used to estimate the stature [8]. Hence the present study is planned to estimate the stature of the person using length of thumb of both the hands and identify the degree of its reliability for identifying a person.

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Aims

1. To find out the correlation between the length of the thumb and the stature of the person.
2. To identify the degree of its reliability for estimating the stature of a person.

Materials and Methods

This cross-sectional study done at Annapoorna Medical College & Hospital, Salem, Tamil nadu comprised of 200 subjects including 96 males and 104 females. We have included subjects between 18 yrs to 60 yrs of age of both the sexes and excluded subjects having spine and limb deformities-scoliosis, kyphosis, arthritis, missing thumb etc and also pregnant women. All the samples were collected from Salem district, Tamilnadu.

Measurements

Informed written consent was taken from the subject before taking the measurements.

Height of the person: Individual height (in cm) was measured as vertical distance from the vertex to the heel making the participant stand erect on a platform of stadiometer with bare foot and the shoulder blocks and buttocks touching the wall, Palms of hand turned inwards and fingers horizontally pointing downward.

Length of the thumb

The length (in cm) of the thumb- was measured with the help of Sliding Digital Callipers. The distance from the midpoint of proximal flexor crease till the tip of the thumb when the subject's hand was placed supine on a flat horizontal surface with the fingers stretched and extended is taken as the length of the thumb.

The measurement was repeated thrice and the average of the three was taken as the final reading.

The obtained data was entered into Microsoft excel and SPSS Version 23.0. Interpretation was done using appropriate statistical methods, by formulating regression equation to estimate the stature from length of the thumb.

Results

In this study, data was collected from 200 subjects. Among them 96 are males and 104 are females. The mean age of male subjects is 42.16 years and of female is 38.06 years. The stature was measured for the subjects and compared for any gender difference. The mean height of male subjects (165.62 cms) is more than that of female subjects (154.00 cms). The difference in mean height of male and female is statistically significant ($p<0.0005$). Mean length of left thumb (7.15 cm) and length of right thumb (7.08 cm) in male is significantly more than that of females (6.45 cm) & (6.374 cm)(Table 1).

In the present study, we observed a significant correlation between length of thumb and stature (right thumb r=0.520 and left thumb r=0.559) and the significant level for both pair is ($p<.0001$). Amongst male, the correlation is little higher between length of left thumb and height, where as in females, correlation is higher between length of right thumb length and height (right thumb r=0.452 and left thumb r=0.432) (Table 2).

Table 1: Group Statistics

Descriptive Statistics					
	SEX	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Age	Male	96	42.156	13.1832	1.3455
	Female	104	38.058	13.4271	1.3166
Length of Right Thumb (LRT)	Male	96	7.150	.4933	.0503
	Female	104	6.451	.5055	.0496
Lenght of Left Thumb (LLT)	Male	96	7.080	.4721	.0482
	Female	104	6.374	.4831	.0474
Height	Male	96	165.620	6.4030	.6535
	Female	104	154.000	7.2968	.7155

Table 2: Pearson Correlation (r) between Thumb length and Stature (in cms)

Parameter	Male	Significance	Female	Significance
LRT	0.520	P<0.0001	0.452	p<0.0001
LLT	0.559	P<0.0001	0.432	p<0.0001

Table 3: Student 't' test results showing the significance of the difference between male and female.

Parameter	t	df	Sig. (2-tailed)
Age	2.176	198	.031
LRT	9.884	198	.000
LLT	10.441	198	.000
Height	11.929	198	.000

Table 4: Linear Regression Models Calculated to Reconstruct the Stature from Thumb (in cms)

Parameter	Male stature	Female stature
Length of Right Thumb (LRT)	117.384 + 6.749 x LRT	111.929 + 6.522 x LRT
Length of Left Thumb (LLT)	111.972 + 7.577 x LLT	112.412 + 6.525 x LLT

Table 5: Predictive accuracy for the Regression Equation Derived

	Parameter	R	R-Square	Adjusted R-Square	S.E.E (cm)
Male	LRT	.520	.270	.262	5.4991
	LLT	.559	.312	.305	5.3388
Female	LRT	.452	.204	.196	6.5414
	LLT	.432	.187	.179	6.6130

The descriptive statistics for Age, Length of left thumb (LLT), Length of Right Thumb (LRT) and height are compared by using Student 't' test. As the calculated positive values are more than 1.96 (Table 3) we concluded that, the difference between male and female subjects are statistically significant.

By applying regression equation,

Y=c+ax, where 'Y' is dependent variable, 'x' is independent variable, 'a' is coefficient and 'c' is constant. In our study, the dependent variable 'Y' is height and the independent variable 'x' is thumb length. The equations for reconstructing the stature of males and females using left and right thumb lengths were derived (Table 4).

As the ANOVA results show that the prediction of the dependent variable using Left and Right thumb for both sex are statistically significant (p-value <0.05). The regression model equations obtained are valid for estimations of height for a given value of thumb measurement.

The predictive accuracy for regression models for stature reconstruction was also derived. In females, 'R' for LLT is 0.432 and for LRT is 0.452. For males, 'R' for LLT is 0.559 and for LRT is 0.520. (Table 5).

Discussion

Stature reconstruction from skeletal remains is one of the most important anthropological analyses for the purpose of identification of a person. Stature is usually estimated by the anatomical and mathematical method [9]. Anatomical method can be used when all the bones i.e, from skull to calcaneum is available. But in cases where only some body parts are available, it is difficult to apply. In such cases, mathematical method i.e., based on the relationship between length of long bones and stature can be applied, by utilizing ratios or regression analysis. Though it is less precise, it is workable even if a fragment of long bone is available [10]. Stature of a person depends on various factors like nutrition, genetic diversity, geographical location, hormonal, etc.

Estimation of stature by Regression formulae varies from population to population and it is sex specific. Hence, Regression formulae obtained for a specific population cannot be applied for others, it may either underestimate or over estimate [1,11].

There are many studies where stature is estimated using hand and foot length, length of middle finger, length of index and ring finger [4-7]. There are very few studies where length of thumb has been used to estimate the stature [8]. And most of the studies were applicable to adolescent population only. Hence there is need to study the correlation of stature and length of thumb in different geographical location which could be applied to adult population.

Raju et al. studied 250 subjects of age 18-25 years from Davangere district, Karnataka and found that right index finger was best prediction of stature in females and right ring finger in case of males. It was also found that, better prediction of stature from finger lengths could be done in males when compared to females [12].

Tyagi et al. studied subjects from Delhi and also found that index finger was best predictor of stature in both males and females [2].

Khan et al. studied relationship of stature and middle finger among 150 students of 17-22 yrs age group in Mangalore university and found a very good correlation with a coefficient of 0.658 and p value of <0.001 which is highly significant [13].

Rastogi et al. estimated stature from middle finger length and found positive correlation that ranged from 0.504 to 0.696 while studying the north and south Indian population [6].

Habib et al. studied 159 Egyptians of age 18-25 years and found that little finger in males and distal phalanges of females fingers were not correlated with stature [14].

In our study, we observed a significant correlation between stature and length of both the thumbs (right thumb r=0.520 and left thumb r=0.559) and the significance level for both pair is (p<.0001). Amongst male, correlation is little higher between length of left thumb (LLT) and height, where as in females, correlation is higher between length of right thumb length (LRT) and height (right thumb r=0.452 and left thumb r=0.432). Kumar et al. also found a positive correlation between Length of thumb and stature. The correlation coefficient ranged from 0.240 to 0.256. [15] In a study done by Prerna et al. the correlation coefficient of right thumb was 0.635 and left thumb 0.245 in males and in females it was 0.212 for right thumb and 0.197 for left thumb [16].

In our study, Anova results also showed that the prediction of the dependent variable using Left and Right thumb for both sex are statistically significant. And the regression model equations obtained are valid for estimations of height for a given value of thumb measurement. The predictive accuracy for regression models for stature reconstruction i.e., 'R' for LLT is 0.432 and for LRT is 0.452 in females and 'R' for LLT is 0.559 and for LRT is 0.520 for males.

Conclusion

When Forensic Investigators receive a disintegrated body or skeletal remains, establishing the identity of the person is really challenging. Stature is one of the important criteria to fix identity of a person. In the present study, we observed a significant correlation between stature and length of both the thumbs. And the regression model equations obtained are valid for estimations of height for a given value of thumb measurement. So, even if only thumb is available it is possible to estimate the stature of individual using regression model equations. Further studies have to be carried out in different geographical locations and with a bigger sample size to find out the reliability of regression model equations in their locations.

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Original Article

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Efficacy of Endurance vs Isometric Neck Exercise in Chronic Non - Specific Neck Pain: A RCT

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Abstract

Objective: The objective of the study was to determine the efficacy endurance exercise in chronic mechanical neck pain patients. *Background:* Neck pain is of the 20 most burdensome chronic musculoskeletal disorder affecting 10-20% of population worldwide. In a relatively recent report on the global burden of disease, where 291 conditions were studied, neck pain was ranked 21st in terms of overall burden and fourth when measured by years lived with disability. Patients with chronic mechanical neck pain showed larger sway areas in standing posture and reduced ability to successfully execute more challenging balance and proprioception tasks. *Methodology:* This was an experimental study design with Pre-Post type conducted in the outpatient department of Physiotherapy at ACS Medical College and Hospital. 120 samples were selected from 150 volunteers based on the inclusion criteria Pre and posttest measurement will be taken and compared by using outcome measures like VAS, Neck Disability Index questionnaire and Jull's technique. *Results:* On comparing the mean value of group A and group B, shows significant difference between group A and group B. Group A seems to be more effective than Group B.

Keywords: Chronic neck pain; Endurance; Disability; VAS; NDI.

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Introduction

Neck pain is defined by Global burden of health 2010 study aspain in the neck with or without pain referred into one or both upper limbs that lasts for at least one day.' Neck pain occurs commonly throughout the world and causes substantial disability, economic cost and has large impact on their lives. Neck pain or Cervicalgia refers to pain in the cervical region. Pain in the neck sometimes radiates down to the nerve course with the arm sometimes due to entrapments, it varies in intensity and may feel and may feel achy or like and electric shock from neck to arm. Neck pain can have causes that aren't due to underlying disease. Examples include prolonged straining (looking up or down), sleeping in an uncomfortable position, stress, chiropractic manipulation or wearing heavy necklaces [1]. With the lack of trauma in neck pain, raise the possibility that the proprioceptive dysfunction in neck pain stems from spinal or supra spinal causes [2].

Neck pain is labelled chronic if it lasts more than six months and the causes are often osteoarthritis or poor professional posture referred to Mechanical neck pain. Therefore

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mechanical neck pain refers to neck pain caused by placing abnormal stress and strain on muscles and mostly results from poor posture [3]. Neck pain is a common occurrence with reported lifetime prevalence between 22 and 70% and ranges from 16.7% to 75.1%. Chronic neck pain is estimated to affect 10% to 20% of the population every year with a global point prevalence of 4.9% [4]. In India, since 1990 neck pain has increased by 19.1% by an average of 0.8% a year. Neck pain prevalence is higher in females than in males (41.7 vs 34.4%) [5]. In Tamilnadu, 1.7% of subjects reported neck pain, 6.8% was reported by Joshi et al. among rural population. In Chennai 25% suffer from chronic neck pain. Age group between 50-65 age are prone to be more affected. 20% of neck pain in the age group of 16-24 was affected (2017). For one year prevalence, Scandinavian countries reported more than neck pain than rest of Europe and Asia [6]. Prevalence of neck pain was 20.3% amongst women who were widowers or separated [7].

It has a large personal burden and also significantly economic burden. Chronic mechanical neck pain affects the daily activities of living (ADL) attributed to musculoskeletal conditions. Patients with chronic mechanical neck pain showed larger sway areas in standing posture and reduced ability to successfully execute more challenging balance tasks [10].

Balance and Proprioception has been recommended to be tested in chronic neck pain patients. There exist clinical tests for this population. The Neck Disability Index has been tested for face validity, test-retest reliability, construct validity, concurrent validity and is valid and reliable r=s (0.94-0.99) and found to be reliable, valid and responsive in numerous patient population with acute and chronic neck pain [13]. Visual Analogue scale test-retest reliability in neck pain was excellent (r=0.91) and is easy to measure the intensity or frequency of pain. Neck muscle endurance test: JULL'S test, also known as Cranio-cervical flexion test is a test of neuromotor control. To test endurance, we look at the synergy between superficial and deep muscles [15].

Materials and Methods

This was an experimental study design with Pre-Post type. This was conducted in the outpatient department Physiotherapy department of ACS Medical College and Hospital and took nearly 3 months to complete the study (January 2018- April 2018). 120 samples were selected from 150 volunteers based on the inclusion criteria with chronic neck pain, both male and female with age group of 50-65 years, with history of neck pain more than 3 months, patients with VAS score between 4-7 and ability to follow instructions and exclusion criteria with Recent spinal injury, VAS score >4 and <7, Patient with acute and sub-acute neck pain, chronic medications of steroid and hormonal drugs, whiplash injury, malignancy, pregnant women.

Once the study gets approved from Institutional Review Board (Ref no. IV B 047/ PHYSIO/ IRB/ 2017 - 2018), the 120 Samples were divided into two groups by randomly by computer generated softwareinto 60 samples each in Group A and to Group B. The samples will be fully explained about the study and the questionnaire to be filled. They were then asked to fill the Consent form in acceptance to participate in study, which is duly signed by the samples and therapist. Initially demographic details like age, gender, height, weight were collected assuring confidentiality of the same. The procedure is done by performing endurance exercises for two session per day for 6 days a week and for 12 weeks along with Isometric neck exercises and hot packs for groups A, Isometric neck exercises with hot packs for two session per day for 6 days and for 12 weeks for group B. After the study of three months, the posttest measurement will be taken and compared by using outcome measures of VAS, Neck Disability Index questionnaire, Jull's technique.

Blinding: First, patients were blinded to the group allocation and to the fact that one group would receive conventional treatment as it was recommended, instead they were told that 2 exercises would be tested. Second the investigator assessing the outcomes remained blind to the patient's allocation during the whole study period. Third the statistician who conducted outcome analyses was blinded to the group allocation by renaming the groups with numbers.

Data Analysis

The collected data were tabulated and analyzed using both descriptive and inferential statistics. All the parameters were assessed using statistical package for social science (SPSS) version 24. Paired t-test was adopted to find the statistical difference within the groups Independent t-test (Student t-Test) was adopted to find the statistical difference between the groups.

Results

On comparing the Mean values of Group A & Group B on Visual Analogue Scale Score, it shows significant decreasein the post test Mean values but (Group A -) shows (1.60) which has the Lower Mean value is more effective than (Group B (3.06) at $p \leq 0.001$. (Table 2)

On comparing the Mean values of Group A & Group B on Neck Disability Index score, it shows significant decrease in the post test Mean values but (Group A) shows (6.80) which has the Lower Mean value is more effective than (Group B (11.33) at $p \leq 0.001$. (Table 3)

On comparing the Mean values of Group A & Group B on Jull's test, it shows significant Increase in the post test Mean values but (Group A - Balance & Proprioception Exercise) shows (40.60) which has the Higher Mean value is more effective than (Group B) (33.53) at ≤ 0.001. (Table 4). Table 1 shows the demographic details of the samples.

Discussion

Neck pain is a common health problem and is along with low back pain, the world's leading cause of years lived with disability. In combination with lack of trauma in neck pain, raise the possibility that the proprioceptive dysfunction in neck pain stems from spinal or supraspinal causes [16]. It was even found that cervical muscle fatigue produced significant disturbances on balance [17]. For instance, impaired balance during quiet standing has been reported in patients with chronic neck pain of different aetiologies [18].

Chronic neck pain is more common in females than in males [19]. There were trends for the elderly group with neck pain to have poorer balance than the healthy controls across most balance conditions [20]. To be effective, treatment must address not only the symptoms but also the impairments associated with neck pain [21]. Exercises and physical activities are more beneficial

Table 1: Demographic Characteristics

Characteristics	Data - Group-A	Data - Group-B
Male	27%	47%
Female	73%	53%
Age	54.73 ± 7.72	54.86 ± 7.42
Height	157.06 ± 5.01	158.66 ± 6.25
Weight	69.2 ± 8.14	69.93 ± 9.74
Body Mass Index(BMI)	28.07 ± 3.18	27.71 ± 5.74

Table 2: Comparison of Vas Score Between Group - A and Group - B in Pre and Post Test

#VAS	#Group - A		#Group - B		t - Test		
	Mean	S.D	Mean	S.D		df	Significance
Pre Test	6.06	1.16	6.13	-.180	1.13	28	.858*
Post Test	1.60	.736	3.06	.539	-6.00	28	.000***

Table 3: Comparison of Neck Disability Index (NDI) Between Group - A and Group - B in Pre and Post Test

#NDI	#Group - A		#Group - B		t - Test		
	Mean	S.D	Mean	S.D		df	Significance
Pre Test	18.40	2.52	18.26	3.28	.125	28	.902*
Post Test	6.80	1.20	11.33	1.11	-10.69	28	.000***

Table 4: Comparison of Jull's Test Between Group - A and Group - B in Pre and Post Test

#Test (Seconds)	#Group - A		#Group - B		t - Test		
	Mean	S.D	Mean	S.D		df	Significance
Pre Test	22.26	2.86	22.73	1.75	-.538	28	.651*
Post Test	4.60	3.68	33.53	2.03	6.51	28	.000***

for the most common musculoskeletal disorders such as chronic neck pain. However, poor adherence to exercise and physical activity may limit long term effectiveness [22].

The study concluded that the Yoga is more effective than the Pilates and Tai chi ,Yoga is effective in reducing pain, disability, quality of life and fear of movements in subjects with mechanical neck pain [23]. In this systematic review maximum studies showed that there was some improvement in neck functional abilities and reduction in neck pain in the endurance training group. On the other hand, the long term follow ups failed to show the improvement on neck functional ability and pain [24]. Both the groups (schroth method and yoga) shows improvement in the postural alignment (forward head shift, shoulder protraction) and pulmonary function [25].

Conclusion

The study concludes endurance exercise is an important determinant factor in neck pain. This study is to create awareness among neck pain pupils that endurance is reduced due to neck pain and hence exercises should be added in regular routine schedule. Through this study, we conclude that there seems to be evidence that endurance exercise are more beneficial in general exercise program in reducing neck pain and seems to be advantageous.

Authors Contribution: All authors have contributed equally.

Conflict of Interest: 'Conflicts of interest: none'.

Ethical Considerations: The manuscript is approved by the Institutional Review board of faculty of physiotherapy. All the procedures were performed in accordance with the ethical standards of the responsible ethics committee both (Institutional and national) on human experimentation and the Helsinki Declaration of 1964 (as revised in 2008).

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Original Article

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Profile of Medico-Legal Cases in Casualty Department of Rural Medical College, Maharashtra: Retrospective Study of One Year

Rajesh D. Kharat[1], Rahul V. Kedare[2]

Abstract

Background: As proved that humans are different from the other living animals. Human being is a more social and lives in a community. One of the important things which govern the community is rules and regulations. The present work was planned to study the profile of medico-legal cases (MLCs). *Aims:* To evaluate complete profile of medico-legal cases at casualty department of Rural Medical College, Maharashtra. *Material and Method:* Study was conducted retrospectively by assessment of the medico-legal cases during the period from 1st January 2017 to 31st December 2017. *Result:* The total 724 cases were registered as "medico-legal". Men cases were predominated over women cases. The maximum numbers of cases were in the age group of 21-30 years. The most of cases were of road traffic accidents (RTA) 410 cases (56.62%), then followed by fall from height, 72 cases (9.94%). Majority of MLCs were treated on the OPD basis, 379 cases (52.41%). Maximum numbers of cases were discharge after completion of treatment, 584 cases (80.69%). *Conclusion:* The present study showed that load of medico-legal cases at the tertiary care hospital and hospital not only caters to the requirement of patients who reports for their sickness but also carry out legal responsibilities to examine, document and certify medico-legal cases.

Keywords: Medico-legal cases; Road traffic accident; Assault; Poisoning.

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Introduction

A medico-legal case is any type of case where the accompanying registered medical practitioners (RMP), after obtaining a detail history and examining the patient, thinks that some investigation or procedure by law enforcement agencies is required to establish and fix responsibility for the case in accordance with the law or legal ground [1]. It is the duty of a registered medical practitioner to judge or evaluate the each and every case properly and in suspicious cases, it is better to inform the police. It saves the treating physician from unnecessary or unwanted and needless allegations afterwards. In all emergency cases, be it medical or surgical, comes to the casualty of any hospital and Casualty Medical Officer (CMO) or Resident medical officer (RMO) is the first doctor to attend the patient and give First Aid and save the life of patient. Another duty is to perform all medico-legal formalities concerned to patients. Profiling of Medico-legal cases is an integral aspect for the avoiding of avoidable causalities in future [2]. This study is based on medico-legal cases reported to the casualty of Tertiary Care Hospital attached to Rural Medical College, Maharashtra for a period of 1 year, from 1st January 2017 to 31st December 2017.

Materials and Methods

It was a retrospective study of medico-legal cases registered in a casualty of Tertiary Care Hospital

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attached to Rural Medical College, Maharashtra for a period of 1 year. During the study period a total of 724 medico-legal cases were registered. The collected data was analyzed and represented in form of tables by mentioning various parameters and compared with other resembling studies.

Observations and Results

In the present study, a total of 724 medico-legal cases were reported (Table 7), out of which, male ascendancy was noted with 75.41% of cases and females were 24.58% (Table 2). While considering religion, most of the cases were belong to Hindu community (93.92%), followed by Muslims in 5.93% cases and Christians were 0.13% (Table 3). Most of patients were from the age group of 21-30 years i.e. 36.46%, followed by 20.02% cases belonging to 31-40 years age group (Table 1). Majority of cases (66.29%) reported to casualty immediately after the incidence, whereas 4.55% cases reported delayed (after 12 hours) of incidence (Table 4). The maximum cases (56.62%) were of road traffic accident (RTA), followed by fall from height in 9.94%, poisoning in 8.97% cases and assault accounted for a total of 7.87% cases while some cases of 6.21% snake & scorpion bite and few (3.03%) cases were brought dead to the casualty (Table No. 7). After analysis of cases by month wise distribution, maximum number was observed in month of October (11.32%), followed by April in 9.53% (Table No. 7). Most of MLC were treated on the OPD basis, 379 cases (52.41%), out of which 357 cases (49.38%) were living while 22 cases (3.03%) were brought dead to casualty; indoor cases were 345 cases (47.59%) (Table 5). Maximum numbers of cases were discharge after the completion of required treatment, 584 cases (80.69%); while 70 cases (9.68%) were dead during the course of treatment and few 32 cases (4.45%) were referred to higher center for further treatment (Table 6).

Table 1: Age Wise Distribution of Cases

Age Group (Yrs)	No. of Cases	Percentage (%)
0-10	38	5.24
11-20	114	15.74
21-30	264	36.46
31-40	145	20.02
41-50	92	12.7
51-60	45	6.21
61 & Above	26	3.59
Total	724	100

Table 2: Gender Wise Distribution of Cases

Gender	No. of Cases	Percentage (%)
Male	546	75.41
Female	178	24.58
Total	724	100

Table 3: Religion Wise Distribution of Cases

Religion	No. of Cases	Percentage (%)
Hindu	680	93.92
Muslim	43	5.93
Christians	01	0.13
Total	724	100

Table 4: Time Period Between Incidence & Reporting to Casualty

Time Period	No.of Cases	Percentage (%)
< 1 hr	480	66.29
1-2 hrs	97	13.39
2-4 hrs	59	8.14
4-12 hrs	55	7.59
>12 hrs	33	4.55
Total	724	100

Tabel 5: Distribution of Cases on the Basis of OPD or Admisssion (Indoor)

Treated as	No. of Cases	Percentage (%)
OPD	379	52.41
Indoor	345	47.59
Total	724	100

Table 6: Distribution According to Disposal of Cases

Disposal	No. of Cases	Percentage (%)
Discharge	584	80.69
Absconded	38	5.18
Death	70	9.68
Referred	32	4.45
Total	724	100

Table 7: Monthly Distribution of Different Categories of MLC From January 2017 to December 2017

Category	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	%
RTA	31	24	36	34	38	33	29	32	36	47	37	33	410	56.62
Assault	6	2	6	7	5	1	3	6	6	5	5	5	57	7.87
Fall From Height	7	4	4	8	7	3	4	4	5	11	8	7	72	9.94
Poisoning	5	4	6	6	7	5	6	4	5	8	3	6	65	8.97
Railway Accident	1	0	1	0	1	0	1	0	0	1	1	0	6	0.82
Burn	1	5	3	1	2	1	2	1	2	1	2	2	23	3.17
Electrocution	2	0	0	2	2	0	0	1	0	1	2	1	11	1.51
Snake / Scorpion Bite	5	3	4	6	3	2	2	3	5	7	3	2	45	6.21
Alcohol Intoxication	0	0	1	0	1	0	0	0	1	0	0	0	3	0.41
Drowning	1	0	0	1	0	0	0	0	0	0	0	0	2	0.27
Hanging	0	1	0	0	0	1	0	1	0	0	1	1	5	0.69
Hit By Animal	1	0	0	0	1	0	0	0	0	0	0	1	3	0.41
Brought Dead	3	1	2	4	1	3	1	1	1	1	2	2	22	3.03
Total	63	44	63	69	68	49	48	53	61	82	64	60	724	100

Discussion

It was noted that majority of the cases were of male (75.41%). This finding was supported by other similar studies [3,4,5,6,7]. The male predominance was observed because males were active in various day to day outdoor activities and other social events. They were main or primary earner in the most of families. Males were vulnerable and exposed to such various situations which fall as MLCs in this study.

In the present study victims of Hindu religion were more of either sex. It was because of Maval region has a predominantly of Hindu population.

It was observed that majority of the cases fall in age group of 21-30 years (32.10%). It may be due to their active, aggressive and arrogant by behaviour. It was mainly due to the more vulnerable, fast changing social trends and culture. Most of them were married, exposed various family associated problems as well as social commitments.

In our study, majority of the victims (66.29%) reported to casualty within immediately after the incidence, followed by 13.39% of the victims within 1– 2 hours of the incidence. This finding is consistent with other studies conducted by Yadav A et al. and Siddappa SC. Their findings were 51.94% cases within 1 hour and 20.12% within 1- 2 hours of incidence. It may be due to tertiary care hospital is in their close vicinity or approachable distance.

Majority of the cases were treated on the OPD (49.38%) basis as they didn't required hospital stay whereas 345 indoor cases were transferred to the surgery and other respective departments, because maximum cases of road traffic accidents, assaults, fall from height, some animal bite, and burns etc., were treated in to the surgery and other respective departments. The similar observation made by Malik et al in earlier study.

Present study revealed that maximum cases reported to casualty were of RTA (56.62%). This finding was consistent with other studies [8,9,10,11]. Majority of accidental cases may be due to our medical college being situated on the side of a busy national highway and also a nearby situated big square, where some times traffic signal not working due to some reasons.(despite multiple complaints) or in absence of traffic police on that square to manage traffic. Malik Y et al. and Yadav A et al. studies finding showed that maximum cases reported to casualty were of poisoning which differ from present study. Our study was also in contrast with the findings of earlier study done by Hussain SN et al., who observed maximum number of cases reported to casualty were of burnt.

Conclusions and Recommendations

Casualty or emergency department of a medical college receives all type of emergency cases including medico legal cases. In medico legal cases additional work or documentation required, which puts a lot of burden in the casualty. Most of times duty of CMO is done by a MBBS doctor who is not specialist in handling medico legal cases. Expertise of concerned subject having knowledge with adequate experience of such cases but the same thing may observed with MBBS doctor who working as CMO. The doctors who are involved in treatment of such cases need to be more trained in same field. The sensitive or important things of medico-legal work should be carried out under the supervision of senior medical officers as part of their training in the field, so as to avoid imprecision in giving the opinion.

Poor or unclear opinion is not good than any opinion at all, as the later can mislead the case and may lead to administration of injustice.

In the present study, maximum number of medico-legal cases was of road traffic accident, seen among young individuals or adults and mostly in urban inhabitants. Such incidences can be prevented or minimize by giving proper education, awareness, training of safety standards by administrators and by law enforcement agencies. Moreover, a national drive or program should be started, just like "Swachh Bharat Abhiyan". There should be a road-safety program in which all the cities of our country must be ranked on the basis of various criteria like standard of roads, functioning of traffic signals, obeying of traffic rules and accident cases number per year etc.

Conflict of Interest: There is no conflict of interest; the author does not have financial or other relationship with other people or organization that may inappropriately influence the author's work.

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