

Medico-Legal Update

An International Journal



Medico-Legal Update

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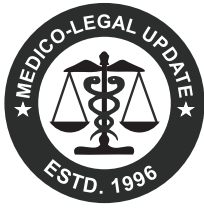
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Study of Pattern of Poisoning in a Tertiary Care Hospital

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ABSTRACT

Poisoning is one of the causes for morbidity and mortality in developing countries and methods of poisoning varies from one place to other. Hence to know the pattern of poisoning, a retrospective study of 150 cases was done at a Navodaya Medical college Hospital, Raichur (Karnataka) between Jan-June 2013. During this period 150 cases of poisoning cases were studied. These poisoning cases were studied to know the age and sex distribution of the victims, commonest type of poisons used and manner of poisoning. In this study, majority 106 (71%) of the cases were due to organophosphorus compound, followed by snake bite 14 (9%), aluminium phosphide 11 (8%) and others respectively.

Keywords: *Poisoning, Unnatural Death, Organophosphorous Compound, Snake Bite, Aluminium Phosphide*

INTRODUCTION

Unnatural deaths due to poisoning is one of the second common cause following road traffic accidents. Deaths due to poisoning may be suicidal, homicidal or accidental in nature. The commonest cause for poisoning in India and other developing countries is insecticides, the reason for this is the economy of the countries depends mainly on agriculture. The method of poisoning depends on the various factors like, socioeconomic status, religious, cultural influences and easy availability of poison. It also varies from country to country and from one place to the other. The pattern of poisoning within a country depends on several factors such as the accessibility of various poisons, socio-economic status of the people, religious and cultural practices and drugs prescription methods¹.

MATERIALS AND METHOD

The poisoning cases admitted to Navodaya Medical college hospital, Raichur between Jan – June 2013 were considered for the present study. The data were

collected from hospital case records, police inquest forms, post-mortem and forensic science laboratory reports.

RESULTS

In this study following results were found. Total number of deaths due to poisoning was 150 cases. Table No.1 shows age and sex wise distribution of poisoning deaths. Among the 150 cases, 100 were males and 50 were females with a ratio of 2:1. The incidence was more in the age groups of 21 – 30 years 58 (38%) followed by 31 – 40 years 35 (23%) and 41 – 50 years 26 (17%). In case of males, incidence was more in age group 21 – 30 years, followed by 31 – 40 years but in females the incidence was more in 21 – 30 years followed by 31 – 40 years.

Table No.1: Age and sex wise distribution of poisoning deaths

Age	Male	Female	Total	Percentage
0 -10 yrs	2	1	3	2%
11 - 20 yrs	06	14	20	13%
21 – 30 yrs	42	16	58	38%
31 – 40 yrs	26	09	35	23%
41 – 50 yrs	18	08	26	17%
51 – 60 yrs	3	1	04	3%
61 – 70 yrs	2	1	3	2%
> 71 yrs	1	0	1	2%
Total	100	50	150	100%

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Table No.2: Type of poisons

Poison	Male	Female	Total	percentage
Organophosphorous	75	31	106	71%
Snake bite	08	06	14	09%
Aluminium phosphide	05	06	11	08%
Organochlorine	05	04	09	06%
Alcohol	04	0	04	03%
Carbamates	1	1	2	1%
Pyrethroids	0	1	2	1%
Miscellaneous	2	1	2	1%
Total	100	50	150	100%

Table No.3: Manner of Death

Manner of Death	Male	Female	Total	Percentage
Suicidal	90	37	127	85%
Accidental	08	10	18	12%
Homicidal	02	3	05	3%
Total	100	50	150	100%

DISCUSSION

Among unnatural deaths, poisoning is one of the causes of death worldwide. During a study it was found 67% were male individuals, 63% married persons, 83% with rural background and 63.4% were suicidal in nature. Responsible poison could not be ascertained in 16% of clinical and 9.9% of fatal cases. Insecticides were the cause for 35% of clinical and 55.4% of fatal cases and it concluded that Young married males of rural areas with agricultural occupation and failure of monsoon rains are the major risk factors associated with poisoning². In another study of poisoning cases presented to emergency department, The female to male ratio was 1.17:1. Most of poisoning occurred in the age group 15-24 years. Snakebite was the commonest form of poisoning amongst all cases. Majority of the cases were in farmers. Accidental poisoning prevailed over intentional poisoning. Seasonal trend revealed maximum cases being in summer³. The above results are consistent with our study with little variation.

In another study of 137 cases during the one year duration and maximum cases belonged to 20 – 30 years of life. Most common manner of poisoning was suicidal and the incidence was mainly during evening hours. Organophosphorus compound was the most commonly abused substance⁴. In other study it was found that among male patients majority of poisoning caused by suspected sedative poisoning, followed by

organophosphorous, copper sulphate, benzodiazepines (attempted suicide). Among female patients majority of poisoning was caused by organophosphorous compounds, followed by rodenticide and benzodiazepines⁵.

In another study, the common insecticides used for poisoning were organophosphorus compounds mainly Methyl Parathion (Metacid) and Dichlorvos (Nuvan). Paracetamol alone or combination preparations with antihistamines were the most common analgesic used for poisoning purpose. Benzodiazepines were the most commonly used sedatives. Majority of the cases was suicidal poisoning⁵. In another study it was found that, the most common type of poisoning was found to be organophosphorus and the least was pyrethrin. The Common motive of poisoning was suicidal in both male and female, especially in young population of rural background with agriculture as major occupation⁶.

CONCLUSION

Intervention is required to reduce the dangerous trend of self-poisoning by detecting the cause of poisoning. Quick medical measures along with psychiatric counseling will help in saving the life of an individual. Strict laws concerned with sale and distribution of toxic substances is required. If poisoning regulatory laws are strictly enforced by Govt agencies the morbidity and mortality due to poisoning can be reduced largely.

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Criminal Behavior among the Personality Disorders

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ABSTRACT

Preventing crime rather than waiting for a crime to be committed is appealing. There is a well-established association between personality disorder and offending but the nature of the relationship is less well understood. Personality disorders lead to a disturbance in functioning as great as that in most major mental disorders. They are associated with high rates of separation and divorce; unemployment and inefficiency; and poor quality of life for the individual and his/her family. Patients with personality disorders have an increased risk of mortality through suicide, homicide, and accidents. By knowing the relation between personality disorders and criminal behavior it is possible to take precautions in preventing the crimes.

Keywords: Personality Disorders, Criminal Behavior, Sociopath, Mental Illness

INTRODUCTION

A clear understanding of the nature of the link between personality disorder and offending has important implications for treatment and risk management. Until recently, however, less attention has been paid to types and aspects of personality disorder other than antisocial and their relationship with offending behaviour; and between personality disorders with particular aspects and types of offending behaviour, violent and nonviolent.

It is well established that people in correctional and forensic mental health settings have higher rates of personality disorder, especially antisocial personality disorder, than people in the general community.⁽¹⁾ The relationship between personality disorder and violent re-offending is so well established that the presence of personality disorder has been incorporated as a risk factor in structured risk assessment tools such as the Historical Clinical Risk Management-20⁽²⁾ and Violence Risk Assessment Guide (VRAG).⁽³⁾ The Hare Psychopathy Checklist revised (PCL-R),⁽⁴⁾ which measures psychopathy, a particular subtype of antisocial personality, has become well established as an actuarial tool for predicting the risk of violent re-offending.

The definition of personality disorders

Personality disorders are a group of mental health conditions in which a person has a long-term pattern

of behaviors, emotions, and thoughts that is very different from his or her culture's expectations.

Causes, incidence, and risk factors: Causes of personality disorders are unknown. Genetic and environmental factors are thought to play a role.

Symptoms

- Symptoms vary widely depending on the type of personality disorder.
- In general, personality disorders involve feelings, thoughts, and behaviors that do not adapt to a wide range of settings.
- These patterns usually begin in adolescence and may lead to problems in social and work situations.
- The severity of these conditions ranges from mild to severe.

Signs and tests

- Personality disorders are diagnosed based on a psychological evaluation that assesses the history and severity of the symptoms.

Clusters

These behaviors interfere with the person's ability to function in relationships, work, or other settings. DSM-IV defines a personality disorder as an enduring pattern of inner experience and behavior that deviates

markedly from cultural expectations, is inflexible and pervasive, has its onset in adolescence or early adulthood, is stable over time, and leads to distress or impairment. DSM-IV lists ten personality disorders, and allocates each one to one of three groups or 'clusters': A, B, or C.

- **Cluster A (Odd, bizarre, eccentric):** Paranoid PD, Schizoid PD, Schizotypal PD
- **Cluster B (Dramatic, erratic):** Antisocial PD, Borderline PD, Histrionic PD, Narcissistic PD
- **Cluster C (Anxious, fearful):** Avoidant PD, Dependent PD, Obsessive-compulsive PD

It is important to remember that they are more the product of historical observation than of scientific study, and thus that they are rather vague and imprecise concepts.

The majority of people with a personality disorder never come into contact with mental health services, and those who do usually do so in the context of another psychiatric disorder or at a time of personal crisis, for example, after harming themselves or committing a criminal offence

Psychologist Theodore Millon, who has written numerous popular works on personality, proposed the following description of personality disorders:

Table No 1: Millon's brief description of personality disorders

Type of personality disorder	Description
1. Paranoid	Guarded, defensive, distrustful and suspiciousness. Hypervigilant to the motives of others to undermine or do harm. Always seeking confirmatory evidence of hidden schemes. Feels righteous, but persecuted.
2. Schizoid	Apathetic, indifferent, remote, solitary, distant, humorless. Neither desires nor needs human attachments. Withdrawal from relationships and prefer to be alone. Little interest in others, often seen as a loner. Minimal awareness of feelings of self or others. Few drives or ambitions if any.
3. Schizotypal	Eccentric, self-estranged, bizarre, absent. Exhibits peculiar mannerisms and behaviors. Thinks can read thoughts of others. Preoccupied with odd daydreams and beliefs. Blurs line between reality and fantasy. Magical thinking and strange beliefs.
4. Antisocial	Impulsive, irresponsible, deviant, unruly. Acts without due consideration. Meets social obligations only when self-serving. Disrespects societal customs, rules, and standards. Sees self as free and independent.
5. Borderline	Unpredictable, manipulative, unstable. Frantically fears abandonment and isolation. Experiences rapidly fluctuating moods. Shifts rapidly between loving and hating. Sees self and others alternatively as all-good and all-bad. Unstable and frequently changing moods.
6. Histrionic	Dramatic, seductive, shallow, stimulus-seeking, vain. Overreacts to minor events. Exhibitionistic as a means of securing attention and favors. Sees self as attractive and charming. Constant seeking for others' attention.
7. Narcissistic	Egotistical, arrogant, grandiose, insouciant. Preoccupied with fantasies of success, beauty, or achievement. Sees self as admirable and superior, and therefore entitled to special treatment
8. Avoidant	Hesitant, self-conscious, embarrassed, anxious. Tense in social situations due to fear of rejection. Plagued by constant performance anxiety. Sees self as inept, inferior, or unappealing. Feels alone and empty.
9. Dependent	Helpless, incompetent, submissive, immature. Withdraws from adult responsibilities. Sees self as weak or fragile. Seeks constant reassurance from stronger figures.
10. Obsessive-compulsive	Restrained, conscientious, respectful, rigid. Maintains a rule-bound lifestyle. Adheres closely to social conventions. Sees the world in terms of regulations and hierarchies. Sees self as devoted, reliable, efficient, and productive
11. Depressive	Somber, discouraged, pessimistic, brooding, fatalistic. Presents self as vulnerable and abandoned. Feels valueless, guilty, and impotent. Judges self as worthy only of criticism and contempt
12. Passive-aggressive (Negativistic)	Resentful, contrary, skeptical, discontented. Resists fulfilling others' expectations. Deliberately inefficient. Vents anger indirectly by undermining others' goals. Alternately moody and irritable, then sullen and withdrawn
13. Sadistic	Explosively hostile, abrasive, cruel, dogmatic. Liable to sudden outbursts of rage. Feels self-satisfied through dominating, intimidating and humiliating others. Is opinionated and close-minded
14. Self-defeating (Masochistic)	Deferential, pleasure-phobic, servile, blameful, self-effacing. Encourages others to take advantage. Deliberately defeats own achievements. Seeks condemning or mis-treatful partners

Table adopted from: Millon, Theodore (2004). *Personality Disorders in Modern Life*, p. 4. John Wiley & Sons, Inc., Hoboken, New Jersey. ISBN 0-471-23734-5.

Relationship Between Personality Disorder Subtypes and Different Offences

Roberts and Coid⁽⁵⁾ used data from the National Survey of Psychiatric Morbidity in Prisoners in England and Wales to examine the relationships between different personality disorder subtype scores and lifetime offences. A representative sample of prisoners were interviewed using self-report questionnaires about previous conviction history; and a subsample of 391 prisoners were interviewed by clinicians using the Structured Clinical Interview for Axis II Disorders (SCID-II),⁽⁶⁾ using continuous scores for the different personality disorder subscales. They used logistic regression to examine the relationships.

Unsurprisingly, they found that conduct disorder scores were significantly related to all offence categories and adult antisocial personality disorder scores were associated with most offences, especially obstruction of justice, firearms, robbery and blackmail, escape and breach, fraud, burglary and theft as well as violence. With regards to other cluster B disorders, narcissistic personality disorder scores were associated with fraud and forgery.

In the cluster C disorders, they found that avoidant personality disorder scores were associated with criminal damage but negatively associated with firearm offences. Obsessive-compulsive personality disorder scores were associated with firearm offences and dependent personality disorder scores were significantly associated with firearm offences and violence but negatively associated with criminal damage.

In the cluster A disorders, paranoid personality disorder scores were associated with robbery and blackmail but negatively associated with driving offences. Schizotypal personality disorder scores were significantly associated with arson but negatively associated with robbery and blackmail. Schizoid personality disorder scores were associated with kidnap, burglary and theft.

Interestingly, homicide offences and sex offending were not associated with any personality disorder scores. In the case of homicide, this may be due to the small numbers.

Male Sex Offending: Rapists versus Child Molesters

Francia et al.⁽⁷⁾ examined personality disorders and their features in two groups of incarcerated male sexual offenders in Colorado, USA.

1. They found that rapists had significantly higher levels of antisocial personality traits than child molesters but no difference in narcissistic traits.
2. Child molesters had higher levels of avoidant traits than rapists and higher levels of avoidant, dependent, and schizoid traits than nonsexual offenders.
3. For sexual offenders, if considered together, avoidant personality disorder had the highest prevalence followed by obsessive compulsive, schizoid, paranoid and borderline personality disorders.

Eher et al.⁽⁸⁾ did a similar study of 807 incarcerated sexual offenders admitted to Austria's prisons between 2002 and 2009. They found that sexual offenders displayed high rates of mental illness, sexual disorders, personality disorders and substance abuse. However, there were differences between rapists and child molesters consistent with the finding of the study by Francia et al.⁽⁷⁾

These two studies have treatment implications, as they suggest that child molesters may benefit from treatment aimed at sexual disorders and cluster C traits, whereas rapists may need an approach aimed at the features of cluster B personality disorders more generally and not just at deviant sexual behaviour.

Stalking and Borderline Personality Disorder

Sansone and Sansone⁽⁹⁾ examined the relationship between stalking and borderline personality disorder. Stalking consists of chronic, repeated, unwanted nuisance behaviours by an offender, which have adverse psychological and/or physical effects on victims. Because borderline personality disorder is characterized by a pattern of unstable and intense interpersonal relationships coupled with frantic efforts

to avoid real or imagined abandonment, one might expect this personality disorder to be prominent amongst stalkers.

Homicide

Representative studies of offenders convicted of homicide have consistently found personality disorder to be the most common mental health diagnosis among these offenders, with 6% of all homicide offenders over a three-year period in the UK having a primary diagnosis of personality disorder⁽¹⁰⁾ and 20% of homicide offenders in Angers, France over a ten-year period having a diagnosis of personality disorder.⁽¹¹⁾

Homicide–Suicide

Homicide followed by suicide is a rare but tragic phenomenon. Flynn et al.⁽¹²⁾ reported that studies of homicide followed by suicide have not examined mental health characteristics in details. They conducted a national cross-section study of perpetrators in England and Wales 1996–2005 and found 203 incidents recorded. The median age was 41 and most were men. Men more often killed a spouse or partner and women more often killed their children. The most common primary diagnoses were personality disorder (32%) and affective disorder (26%).

Filicide and Personality Disorder

Kauppi et al. in Finland⁽¹³⁾ examined filicides (killing one's child) in Finland over a 25-year period to look at the difference between those perpetrated by the mother and by the father.

They found 200 filicides, of which 59% were committed by mothers, 39% by fathers and 2% by stepfathers. Fifty-six percent of cases involved the killing of neonates. There were 75 filicide–suicides. There were 65 filicides left over, which were classified as 'other filicides'. It was only for these cases that the authors examined the diagnosis.

Fifty-one percent of maternal perpetrators had psychosis or psychotic depression and 76% were deemed not responsible for their actions by reason of insanity.

On the contrary, 67% of paternal perpetrators had personality disorder, 45% abused alcohol and there were high rates of marital jealousy and domestic violence. Eighteen percent of the male perpetrators were deemed not responsible on the grounds of

insanity. The presence of significant life stressors amongst the male perpetrators included marital break-up, jealousy, fear of separation, long-term substance misuse and low level of education and socioeconomic status. The mean age of the paternal victims (4.2 years) was higher than for those killed by their mothers (2.2). This is evidence suggesting different mechanisms linking personality disorder and killing one's child from those at play in psychosis. It also shows a different view taken by the courts regarding the responsibility for one's actions in personality disorder as opposed to psychosis.

Matricide, Patricide and Personality Disorder

Liettu et al.⁽¹⁴⁾ looked at all male matricidal (n = 86) and patricidal (n = 106) offenders referred for forensic psychiatric examinations between 1973 and 2004 in Finland. This included all offenders who had killed a parent as well as all those convicted of aggravated assault or attempted murder against a parent. They found that matricidal offenders suffered more commonly from psychotic disorders than did patricidal offenders (46 versus 26%, respectively).

A greater proportion of patricidal offenders had a *personality disorder* (64 versus 45%, respectively), with borderline personality disorder being more common amongst the patricidal than matricidal offenders (29 versus 10%, respectively). For matricidal offenders the most common motive was a mental disorder, whereas for patricidal offenders the offences were most commonly motivated by long-term conflict. Once again this hints at a different set of internal and environmental factors interacting to lead to killing in personality disorder compared with an axis I psychotic disorder.

Familicide

Familicide is defined in this article as the killing of an intimate partner and at least one child. Léveillé et al.⁽¹⁵⁾ studied sixteen cases of familicide in Quebec between 1986 and 2000; all were perpetrated by men. Sixty-two percent of the perpetrators used firearms and many (68%) of them killed themselves after the act. The authors reported that 19% had borderline personality disorder and 38% borderline traits. Twelve percent had antisocial personality disorder or antisocial traits and 68% had a lifetime history of depressive symptoms. The four main motivations were: intimate partner loss, social loss, mental state perturbations and economical motivation.

Explaining the Link Between Personality Disorder and Violence

The mechanism of the link between personality disorder and offending is addressed in an article by Logan and Johnstone.⁽¹⁶⁾

They suggest that people who are on the emotional dysregulation dimension experience extreme and fluctuating moods, dejection and disillusionment, impulsive anger and irritability and fear of abandonment and rejection. Where these features co-exist with dissocial characteristics violence can occur when triggered by perceived injury or abandonment by another person.

The motivation for injuring others may be more motivated by a desire to prevent loss and express intolerable emotions rather than the desire for retribution and to restore self esteem that is seen in dissocial individuals. They suggest that dissocial individuals may be violent when they perceive themselves to have been injured by another person. This triggers feelings of shame, guilt, humiliation or envy, which are highly threatening to their fragile self esteem. They hypothesize that violence may arise in the socially inhibited dimension when an individual is confronted with unexpected, unwanted or overwhelming evidence of their inadequacy. Violence may arise in the compulsive dimensions when control over their environment or those within it is threatened by the actions of others.

CONCLUSION

There is now much evidence that personality disorder is related to offending. The studies above show that some personality disorders other than antisocial are related to particular types of offending behaviour. The studies also demonstrate that, although rates of personality disorder are high in all serious offenders, the role played by personality disorder may be greater in some offences than others.

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An Autopsy Evaluation of Defense Wounds in Homicidal Deaths

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ABSTRACT

Evidence of defense wound indicates that the victim was awake and has resisted the offence. Absence of defense wound does not rule out homicide. On the contrary, absence of defense wounds in majority of cases clearly indicated that the victim was present in a place where he never anticipated risk to his life and was caused by a person who had an easy access to the place of crime, or the victim was asleep, unaware, unprepared or under the influence of alcohol/ drugs. The present study was based on retrospective analysis of 218 homicidal deaths in three years period from January 2004 to December 2006 from autopsies done in the Department of Forensic Medicine and Toxicology, Gandhi Medical College, Bhopal and Medico legal Institute, Home (Police) department, Government of Madhya Pradesh. Among total 218 cases included in this study, defense wound was evident in 73 cases i.e. 32.48%, of which 60.3% were on hand and 13.7% were on forearm and 26% were on both forearm and hand region. Defence wound was more common on left side (45.2%) than right (17.8%), because these are nearest to the perpetrator and consistent with the preponderance of right handed individuals in the population. In 37% cases it was present on both sides. The pattern of defense wound is discussed in detail in this paper.

Keywords: Defense Wound, Homicide, Autopsy

INTRODUCTION

Defence/protective wounds are injuries received by the victim in case of assault, by the way of immediate and instinctive reaction of self protection, by raising the arm to prevent the attack or by grasping the weapon². The person may ward-off the weapon or trying to catch or grabbing the weapon- cuts the palm and ulnar aspect of hand. To protect the exposed surface of body, the upper limbs- extensor surface of forearms (ulnar side), the lateral /posterior aspect of arm and dorsum of hand may receive injuries. Similarly the anterior and posterior aspect of lower limbs and back may be injured when an individual curls into a ball with flexion of spine, knees and hips to protect the anterior part of body.³

The nature, site and distribution of such injuries are dependent on circumstances. Even gunshot wounds may be designated as defensive in character depending on circumstances. Defense wounds are invariably homicidal.

Defense wounds like cuts or lacerations or bruises etc, on or between the fingers and palms, back of hands, wrists, inner aspects of forearms or any other part of body, if present, are strongly suggestive of homicide/assault as these are produced during attempts by the injured to seize the weapon instinctively defending himself or in an endeavour to ward-off the attack on the head or some other vital part of body.⁴

MATERIAL AND METHOD

This study was based on retrospective analysis of 218 homicidal deaths from January 2004 to December 2006 from the postmortems done in the Department of Forensic Medicine and Toxicology, Gandhi Medical College, Bhopal and Medico-legal Institute, Home (Police) department, Govt. of Madhya Pradesh.

The data includes not only the Bhopal city but also surrounding areas from where cases were referred to the hospital for tertiary treatment or cases referred for

second autopsy or for expert opinion. The data represents all age groups. The burn cases were excluded from this study because homicidal cases due to burn could not be established with certainty.

Proforma for study was prepared and various information and findings were collected from the post-mortem reports. The data was collected from post mortem report like sex, age, presence of defense injury and its type, weapon used, site and side of injury etc

Observation and Discussion

During the study period, total 5707 autopsies were conducted out of which, 218 cases were homicidal, which comprises 3.82%. Table- 1 shows that among 218 homicidal deaths, defense wound was present in 73 cases (33.48%).^{5, 6, 7} Among 73 defense injuries, 58 (35.58%) were present in males and 15 (27.27%) in females. Thus males outnumbered females with M: F ratio of 3.86:1. In Turkish and U.K study, females revealed more number of defense wound cases than males.

Table- 2 shows that maximum number of defense injury cases (70%) belonged to 3rd and 4th decade i.e 21 to 40 years age group which is consistent with other studies^{5, 8}. Most of the victims of homicide were in this age group because this age group is most active group by nature and has maximum involvement in violent activities.

Evidence of defense wound indicates that the victim was awake and has resisted the offence. Absence of defense wound does not rule out homicide. On the contrary, absence of defense wounds in majority of cases clearly indicated that the victim was present in a place where he never anticipated risk to his life or was caused by a person who had an easy access to the place of crime, or the victim was asleep, unaware, unprepared or under the influence of alcohol/ drugs¹

Analysis of type of defense wound (Table- 3) among total 73 cases revealed that 41 cases (56.2%) were incised wound, followed by contusions in 20 cases (27.4%). Most common type of weapon used was sharp cutting weapon in 56.2%, followed by blunt weapon in 35.6% cases (Table- 4). These are consistent with other studies^{6, 7, 8, 9, 17, 19}

Analysis of site of defense wound (Table- 5) revealed that hand was the most common site in 44

cases (60.3%), followed by forearm and hands both in 19 cases (26%) and forearm alone in 10 cases (13.7%). Defense wound was more common on left side in 33 cases (45.2%), followed by both side in 27 cases (37%), then on right side alone in 13 cases (17%). Left forearm and hand was more commonly involved because these are nearest to the perpetrator with the preponderance of right-handed individuals in the population. Thus our findings are consistent with other studies^{5, 6, 8, 9, 10, 16, 17}. Few researchers²⁰ found defense wound more commonly on both side, whereas others²¹ state that defense wound is more common on right side of body.

CONCLUSION

In assault of any kind, the natural reaction of the victim is to protect themselves. The limb used for protection can themselves be injured and these defense wounds may be of considerable medicolegal significance, as they indicate that the victim was conscious, at least partly mobile and not taken completely by surprise. The preponderance in males and younger age group shows that conscious and alert victims tend to better defend themselves. Presence of defense wound strongly supports homicidal manner of death, but before labeling it as defense wound, one must do careful and meticulous examination. In court of law, it helps autopsy surgeon to answer questions regarding manner of death, type of weapon used, number of assailants, relative position of accused and victim etc.

Table -1: Incidence of defense wound

Sex	No. of homicide	No. of defense wound	Percentage
Male	163	58	35.58
Female	55	15	27.27
Total	218	73	33.48%

Table -2: Age and sex wise distribution of defense wounds

Age in years	Male	Female	Total (%)
0-10	0	0	0
11-20	7	2	9 (12.3%)
21-30	23	4	27 (37%)
31-40	17	7	24 (32.9%)
41-50	5	1	6 (8.2%)
51-60	4	1	5 (6.8%)
>60	2	0	2 (2.7%)
Total	58	15	73 (100%)

Table- 3: Type of injuries in defense wounds

Type of injury	No. of cases	Percentage
Incised	41	56.2
Incised + contusion	6	8.2
Contusion	20	27.4
Contusion + laceration	6	8.2
Total	73	100

Table- 4: Type of weapons used

Weapon used	No. of cases	Percentage
Sharp	41	56.2
Blunt	26	35.6
Both	6	8.2
Total	73	100

Table- 5: Site of defense wound

Site	No. of Cases	Percentage
Forearm	10	13.7%
Hand	44	60.3%
Both	19	26.0%
Total	73	100

Table 6: Side of Defense wound

Side	No. of Cases	Percentage
Right	13	17.8%
Left	33	45.2%
Both	27	37.0%
Total	73	100

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Profile of Deaths of Women with in Seven Years of Marriage in Agartala, Tripura

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ABSTRACT

Epidemiological and medico legal including forensic pathology and toxicological aspects of deaths of females within seven years of marriage were studied in Agartala, Tripura during a period spanning from 1st March 2013 to 28th February 2014. Total numbers of female deaths were 308, out of which 55 numbers of deaths occurred within seven years of marriage. In this present study, out of all the autopsies conducted within the study period in females, 17.85% of deaths occurred within seven years of marriage. The majority of the victims were Hindu housewives with low socioeconomic status with little or no education at all. Burning has been the most common mode of death. Most of the cases occurred in a very young age group (<20years) and within the 2nd year of marriage. The maximum numbers of cases were reported to be in arranged marriage couples who live in a joint family with the in laws and bear no issues.

Keywords: Deaths in Females, Seven Years of Marriage, Dowry

INTRODUCTION

India is a country where women empowerment and liberalization are taking a major shape. Infact India is a country where women are worshipped in the form of various Goddesses in every nook and corner. But are we actually seeing the truth? It has been reported that one woman dies every hour due to dowry related reasons on an average in the country, which has seen a steady rise in such cases between 2007 and 2011¹. Even the National Crime Records Bureau (NCRB) figures state that 8,233 dowry deaths were reported in 2012 from various states. The statistics work out to one death per hour. Harassment of newly wed females by their in-laws and husbands for dowry, ill treatment by new family members, rash and negligent behavior and extra marital affairs of husband, maladjustment and infertility are the most common reasons behind such deaths².

A woman has to go through various vital events of life such as marriage, changes in her social environment, adjusting to new people in a new family, bearing and rearing children, for which she has to face mental, physical, psychological and social stress. This gender based violence is contributing gravely to the preventable morbidity and mortality of women across

diverse cultures³. Under Article 21 and article 14 of Indian constitution women have been given special protection. Time and again Supreme Court of India extended the ambit of Article 21 and held that mere existence is not the right to live, it is the right to live with dignity⁴. The present study has been undertaken to explore the various causes of deaths in females occurring within seven years of marriage.

MATERIALS AND METHOD

Material for the present study are comprised of all cases of deaths in females who died within seven years of their marriage and brought to the mortuary of Agartala Government Medical College and GB Pant hospital, Agartala, Tripura between 1st March 2013 and 28th of February 2014 for postmortem examination. In order to get a good epidemiological picture even all natural deaths (i.e., all brought dead cases), death due to road traffic accidents etc are also included. The various epidemiological data were collected from the police inquest papers, police investigations, various newspaper recordings, hospital records, postmortem findings and history taken from the relatives of the deceased. In all the cases magistrate level inquest were held.

OBSERAVTION:

The total number of autopsy done on females within the study period is 308 and out of that 55 number of cases were autopsied where death occurred within seven years of marriage i.e.,17.85% of all autopsies done on females within the duration of March 2013 till February 2014..

Table 1. Showing duration of marriage

Duration in years	No. of cases	Percentage
<1	13	23.63
1-2	15	27.27
2-3	7	12.73
3-4	10	18.2
4-5	4	7.27
5-6	5	9.09
6-7	1	1.82
Total	55	100

Table 2. Sowing age at death

Age in years	No. of Cases	Percentage
18-20	20	36.36
21-22	8	14.55
23-24	9	16.36
25-26	6	10.91
27-28	4	7.27
29-30	8	14.55
Total	55	100

Table 3. Showing socioeconomic status

SE status	No. of Cases	Percentage
Lower	44	80
Lowermiddle	16	10.91
Uppermiddle	5	9.09
Upper	Nil	Nil
Total	55	100

Table 4. Showing educational status of victim

Education status	No.of Cases	Percentage
Illiterate	5	9.09
Primary	10	18.18
Secondary	34	61.82
Graduate	6	10.91
Postgraduate	Nil	Nil
Total	55	100

Table 5 Showing occupation of the victim

Profession	No. of Cases	Percentage
Housewife	47	85.45%
Office goers	Nil	Nil
Others	8	14.55
Total	55	100

Table 6. Showing type of death

Type of death	No. of Cases	Percentage
Burn	27	49.09
Hanging	9	16.36
Strangulation	Nil	Nil
RTA	3	5.45
Poisoning	6	10.91
Physical assault	2	3.64
Drowning	Nil	Nil
Other causes (brought dead cases, negligence cases etc)	8	14.55
Total	55	100

Table 7. Showing religion of the victim

Religion	No. of Cases	Percentage
Hindu	55	100
Muslim	Nil	Nil
Christian	Nil	Nil
Others	Nil	Nil
Total	55	100

Table 8. Showing type of marriage

Type of marriage	No. of Cases	Percentage
Arrange	46	83.64
Love	9	16.36
Total	55	100

Table 9. Showing type of family

Type of family	No. of Cases	Percentage
Joint	42	76.36
Nuclear	13	23.64
Total	55	100

Table 10. Showing issues of the victim

Issues	No.of cases	Percentage
Both male and female	6	10.91
Only males	10	18.18
Only females	13	23.64
Pregnant at the time of death	2	03.64
No issues	24	43.63
Total	55	100

DISCUSSION

The present study showed that 27% of the deaths occurred within 2nd year of marriage which showed the highest incidence while 23% of the females met their fate within 1st year of marriage.

This findings are consistent with the study of Praveen Arora and A.K Shrivastava (2013)² Rajesh C Dere, Col.K.M.Rajoo(2011)⁴, Kulshrestha p, Sharma RK, Dogra T.D (2004)⁵and Sandra L Martin and et al

(2002)⁶. In all these three studies the incidence were reported to be highest in early age of marriage.

The highest number of cases were reported to occur in a younger age group i.e., among less than 20 years of age bearing a statistics of 36.36%. Thus the most vulnerable age group is reported to be among 18 to 20 years of age while the second most vulnerable age group is 21 to 22 years of age (14.55%). Praveen Arora and A.K Shrivastava (2013)² and Kulshrestha p, Sharma RK, Dogra T.D (2004)⁵ Dr. Reddy P Srinivasa et al(2012)⁷reported in their studies that the most vulnerable age group are between 20 to 22 years of age. In some other studies highest number of cases are reported to be in mid 20s. Early marriage of the girls can be a burning cause for these deaths given to the fact that the victim's maturity levels are not properly modified at this level to sustain stress and strain.

The comparison was done on the basis of socioeconomic status as well which reflected that 80% of the unfortunate incidences happened in the lower socioeconomic class while the upper socioeconomic class reported no case at all. This finding is consistent with the other studies where maximum numbers of cases are reported to occur in the lower to lower middle class people.

Based on the degree of education of the wife it has been reflected that more than 60% of the cases had secondary education while no cases were reported among population having a postgraduate education. This finding is in accordance with the findings of Praveen Arora and A.K Shrivastava (2013)² and Kulshrestha p, Sharma RK, Dogra T.D (2004)⁵ Sandra L Martin and et al (2002)⁶ and Zine Kailash U et al (2009)⁸.

In this present study out of all the unfortunate cases 85.45% of them occurred among the housewives while 14.55% of them occurred among women who does daily wager jobs like daily labour etc., This finding is consistent with the findings of Praveen Arora and A.K Shrivastava (2013)² where 96.5% of the victims were housewives and with the findings of and Kulshrestha p, Sharma RK, Dogra T.D (2004)⁵ where 90% of the cases were housewives.

The highest number of deaths occurred by burning bearing a statistics of 49%, second highest being hanging (16.36%) and no cases of death by drowning or strangulation are being reported. This finding is consistent with the findings of Rajesh C Dere,

Col.K.M.Rajoo(2011)⁴ Kulshrestha p, Sharma RK, Dogra T.D (2004)⁵, Zine Kailash U et al (2009)⁸ and Prajapati et al (2013)⁹ where burn injuries are the most reported cases.

All the cases were reported to happen in Hindu community. It can also be explained by the fact that Tripura itself being dominated by Hindu religion followed by Muslim and Christians respectively. The findings are consistent with the studies of Praveen Arora and A.K Shrivastava (2013)², Kulshrestha p, Sharma RK, Dogra T.D (2004)⁵ and Zine Kailash U et al (2009)⁸.

83% of the incidence happened in arranged marriage couples and among couples living in a joint family (76%). This findings are in accordance with the studies of Praveen Arora and A.K Shrivastava (2013)² while Kulshrestha p, Sharma RK, Dogra T.D (2004) stated that suicides were more common in joint families clearly indicating towards strained relations with in-laws/husband, dowry, torture-physical/mental, and maladjustment in new environment while cases from nuclear families were mostly accidental⁵

In this present study it has been shown that 43.63% of the deaths in females within seven years of marriage occurred in cases where there had been no issues borne by the female at all. This finding is consistent with the study of Kulshrestha p, Sharma RK, Dogra T.D (2004)⁵

CONCLUSION

The numbers of death of a woman within the seven years of marriage are gradually taking its toll all over India. Maximum numbers of the cases come with an associated allegation of the lady suffering from tortures relating dowry. In this present study it has been stated that a very high incidence of death are reported to occur within first few years of marriage and most of the victims are less than 20 years of age or in their early 20s having a very little or no education at all. Most of them happen to be unemployed and mere housewives. These women are dependent on their in laws family not only mentally but also economically as well. Given their age so young

they do not possess sufficient maturity to go through the stress and strain of adjusting to a new environment especially in a joint family. Incidence is more common in the lower socioeconomic group. It also may be explained by the fact that the burden of running the family lies alone with the husband, the wife being a mere housewife thus gradually building

up the tension both psychologically and economically. Thus in order to prevent these mishaps various social organizations and women welfare organizations are taking initiative and also both legal and administrative steps have been taken by Government to give protection to young married women against cruelty at the hands of their husbands and in-laws⁵ Along with these steps it is becoming very much necessary for each and every woman in each and every nook and corner of India to get a proper education which in turn will make them not only financially independent but also will help them attain self-confidence and self-respect.

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Study of Cases in the Casualty of a District Hospital

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ABSTRACT

This study was conducted on 250 patients who visited the casualty of District Hospital, Raichur, Karnataka, India. The objective of the study was to know the pattern of cases in the casualty of a district hospital and to analyse the case mix pattern of emergency cases in the casualty. General Medicine & its allied speciality contributed to the maximum number of patients attending the casualty. Maximum number of the patients visiting the casualty had minor complaints and did not suffer from any serious or life threatening problem, which actually required admission and emergency medical care. This results in increase workload of the casualty staff working mainly for providing emergency care in the hospital.

Keywords: *Casualty, Emergency, Medico Legal, Case Mix Pattern*

INTRODUCTION

“Medical Emergency” is defined as a situation when the patient requires urgent medical care to prevent loss of life or limb & initiate action for the restoration of normal healthy life¹.

Casualty section is an important entry point for all the emergency cases. The medical definition of casualty is

- 1) A serious or fatal accident,
- 2) A military person lost through death, wounds, injury, through internment, or capture or through being missing in action,
- 3) - Injury or death from accident
- One injured or killed (as by accident)².

The original term (casualty) meant a serious injured patient. It was predominantly a military word, a general term for the accidents of service: after a battle the dead, the wound & the sick lumped together as

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“casualties”. The term “casual” has its origin from the work house “casual” who was not one of the unemployable permanents, but the irregular and unexpected caller who needed temporary help¹. The casualty of a hospital takes over the complete emergency incharge of the hospital after completion of the duty hours of other OPD departments. In India, the casualty staffs usually provide first aid service to emergency patients until the provision of speciality care to the patient & they treat casual patients who visit the casualty for minor ailments with few complaints especially after other department OPDs are closed due to working hour patterns.

MATERIALS & METHOD

The present study was conducted in the casualty of a District Hospital, Raichur, Karnataka, India during the period Jan to June 2013. A total number of 250 patients attending the casualty during this period were studied. The particulars of the patients were collected from casualty register, case sheets/records & from medical records department of the hospital. The patients were categorised under various specialties of Medicine, surgery orthopedics, pediatrics, OBG, ENT, ophthalmology & psychiatry. The purpose of categorizing or grouping was to know regarding the case mix pattern of patients

To study the pattern of medico-legal cases, the patients were again grouped under the four categories mentioned as follows.

- 1) Emergency cases [threat to life or limb requiring admission]
- 2) Serious but not emergency cases [no threat to life or limb but still requiring admission]
- 3) Cases requiring skilled treatment without any admission, but follow up can be done on outpatient basis.
- 4) Casual attendees with trivial trauma or minor ailments.

Table I: Age & sex distribution of patients

Sex	Age								Total
	0-10yrs	11-20	21-30	31-40	41-50	51-60	61-70	71-80	
Male	18	23	51	18	17	12	06	1	146
Female	11	13	28	12	13	21	05	1	104
Total	29	36	79	30	30	33	11	2	250
Percentage	12	14	32	12	12	13	04	01	100%

Table II: Case mix pattern of patients & the specialty

Sl. No.	Specialty	Patients	Percentage
1	Medicine	106	42
2	Surgery	65	26
3	Orthopedics	32	13
4	Pediatrics	18	07
5	OBG	08	03
6	ENT	09	04
7	Ophthalmology	10	04
8	Psychiatry	02	01
	Total	250	100%

Table III: Type wise distribution of patients:

Types	No. of Patients	Percentage
Type I	11	04
Type II	85	34
Type III	30	12
Type IV	124	50
	250	100%

Table IV: Type of cases [MLC v/s Non-MLC]

Type	Cases	Percentage
Medico legal case	46	18
Non – Medico legal case	204	82
Total	250	100%

Table V: pattern of medico legal cases

	Road traffic accidents	History of fall	Poisoning	Assaults	Thermal burns	Others	Total
Number of cases	15	20	02	03	02	03	45
Percentage	33	45	04	07	04	07	100%

DISCUSSION

Table I shows the age & sex distribution of patients. Male patients (146) outnumbered female patients (104) in attending the casualty department male preponderance was observed in all age groups. The above findings are consistent with the other study in which it was found that majority of the cases involved were adults and more than half of them were males³.

Case mix pattern (Table II) of patients reveals that maximum number of patients belonged to medicine [106 (42%)] followed by surgery [65 (26%)], orthopedics [32 (13%)], pediatrics [18 (07%)], OBG [08 (3%)], ENT [09 (04%)], ophthalmology [10 (4%)], psychiatry [2 (1%)]. The above findings are consistent with the other study in which it was found that maximum patients belonged to Medicine and its allied speciality. It was found that large proportions of patients attending the casualty department were casual attendees and as such did not constitute real clinical emergencies⁴.

Table III shows the grouping of patients under various categories. Category I – 11 (4%) patients, category II – 85 (34%) patients, category III – 30 (12%) patients & category IV – 124 (50%) of patients. The study findings clearly show that maximum i.e. 50% of patients belonged to category IV. In a study conducted at tertiary care hospitals revealed that road traffic accidents constituted majority of the cases most being medico-legal cases, followed by poisoning cases and assault cases. Male predominance was quite evident. The affected age group was 21–30 years followed by 31–40 years indicating young were exposed to such casualties⁵.

Table IV shows MLC & non-MLC disposition. Out of 250 cases studied 46 (18%) were MLC & 204 (82%) were non-MLC. Table V shows the pattern of medico legal cases. 4 % were thermal burns, 4 % were poisoning, 7 % were assault 33 % were road traffic accidents, 45 % gave the History of fall & 7 % were others. This analysis regarding disposition of patients various specialties are comparable with the other research study⁶.

Table V shows pattern of Medico legal cases. Maximum number of cases were history of fall 20 cases (45%) followed by road traffic accidents 15 cases (33%). This finding is consistent with other study in which it was found that Fall from height was the commonest mode of injury followed by road traffic accidents among the patients coming to the hospital while

significant number of trauma patients coming to outreach centers were due to fall from height⁷.

Conclusion: This study concludes that almost half of the patients who were brought to casualty were patients with trivial trauma or minor ailments, which did not require much skilled treatment. Since the maximum numbers of patients attending the casualty were casual attendees, it increases the unnecessary workload of casualty staff. Most of the time is spent in dealing with non-emergency cases this aspect may trouble the emergency care seekers & the treating staff. Hence, suitable measures have to be taken such as separating casual attendees & emergency cases at the entry point of casualty & channelizing the casual care seekers to OPD, thereby to minimize the burden on staff. Without revision of primary health care services, accident and emergency departments will continue to be used inappropriately by patients as an alternative to general practice care. Injuries can be prevented by proper education, awareness and training of safety standards which are required to be implemented strictly under supervision. The doctors who are involved in handling medico legal cases need to be more trained. Also, due to increase in violence and accidents, the need for round the clock availability of medico legal experts, in casualty and emergency departments to deal with medico legal cases is must.

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Seroprevalence of HBV and HCV in Forensic Autopsy Cases

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ABSTRACT

Autopsy rooms are known to be high risk areas for infection and pose a potential health hazard for those working there. While conducting autopsies in conditions which may not provide adequate protection to the forensic personnel, it exposes them to high risk blood-borne viral and other bacterial infections. With the increasing seroprevalence of hepatitis virus, the mutilated and traumatized bodies of victims requiring autopsy, pose a considerable risk to the forensic personnel handling these remains. However limited data are available regarding the risk of acquiring such infections.

The purpose of this study was to estimate the prevalence of HBV and HCV infection in unreported post-mortem cases in the autopsy room. During the study period of 2 months i.e. July - August 2007, randomly selected 40 cases of post-mortem subjects, brought to the mortuary with no previous medical record of infection by either HBV or HCV, with a time interval between death and conduction of post-mortem being less than 24 hours, were included in the present study. It was found that these infections pose a risk for forensic experts and post-mortem room workers. The authors recommend that all forensic autopsies should be treated as potentially infectious and appropriate precautions should be taken when performing autopsies.

Keywords: Seroprevalence, HBV, HCV, Forensic Autopsy

INTRODUCTION

Medico legal autopsy is mandatory in all sudden, unexpected, unexplained, unattended natural deaths or any unnatural death, but the prevailing conditions in mortuaries make it a potential health hazard for those working there.

In resource limited health care settings like India, the situation is worse off and the risk is further compounded by additional factors like high daily working load, traumatized state of many of the bodies,

adverse working conditions and inconsistent availability of protective gears.

Medical history is not available in the cases which are unknown and unclaimed, brought dead to the mortuary. In most of the cases usually, the medical history of the subject may be incomplete and may even be incorrect if fictitious history is put forward by relatives. Practically it is very difficult to know the infectious status (HBV, HCV, HIV, Tuberculosis, etc.) of each and every deceased person brought for the postmortem before conducting the autopsy. With death, the translocation of microorganisms becomes easier in the absence of any live membrane/ cellular barrier.

Hepatitis due to HBV and HCV pose a serious threat to pathologists and forensic experts working in an autopsy room. Infection can be acquired by one of the following routes –infected blood/body fluid of the

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deceased coming in contact with an open wound / area of dermatitis/mucous membranes of eyes/nose/mouth, needle-stick or other injuries resulting from contaminated instruments/bone fragments, inhalation / ingestion of aerosolised particles generated by aspirators, oscillating saws & water hoses or even by compressing and dissecting the lungs.

Considering the present situation, where HBV & HCV infections are taking the form of a global epidemic, the present study was designed to estimate the prevalence of HBV and HCV infection, in unreported post-mortem cases in the autopsy room. It also attempts to see if HBV & HCV seropositivity is related to any demographic characteristics (age, sex, religion, marital status) or any risk factors as history of drug abuse, history of blood transfusion, and family history of hepatitis etc. and analyse these risk determinants, whether they can serve to caution the autopsy surgeon regarding the infectivity of the cadaver.

MATERIAL AND METHOD

The study was carried out at the postmortem centre & Microbiology laboratory of Topiwala National Medical College, and B.Y.L. Nair Charitable Hospital, Mumbai, after taking approval from the Institutional Ethics Committee. During the study period of 2 months i.e. July - August 2007, randomly selected 40 cases of post-mortem subjects brought to the mortuary with no previous medical record of infection by either HBV or HCV and time interval between death and conduction of post-mortem less 24 hours were included in the present study. Informed consent was taken.

Medical Records were reviewed and HBV and HCV positive cases were excluded from the study. Relatives were interviewed based on preformed proforma for

demographic characteristics (age, religion, marital status) and risk determinants (H/o drug abuse or blood transfusion and family history of hepatitis) which might help to predict their association with the sero-status of the deceased with regard to HBV and HCV. 5 cc blood was collected from the deceased from the right ventricle of the heart taking aseptic precautions and stored at 2 degree Celsius till analysed using standardised ERBA Lisa Hepatitis B test kit and HCV Microlisa test kit. The statistical analysis was done using Fisher’s Exact Test for association with the risk determinants and the results were reported.

OBSERVATION AND RESULTS

During the study period of 2 months, randomly selected 40 cases of post-mortem subjects brought to the mortuary with no previous medical record of infection by either HBV or HCV were included and analysed.

Table 1 : Age specific seroprevalence of HBV and HCV

Age Group	No. of cases	HBV	HCV
0-9	0	0	0
10-19	3	0	0
20-29	8	0	0
30-39	7	0	0
40-49	8	0	2
50-59	8	1	1
60-69	4	0	0
>70	2	0	0
Total	40	1 (2.5%)	3 (7.5%)

- In the present study the seroprevalence of HBV was 2.5% and that of HCV was 7.5%.
- The infection was most prevalent in the 40-60 years age group.
- All positive cases were males.

Table 2 : Prevalence of HBV and HCV in known and unknown cadavers.

Identity	HBV			HCV		
	+ve	-ve	Total	+ve	-ve	Total
Known	1	27	28	2	26	28
Unknown	0	12	12	1	11	12
Total	1	39	40	3	37	40

Fishers Exact test value (one tail) is 0.7 (HBV) and 0.66 (HCV) at D.F 1: P > 0.05 [D.F – Degree of freedom, P – one tail probability]

- Table 2 depicts that 30% of the cadavers (12 cases) in the present study were unidentified. Though statistically not significant, infection with HBV (1

case) and HCV (2 cases) was more common in cadavers whose identity was known as compared to the unidentified cadavers (0 HBV case and 1 HCV case)

- HBV & HCV seropositivity could not be related to any demographic characteristics (age, sex, religion, marital status) or risk factors (history of drug abuse, history of blood transfusion, and family history of hepatitis.)

DISCUSSION

Forensic personnel and those working in close contact with dead bodies are at constant risk of

acquiring transmissible diseases like HBV, HCV, HIV etc.

Quite often the forensic department deals with situations involving drug abusers, prostitutes, homosexuals and unidentified bodies where the statistical risk of hepatitis infection is markedly greater than that of the general autopsy population.

Most of the previous studies carried out found no association between any risk factors (like history of drug abuse, blood transfusion, age, sex, marital status, sex) and seroprevalence of HBV & HCV in the autopsy population.

Table 3 : Comparison with previous studies

Name of the study	Sample Size	Year	Test Used	%HBV	%HCV	Associated Risk factors
Li et al ¹	414	1993	ELISA for HBsAg & Anti-HCV Ab	23.2	19.1	Intravenous drug abuse
Brian et al ²	785	1998	ELISA for HBsAg & Anti-HCV Ab	0.76	1.27	No specific association
Plessis et al ³	263	1999	ELISA for HBsAg & Anti-HCV Ab	8	1	No specific association
Takamatsu et al ⁴	1044	1998	ELISA for HBsAg, Anti-HBV Ab & Anti-HCV Ab	1	11	No specific association
SaneihZadeh ⁵	173	2000-01	ELISA for HBsAg & Anti-HCV Ab	4.6	4.04	No specific association
MounaLazrek et al ⁶	77	2005	ELISA for Anti-HCV Ab and HCV RNA & immunoblot assay	-	16.9	No specific association
Kato et al ⁷	12	2007	Polymerase chain reaction	0	16.6	Intravenous drug abuse
Present Study	40	2007	ELISA for HBs Ag & Anti HCV Ab	2.5	7.5	No specific association

In the present study the seroprevalence of HBV & HCV was found out to be 2.5% and 7.5% respectively. The difference in the seroprevalence of HBV and HCV in different studies may be due to a difference in the geographic distribution of the viruses and the different populations studied.

Out of the 40 samples selected, 28 cases were of known identity i.e. they were either accompanied by relatives or were escorted by police personnel. One case tested positive for HBV and 2 cases tested positive for HCV in this group. The unidentified cases (12 in number) were victims of road and railway accidents. One case was positive for HCV in this group.

No association could be found in the present study with any of the risk factors. The risk determinants considered in this study were age, sex, marital status, history of drug abuse and blood transfusion.

The seroprevalence was found to be maximum in the age group 40-60 years. This is in agreement with the study done by Sanieh-Zadeh ⁵. This is probably because the cases have been brought to the hospital at a later age, but may have harboured the virus for a long time.

All positive cases in the present study were males; however the results were not statistically significant. This may be due to the fact that most of the autopsy cases were of accidental deaths and generally, it is the male population which is more mobile, the females being confined to the relative safety of their homes.

No association was found with the marital status of the individual. Though Gholamreza ⁸ in his study found HBV & HCV to be more prevalent in singles as compared to married population which may be due to high risk sexual behaviour & indulgence in drug abuse,

no such correlation was found in the present study, as the sample size of single men was not enough to compare with married men. Even in married cases, their personal sexual history given by their relatives could not be relied upon.

No association of infection with HCV & HBV was found in post-mortem subjects with a history of blood transfusion. This is so because the number of cases who received blood transfusion was small as compared to those who hadn't received it. And the cases which tested positive were from the group who hadn't received blood transfusion.

Present study found no association with drug abuse, though Kato et al ⁷ & Li et al ¹ found a high prevalence of the viruses in cadavers who were known intravenous drug users. This is so because none of the cases in the present study had a positive history of drug abuse. A history of drug abuse and blood transfusion should put the autopsy surgeon on alert, but such a detailed medical history is either not available or not revealed by the family and screening all cadavers for HBV & HCV is impractical because of several technical & practical reasons.

The findings of previous studies as well as present study reinforce the fact that while handling human remains, use of personal protective gears and observing standard safety precautions should be made mandatory.

CONCLUSIONS

The present study determines a high prevalence of HBV & HCV in the autopsy population at a tertiary care hospital in Mumbai. In light of the results obtained and the interpretation and analysis of the findings, it is advisable that forensic personnel should consider all autopsies as potentially infectious and should therefore follow standard precautions ⁹ in the autopsy room.

Hepatitis B virus is almost totally preventable by adequate vaccination and appropriate booster injections. According to recommendation from U.K., every health care worker should be vaccinated and antibody level measured every 5 years. Vaccines against other deadly diseases like tetanus, diphtheria, pertussis, measles, mumps, rubella, rabies etc. should be administered to forensic medicine personnel ¹⁰.

In Medicolegal autopsies where the infectious status of the dead bodies is not known (as in unknown, unclaimed and brought dead cases), screening for HBV and HCV should be made compulsory before performing an autopsy.

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Study of Metopic Sutures in South Chennai Region of Tamilnadu

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ABSTRACT

Sutures are fibrous joint which hold together majority of the skull bones. The fibrous joint between two frontal bones is termed as Metopic suture, which is a dentate type of calvarial suture that runs through the midline across the frontal bone. In the present study 100 skull bones were evaluated for the presence of complete and incomplete metopic suture and their morphology. The results were compared with the available literatures. The incidence of complete metopic suture was found to be 2% and incomplete metopic suture was found to be 88%. Linear variety pattern was found to be most common type (25.4%) and least was inverted U shaped pattern with (2.05%).

Keywords: Metopic Suture, Frontal Bone, Bregma

INTRODUCTION

The skull is the bony skeleton of the head. It shields the brain, the organs of special sense and the cranial parts of respiratory and digestive systems and provides attachments for many of the muscles of the head and neck. The majority of skull bones are held together by fibrous joints termed sutures. The frontal bone is an unpaired skull bone forming the forehead or the 'fron'. The metopic suture (also known as the frontal suture) is a dentate type of calvarial suture that runs through the midline across the frontal bone. According to Gray¹, the glabella may show remains of frontal suture (metopic suture), which is present in about 9% of adult skulls.

Manzanares et al² mentioned that the metopic suture ossifies in membrane from two primary centers which appear by the end of second month of fetal life and fuse first at the inner surface of the skull by chondroid tissue. As stated by Moore et al³ frontal

suture is obliterated by 8th year and in approximately 8% of the people, metopic suture persists. Datta⁴ reported that at birth the two halves of the frontal bone remain separate as the metopic suture, which is replaced by bone at about 2 years. Knowledge regarding the persistent metopic suture is essential in studying the radiographs to avoid misinterpretation as fractures and also in evaluating various medico-legal cases. However, in some cases, it may persist either in complete or in an incomplete form. The suture, when extends from bregma to nasion in a complete form it is called metopism or persistent metopic suture or sutura-frontalis persistent and if it extends in an interrupted form, it is called an incomplete metopic suture. The remnant suture seldom penetrates deeper than the outer table at all⁵. This remnant, as with the inferior portion of a complete metopic suture, is very tortuous and exhibits various morphological patterns. Though rare, metopism is not considered as pathological⁶, but their premature fusion can result in craniosynostosis and trigonocephaly⁷ and is termed as metopic synostosis. Bryce⁸ stated that the metopism is more frequent in the taller individuals.

It is commonly said that, even in the adults, some traces of the suture persist at the nasion⁹. According to Warwick & Williams, metopic suture is obliterated by 8th year. Romanes⁹ declared that the metopic suture closes by 5th or 6th year, leaving traces above or below.

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Similar studies have also been made on Indian skulls and metopism has been found to be 5% (Jit & Shah, 1948)¹⁰, 3.31% (Das, Saxena & Deo, 1973)¹¹ and 2.66% (Agarwal, Malhotra & Tewari, 1979)¹².

Hess¹³ defined "metopica syndrome" of persistent metopic suture with associated cranial and finger anomalies, probably genetically determined. Many factors were attributed for persistence of metopic sutures into adult age which include hormones, cytokines, growth factors, cranial malformations, abnormal skull growth, hydrocephalus, atavism, genetic causes, etc¹⁴. Ossenber¹³ stated that the trait is presence slightly more often in females than in males. Torgersen¹⁵ studied the trait radiologically in living and determined that the suture is due to a dominant gene with varying penetrance. Impaired closure of the metopic suture is common in Apert syndrome¹⁶. The present study aims at evaluating the persistent metopic sutures in adults & comparing the results with different authors.

MATERIALS AND METHOD

This study was conducted in the Department of Anatomy and Forensic Medicine, Madha Medical College, Kovur, Chennai. 100 skulls of unknown age and sex were obtained from the Department of Anatomy and Forensic Medicine, Madha Medical College. Damaged and diseased skulls were excluded from the study. Each skull was thoroughly inspected for different forms of metopic suture. The measurements of the lengths of metopic suture were tabulated and compared with those of different authors.

RESULTS

100 skulls were studied for metopic suture of which 2 skulls (2%) showed complete metopism whereas 88 skulls (88%) showed incomplete metopic suture and 10 skulls (10%) showed total absence of metopic suture. Of the skulls that showed incomplete metopic sutures, 84 (95.45%) were on the anterior 1/3 starting

from nasion extending over glabella, 3 (3.4%) were on the middle 1/3rd and 1 (1.1%) on the posterior 1/3rd. The morphological patterns of these sutures were studied. The sutures on middle 1/3rd and posterior 1/3rd showed linear pattern whereas the sutures present on anterior 1/3rd of the skull, showed a variety of morphological patterns.

Table 1: Incidence of metopic sutures

Extent of suture	N	%
Absent suture	10	10
Complete	2	2
Incomplete	88	88
Total	100	100

Table 2: Incidence of incomplete suture as per the location

Location of suture	N	%
Anterior 1/3	84	95.45
Middle 1/3	3	3.40
Posterior 1/3	1	1.13

DISCUSSION

Variations of metopic sutures have been studied by several research workers. Keith¹⁷ stated that the metopic suture disappears at the end of the first year or at the beginning of second year of life, but Piersol¹⁸ has mentioned that it closes by the end of the fourth year with a faint trace persisting at the lower end. According to Romanes⁹, the metopic suture is present at birth but is normally closed by the five or six years and only traces of it will be left above and below. In the present study, metopism is seen in only two cases (2%) which is higher than the incidence reported by Bryce⁹ in Negroes & Australian, Africans by Breathnach¹⁹ but lower than Indian as reported by Das et al¹¹, Agarwal et al¹², Ajmani et al²⁰, Jit & Shah¹⁰ and lower than Bryce's⁹ study on European, Mongolian & Scottish skulls. The results of the present study with previous ones are compared in Table no.3

Table 3: Incidence Of Metopism In Difference Races As Reported By Various Workers

Worker	Race	Percentage
Jit & Shah, (1948)	Indian (Punjabi)	5.00%
Das et al., (1973)	Indian (U.P)	33.31%
Agarwal et al., (1979)	Indian(Kanpur)	2.66%
Bryce et. al., (1915)	European	8.70%
	Mongolian	5.10%
	Negroes	1.20%
	Australian	1%
	Scottish	9.50%

Table 3: Incidence Of Metopism In Difference Races As Reported By Various Workers (Contd.)

Worker	Race	Percentage
Keith et al., (1948)	Subject to race	3.8%
Woo et.al., (1949)	Mongolian	10.0%
	Negroes	2.0%
Breathnach et al., (1958)	European	7-10%
	Yellow races	4-5%
	African	1.00%
Romanes et.al., (1972)	Europeans	UP TO 8%
Berry et.al., (1975)	Various ethnic groups	07.4%
Ajmani et.al., (1983)	Nigerians	3.40%
Present study (2014)	Indian (Tamil Nadu)	2%

In our study, majority of the skulls showed incomplete sutures. Of this, most were of linear variety (25.45%) followed by U shaped (14.45%), V shaped (12.34%), H shaped (7.34%) & Y shaped patterns (4.93%) and least observed was inverted U shaped (2.05%). The incidence of these morphological patterns in previous studies is compared in Table no. 4.

Table 4: Comparison of the incidence of incomplete metopic suture with other workers

Extent and shape of suture	Agarwal et al., (1979)%	Das. et al., (1973)%	Jit & Shah, (1948)%	Ajmani. et.al. (1983)%	Present study (2014)%
Incomplete	35.51	17.57	-	31.57	88
Linear	23.12	-	-	24.27	25.45
'H'-shaped	1.57	-	1.25	3.88	7.34
'U'-shaped	-	-	-	-	14.45
Inverted' U'	2.43	1.93	11.25	0.97	2.05
'V' shaped	3.25	1.01	-	0.49	12.34
'Y'shaped	1.96	0.28	1.25	-	4.93

CONCLUSION

The persistence of metopic suture in adults which separates the frontal bones is of paramount importance in interpreting the radiological images and in evaluating medico-legal cases. The morphological knowledge of the metopic suture is important for the radiologists and neurosurgeons in day-to-day practice. Persistent metopic suture can be misdiagnosed as a vertical traumatic skull fracture in head injury patients. Therefore the surgeon should be aware of this anatomical condition in the surveillance of the traumatized patient and during surgical intervention especially frontal craniotomy. It is also important for paleodemography and Forensic medicine. Persistent frontal sutures are visible in radiographs they can be useful for the Forensic identification of human skeletal remains. Thus the present study will be useful in the fields of human Anatomy, Forensic Medicine, Neurosurgery, Radiodiagnosis, Trauma and Emergency care.

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Conflict of Interest: We the authors hereby declare that authors or the institution have no financial or the other relationship with other people or organization.

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Ethical Clearance: Taken

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Comparison of Body Height and Percutaneous Femur Length among North Indian Students

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ABSTRACT

Background: Identification of any victim is very important for any crime investigation. It is important in mass disaster or any other situation in which identification is necessary. Stature is one of the important elements of identification.

Objectives: In this study we try to find the relation between percutaneous femur length and stature along with multiplication factor to reconstruct the stature.

Method: The current study was conducted among 145 medical students during January to March 2013 in Department Of Forensic Medicine, PGIMS, Rohtak.

Results: The average of mean femur length in male and female was 41.9 and 42.4 cm respectively. Height of individual male was 4.11 and female is 3.74 times the length of his/her femur length. The correlation coefficients between stature and dimensions of femur were found to be positive and statistically significant.

Conclusion: It means there is a definite relation between height and femur length and if either of the measurement (femur length or total height) is known, the other can be calculated. The results of the present study show that femur dimensions can be used as predictive values for stature estimation by Anthropologists and Forensic Medicine experts.

Keywords: Anthropometry, Correlation, Femur Length, Total Body Height

INTRODUCTION

Forensic anthropology is a branch of anthropology concerned with the application of anthropological knowledge and methods to the legal process.¹ Stature estimation is difficult when forensic expert gets an incomplete or fragmented corpse. When incomplete skeletal material is available, calculations have to be made on the basis of one or more bones. Where ever possible, all available bones should be used and a consensus of results assessed, though the accuracy derived from different bones varies. The descending order of usefulness is : femur, tibia, humerus, radius.²

In India there is a lacunae in this field as documented material available pertains to western countries or particular state or sect which is not apt for a country with so much genetic & socio-cultural

diversity. The researchers have focused their attention towards living population groups of India and have taken relevant bone lengths over the skin² and correlated them with the stature to find out the relationship between them and subsequently formulated regression formulae for reconstruction of stature. Thus almost all the studies conducted by researchers in India pertains to the use of percutaneous measurements of body including upper and the lower extremity bone lengths for reconstruction of stature³⁻¹².

Various studies have reported significant difference in the proportions of the limb bone dimensions, due to the environmental and genetic differentiation. Owing to the genetic, dietary and socio-cultural variations observed in different population groups in

India, an attempt has been made in the present study to compute multiplication factors and regression equations for estimation of stature among male and female in population of Haryana, which could be used as reference for further studies and our indigenous formulae could be developed for use in near future.

MATERIAL AND METHOD

For present study, total 145 (80 male and 65 female) asymptomatic, healthy medical students belonging to various regions of Haryana were selected. Their age ranged between 18 to 25 years. The study was conducted during January to March 2013 in Department Of Forensic Medicine, PGIMS, Rohtak. The left femur was selected for measurement.

The measurements were taken at a fixed time between 2.00 to 4.30 p.m. to eliminate diurnal variation and by the same person to avoid personal error in methodology. All the observations were recorded in centimeters (cm). Each subject was measured for the following percutaneous dimension besides stature:

Stature (S): It was obtained as the projective distance between the standing surface and the highest point on the head (vertex) when the subject was standing in the standard standing position, using anthropometer.

Femur Length (FEML): It was measured when the subject was standing erect with the left leg placed slightly ahead of the right one and the foot partly inverted to relax the soft tissues. The measurement was made as the distance from the upper most point on the greater trochanter to the lower most point palpable on the lateral femoral condyle, by using body pencils to mark these points & then measuring the distance with a steel measuring tape with graduation upto 1mm.

The data have been treated statistically using the standard programme of SPSS, to obtain mean, standard error of mean, and test of significance. Besides these, correlation and regression equations were also formulated for stature reconstruction.

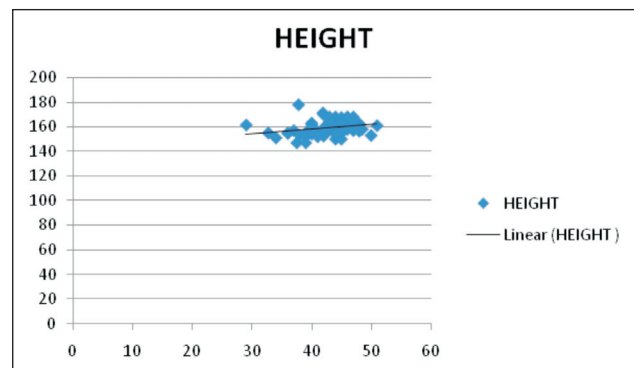
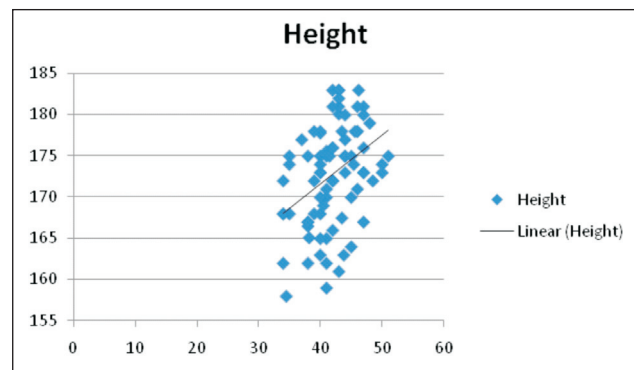
RESULTS

Data of 145 students was analyzed in the current study. Table 1 shows Mean Height, Mean femur length, correlation coefficient®, regression coefficient (b) and value of constant (a) in 80 Males and 65 Females. The correlation coefficient between height and femur

length was found to be positive (0.38 in males and 0.24 in females). (Table 1)

Table -1: Gender wise distribution of selected parameters among medical students

Parameters	Male(n=80)	Female(n=65)
Mean height (cm)	172.75	159.10
S.D. of height	6.111	6.048
Mean femur length (cm)	41.965	42.46
S.D. of femur length	3.99	4.09
Correlation Coefficient (r) (Height and Femur Length)	0.3829	0.2448



In the presence study the formula is derived as under. The linear regression equations which were derived for estimation of statures from Femur length (F) in both males and females are given in table 2. The correlation coefficients between stature and dimensions of femur were found to be positive and statistically significant. (Table 2)

Table -2: Regression formula from foot dimensions for both the sexes

Regression equation from foot length in males
Height = 147.85 +0.5922x F*
*F - Femur length
Regression equation from foot length in females
Height = 143.76+0.3615x F*
*F - Femur length

DISCUSSION

In the present study a good correlation of body height was observed with femur length and it was highly statistically significant with statistical significance of 0.001 in males and 0.002 in females.

The correlation coefficient between height and femur length is + 0.59 in male and + 0.36 in female which is highly significant. It means there is a strong correlation between height and femur length and if either of the measurement (femur length or total height) is known, the other can be calculated and this would be useful for Anthropologists and Forensic Medicine experts.

Height is more if the length of Femur is more. Femur size and height are both based on many factors such as gender, genetics, health and environment. Some of these factors are subject to change due to genetic abnormalities, disability, poor nutrition and hormonal imbalances and these variables can affect the relation of height to femur size.

Preliminary testing shows these ratios to be more accurate in estimating stature than the properly selected Trotter and Gleser adult regression equation in north Indian subjects.

Bhavna, S Nath. studied 503 male and 508 female Shkomia Muslims of Delhi using lower limb dimensions with aged from 20 to 40 years. Author reported Multiplication factors (M.Fs) and linear regression equations for stature estimation. Analysis of data revealed that the Shia males were taller than the Shia females. The sex differences have been observed to be highly significant. The study highlights that the tibial length among males and femur length among female provides the best estimate of stature. The observations were :- Male Stature (MS) mean 167.66cm, SD of MS 5.69, SE of MS 0.25, Femur Length (FL) mean for males 41.71cm, SD of FL 1.96, SE of FL 0.09. Female stature (FS) mean 154.40, SD of FS 4.91, SE of FS 0.22, Femur Length mean for females 38.93, SD of FL 1.62, SE of FL 0.07 and Regression equation for male $77.99 + 2.15 \pm 3.80$, for female $66.82 + 2.25 \pm 3.29$.¹³

CONCLUSION

The results of the present study show that femur dimensions can be used as predictive values for stature estimation in forensic and medical investigations. With this findings it is clear that by the measurement of

either any (femur length or total height) the other can be calculated and this fact may be of practically use in Medico legal cases (M.L.C.) investigations. Thus the results of the present study will provide useful information to various Anthropologists and Forensic Medicine Experts.

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Relationship between Gender and 2D:4D Ratio in South Indian Medical Students

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ABSTRACT

Objectives: To find the association of ratio of second digit (2D) to fourth digit (4D) lengths (2D:4D ratio) with gender among South Indian medical students.

Materials and method: 2D and 4D lengths (right hand) of 316 medical students both male and female from IInd MBBS aged between 18 to 21 years were taken using digital vernier callipers. 2D:4D ratios were calculated by dividing 2D length by 4D length.

Results: Statistically significant difference was found between 2D:4D ratios of male and female students. 2D:4D ratio of males was lesser than 2D:4D ratio of females.

Conclusion: 2D:4D ratio could be used as a gender determinant in South Indian population as agreed upon by other studies in India.

Keywords: 2D:4D ratio, gender determination, sectioning point, South India

INTRODUCTION

In the identification of an unknown individual, initial tools of identification are age, gender and stature. Among these the age and stature are gender dependent. So gender determination is the first step in identification of an individual. The methods of gender determination depend on the degree of sexual dimorphism inherent in the population from which the individual originates. Hence they might be of less efficacy if the individual originates from a population with low levels of sexual dimorphism¹.

Gender of a person can be determined from physical, morphological features, bones, microscopic study of sex chromatin in cells, gonadal biopsy and hormonal methods. Sometimes less reliable features like dress of an individual².

Usually gender determination from an individual is easy if the deceased is normal. If the deceased is found to be in a highly decomposed condition,

skeletonised state or mutilated condition, it becomes a difficult task which requires a proper post-mortem examination of the internal genital tract and skeletal examination³.

If only some part of the body like the head of an individual is received, gender can be determined by presence or absence of beard and moustache. If other parts of the body other than internal or external genitalia are received then it can pose difficulty. The nature and character of the soft parts may be helpful⁴. With skeletal examination, gender determination is more accurate only if pelvis, skull or long bones are available. Otherwise accuracy progressively decreases with other bones^{5,6,7}.

Second to fourth digit ratio (2D:4D) means ratio of the length of the index finger to length of the ring finger. Several studies have shown 2D:4D ratio and its correlation with gender and sex hormones. Lower 2D:4D values to be associated with males and also with masculinity.^{8,9,10}

Even among right and left hand, 2D:4D sexual dimorphism is more pronounced in the right hand^{11, 12}. Studies in Poland, UK, Austria, Nigeria & Saudi Arabia the 2D:4D ratio of males was less than females^{12, 13}. Studies in Mumbai and Manipal, also showed 2D:4D ratio of males was less than females^{11,14,15}.

2D and 4D show a pattern of symmetry around the third digit. If 4th digit is longer than the 2nd digit, 2D:4D ratio < 1. If 4th digit is shorter than the 2nd digit, 2D:4D ratio >1. Kanchan et al¹⁵ have proposed a sectioning point for 2D:4D ratio. The sectioning point is derived by calculating (Mean 2D:4D ratio of males +Mean 2D: 4D ratio of females) divided by 2 and the 2D:4D ratio is above this sectioning point in females and below it in males (Table no.1)^{11, 15}.

Table No.1: 2D:4D ratios in males and females.

Gender	Male	Female	Indian Male	Indian Female
2D:4D ratio	< 1	> 1	<0.97	>0.97

MATERIALS AND METHOD

This study is a cross sectional descriptive study conducted at PES Institute of Medical Science & Research, Kuppam and AV Medical College, Puducherry. Study participants were 316 medical UG students both male and female from IInd MBBS aged between 18 to 21 years. Only students who were born and brought up in southern states of India (Pondicherry, Tamil Nadu, Kerala, Karnataka & Andhra Pradesh) were included. Student with skeletal deformities were excluded from the study. Also, students with parents from other states of India and other countries were excluded from the study. Measured variables included 2D length, 4D length and their ratio. Digit lengths were measured using digital sliding callipers (with accuracy up to 0.01 mm). The digital lengths were measured from basal crease to tip of the finger of the right hand as the right hand has strong associations with gender. Statistical analysis was done by unpaired t test using Microsoft Excel, Data analysis software.

RESULTS

Among males the mean 2D:4D ratio was 0.972 and among females the mean 2D:4D ratio was 0.983. When unpaired t test was applied, the *p* value was 0.008. Hence the difference in the mean 2D:4D ratios in males and females are statistically significant. (Table no. 2)

The mean 2D length and 4D length of males 72.58 mm and 74.67 mm were much higher than the mean 2D length and 4D length of females, 67.36 mm and 68.33 mm respectively. In both males and females, the mean 4D length was higher than the mean 2D length. (Table no. 3)

The 2D lengths of males in the study ranged from a minimum of 62.1 mm to a maximum of 85 mm, whereas the 2D lengths of females in the study ranged from a minimum of 55.27 mm to a maximum of 80.1 mm. (Table no. 3)

The 4D lengths of males in the study ranged from a minimum of 64.41 mm to a maximum of 91.18 mm. The 4D lengths of females in the study ranged from a minimum of 58.83 mm to a maximum of 84.28 mm. (Table no. 3)

When the sectioning point was derived by calculating (Mean 2D:4D ratio of males +Mean 2D: 4D ratio of females) divided by 2, a sectioning point of 0.977 was derived. Considering mean 2D:4D ratio, 60.43% of males had 2D:4D ratio below the sectioning point and 53.9 % of females had 2D:4D ratio above the sectioning point.

Table No.2: Mean and Standard Deviation of the 2D:4D ratios

Parameter	Value
Mean of 2D:4D ratios(right hand) in males (n=139)	0.972
Mean of 2D:4D ratios(right hand) in females (n=177)	0.983
SD of 2D:4D ratios in males	0.033
SD of 2D:4D ratios in females	0.035
t (df 307)	1.97
p value	0.008(<0.05, Statistically significant)

Table No. 3: Mean values of 2D & 4D lengths

		Male	Female
2D length (in mm)	Minimum	62.1	55.27
	Maximum	85	80.1
	Mean	72.58	67.36
4D length (in mm)	Minimum	64.41	58.83
	Maximum	91.18	84.28
	Mean	74.67	68.33

DISCUSSION

Results of the present study were in agreement with several other studies conducted in India and other parts of the world. Uniformly in all the studies, the 2D:4D ratio of males was lesser than that of females (Graph No.1).

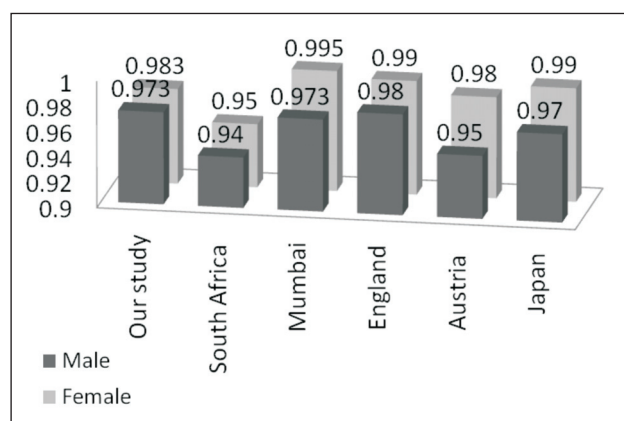
If we observe the table no. 4, we can see that except for the study sample from South Africa, in all other population samples the p value for gender discrimination from 2D:4D ratio was statistically significant.

The sectioning point for 2D:4D ratio of right hand in the present study was 0.977 while compared to a similar study by Kanchan T et al¹⁵ where it was 0.971. Using the sectioning point, Kanchan T et al¹⁵ could determine gender in 80 % of males and 74 % of females. While in the present study, it could determine gender in 60.43% of males and 53.9 % of females. Since this is new way of looking at 2D:4D ratios, more studies are required in different Indian populations to know the applicability of this formula.

Table No. 4: Comparison of this study with other similar studies in India & other parts of the world^{11,16,17}.

Study	t	p value	Comparison
Our study	1.97	0.008	Significant
South Africa	1.39	0.17	Not significant
Study in Mumbai	(not mentioned)	0.019	Significant
England	2.01	0.04	Significant
India (AP tribes)	2.41	0.02	Significant
Japan	-4.3	0.001	Significant

Graph No.1: Comparison of 2D:4D ratios in male and female participants of this study with counterparts in other studies conducted in India and other parts of the world.



CONCLUSION

The mean 2D:4D ratio of males was lesser than the mean 2D:4D ratio of females. The results of this study are statistically significant ($p = 0.008, <0.05$). The sectioning point for 2D:4D ratio of right hand was 0.977 in the present study. It could determine gender in 60.43% of males and 53.9 % of females.

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Ethical & Medico-Legal Aspects of Mandatory HIV Testing: A Debate on Pros & Cons of Mandatory Prenatal & Premarital Testing" - A Literature Review

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ABSTRACT

This paper discusses about the Mandatory HIV testing that is implemented in some countries either for pregnant women as prenatal mandatory testing or premarital mandatory HIV testing. Objective: The main objective of this paper is to discuss & debate if mandatory testing makes any difference in preventing HIV/AIDS and whether it's an effective & successful strategy. A growing number of religious communities and national and local governments have adopted mandatory premarital HIV testing (PHT) policies. A mandatory approach to testing and treatment has the potential to significantly reduce perinatal transmission of HIV and defend the view that mandatory testing is morally required if a number of conditions can be met. Mandatory PHT, however, remains controversial. The paper further discusses and debates about the pros & cons of prenatal & premarital mandatory HIV testing and further explores the medico-legal & ethical aspects linked to Mandatory testing.

Conclusions: Mandatory testing benefits the mother by enabling her to get help and initiate antiretroviral therapy and for the fetus by decreasing the risk of transmission. Premarital testing increases stigmatization of people living with HIV as discrimination increases nearly every aspect of life, including employment, societal and family life.

Keywords: Mandatory HIV Testing, Premarital HIV Testing (PHT), Prenatal testing, Medico-legal & Ethical, Human Rights, Counseling

INTRODUCTION

Global HIV incidence may have peaked¹ but calls for scaling up prevention have not diminished. The World Health Organization (2011) reported that there were 2.6 million new HIV infections in 2009 alone, contributing to the current global prevalence of 33.3 million. With the number of new infections worldwide remaining high, some regions previously unscathed experiencing rising incidences of HIV, and the number of patients presenting late at health facilities with advanced HIV/AIDS, there is a growing sense of frustration that global efforts to prevent HIV/AIDS are being outpaced by the spread of the pandemic². As a result, calls have been mounting for a more pragmatic approach to containing the disease, with routine and mandatory testing gaining increasing attention. A growing number of religious communities and national and local governments have adopted

mandatory premarital HIV testing (PHT) policies. Mandatory PHT, however, remains controversial.

The US Centers for Disease Control and Prevention recently proposed a new approach for HIV testing in adults, adolescents and pregnant women under which testing will be routinely offered in all health-care settings. No signed consent from patients would be required under this new proposal; the general consent for medical care would be considered sufficient to encompass consent for HIV testing.^{3,4} Former US President Bill Clinton has also lent support for mandatory HIV testing in countries where the prevalence rate is 5% or higher.⁵ Political support for mandatory testing has been seen in countries like India, where the state government of Goa has proposed mandatory premarital testing, and in China, which plans to test all workers in the tourism industry.⁶

The main objective of this paper is to discuss if the medico-legal & ethical aspects of mandatory testing and whether it's an effective & successful strategy in HIV prevention?

The arguments are classified by the proponents and opponents of mandatory HIV testing.

1. Mandatory HIV testing for pregnant women &
2. Mandatory premarital HIV testing.

The authors do feel that mandatory testing among pregnant women can do a greater good considering the high prevalence & the public program of growing epidemic under some specific conditions though we don't advocate mandatory testing as the best strategy to be implemented as a prevention tool/ strategy for HIV prevention globally.

Arguments for and against mandatory testing for pregnant women seem to fall into one of three categories

- (1) Legal arguments,
- (2) Ethical considerations
- (3) Health policy.

Legal Arguments: Examples of legal concerns surrounding the practice of mandatory testing include constitutional issues such as due process, equal treatment, informed consent, reasonable search and seizure, reproductive rights and privacy rights.

Ethical considerations: They often go hand-in-hand with many of the legal issues and ask questions like

- a. Is it right to compel a pregnant woman to have an HIV test?
- b. Is it right to allow a fetus to go untreated for a fatal disease if treatment is readily available?
- c. Would testing discriminate unjustly against particular racial or socioeconomic groups?
- d. Is it ethical compelling a pregnant woman to get an HIV test, and then allow her to decline treatment for herself and her baby if she tested positive for the virus?

Health policy: It will continue to be the most prevalent grounds for the debate because as states and

medical organizations decide what health measures should be taken to decrease the spread of AIDS (whether it be testing or prevention measures, education, etc.), their focus will likely be on whether the laws or policies will meet their goals.

This type of utilitarian thinking certainly has both legal and ethical underpinnings, but really emphasizes the question: "Will this work?" rather than: "Is this right?" or "Is this legal?" Health policy looks at more than just whether or not mandatory testing will limit the spread of HIV to newborns. It also asks: Do the health benefits of the AZT regimen⁷ outweigh the risks to both mother and child? Might the policy of mandatory testing have the effect of driving women away from prenatal testing and prenatal care? Is such a policy going to significantly harm patient/provider trust and the overall patient/provider relationship? These are some of the many policy considerations that will be a part of this decision.

Mandatory Testing among pregnant women

Pros of mandatory prenatal testing

Can save more lives : Highly effective antiretroviral drugs, elective cesarean section and formula feeding have been shown to reduce the mother-to-child spread of HIV from approximately 25% to less than 2%. Despite these advances, perinatal transmission continues to occur in women who are unaware of their HIV status. The primary prevention strategy is to maximize prenatal HIV testing of pregnant women. Ideally, this would involve sensitive and careful patient education and counseling to encourage all these women to undergo voluntary prenatal HIV screening. Even with such measures in place, some refuse to be tested during pregnancy, endangering themselves and their unborn children. Mandatory prenatal testing may help solve this problem. This approach would require all pregnant women to undergo HIV testing so that measures could be initiated to prevent transmission of infection to their fetuses.

For a greater good (Beneficence principle)

Mandating immunization to prevent infectious diseases in children is another example of loss of individual autonomy for the greater health benefit to the public. While there's some debate on this issue, it's widely favored and practiced, positioned as a greater good for both the child and society by preventing transmission of disease.

These situations are comparable to mandatory HIV testing in pregnancy with distinct similarities and differences. Still, this action fulfills the beneficence principle for the mother by enabling her to get help and initiate antiretroviral therapy and for the fetus by decreasing the risk of transmission. Testing would prevent further spread of infection to other individuals in society. Compulsory screening may also reduce the negative economic impact that infections such as HIV and AIDS have on society. A utilitarian perspective may support this approach.

Other concerns

If mandatory testing programs are to be introduced, continuing medical care, including antiretroviral therapy, must be provided and pregnant women must have reasonable alternatives to compulsory testing and treatment. Though introduction of mandatory HIV testing of pregnant women, as well as for compulsory treatment of HIV-positive pregnant women, can be made, there remain concerns regarding the protection of women's privacy and their risk of becoming victims of various forms of stigmatization⁹.

Arguments against Mandatory HIV Testing among pregnant women

1. First of all, it plays into an already deleterious response to various populations that are at risk, and who are already discriminated against in a variety of fashions,
2. Secondly, with a possible or probable, inappropriate release of information about the test result, these individuals will suffer discrimination not just in terms of health services but also in other areas of life.
3. Mandatory testing will result in a significant impairment in the physician-patient relationship. That relationship is based on a sense of trust, and trust depends on the ability to keep a secret.
4. Mandatory Testing & issue of False Positives: Mandatory prenatal HIV testing requires certainty that the tests are accurate and that subsequent interventions will benefit both mother and child. If the certainty of these tests is questionable due to the false positives, then it will cause disastrous effects.
5. Finally, mandatory testing and mandatory reporting of test results & such policies will drive

those who are at risk underground, probably discourage testing at all, and in that sense, spread the infection rather than curtail it.

Mandatory Premarital HIV Testing:

Over the past decade, a growing number of religious communities, national governments, and state, city, and village governments have adopted mandatory premarital HIV testing policies. This trend infringes upon the human rights of people living with HIV and threatens the three key principles of HIV testing: that individuals freely consent to testing; that counseling is provided before and after testing; and that results are kept confidential.

The countries of Bahrain, Guinea, United Arab Emirates, and Saudi Arabia have enacted national laws and policies mandating premarital testing. Local governments and legislatures in five Indian states, districts in the Yunnan province of China, Ethiopia, and the Democratic Republic of the Congo have introduced or passed similar laws or regulations¹⁰.Uzbekistan requires a premarital consultation with a medical practitioner, who has the discretion to mandate an HIV test. In Cambodia, Senegal, and Zimbabwe, some women's and mothers' groups have called on the government to enact mandatory HIV testing policies in the hope that it will reduce the spread of HIV to young women who are often powerless in choosing a husband.

Pros of Mandatory premarital HIV Testing

Premarital testing helps reduce HIV infection rates by containing infection within the population of people living with HIV. It is with the conviction that mandatory PHT will encourage couples to practice moral behavior, such as abstinence before marriage and fidelity after marriage, which in turn can slow the spread of HIV infection. The majority of proponents appear to favor mandatory testing as a way to identify sero-discordant couples in order to prohibit them from marrying. Premarital testing will reduce HIV infection rates by "containing" infection within the population of people living with HIV. It is also argued that the requirement of a premarital HIV test will encourage couples to practice "moral behavior" e.g. abstinence before marriage and fidelity after marriage and that this too will slow the spread of HIV infection. A number of supporters, including women's and mothers' groups, believe that mandatory premarital HIV testing and a ban on discordant marriages will protect women from becoming infected with HIV upon marriage.

These arguments emphasize a woman's powerlessness in many societies to select her spouse or object to a marriage."

Arguments against Mandatory Premarital HIV Testing

The main arguments against mandatory premarital HIV testing include human rights concern, confidentiality, stigmatization, counseling and treatment inadequacy¹¹.

Human Rights Concern

Mandatory premarital HIV testing, especially when accompanied by a requirement that people be HIV negative in order to marry, infringes upon internationally guaranteed human rights, especially the right to marry and found a family. In addition, the way in which mandatory premarital HIV testing is typically carried out without regard for informed consent, confidentiality, and access to HIV counseling and information infringes upon basic human rights to bodily integrity, privacy, and information¹².

Lack of Confidentiality

Confidentiality of mandatory premarital HIV test results is extremely challenging to maintain. In some cases, medical professionals disclose premarital test results directly to church marriage committees or traditional leaders. In other cases, couples are themselves required to disclose their results to the religious or state authorities who perform the marriage ceremony or issue the marriage license. For instance, in Malaysia, Muslim couples submit a certificate disclosing their HIV status to state religious departments when applying for a marriage license¹³.

Judgmental Counseling

Information on counseling services for couples who are required to take the premarital HIV test is limited, but the available information suggests that counseling is inadequate, particularly for people who test HIV positive. In most cases, counseling focuses primarily on encouraging discordant couples to call off their wedding.

In addition, mandatory premarital HIV testing may have negative public health consequences by lulling couples into a false sense of security if they both test negative before marrying. A number of reports suggest that if a couple tests negative, it could make it more difficult for the woman to enforce safer sex with her

husband, thus increasing her vulnerability to HIV infection. While women have a legitimate interest in knowing the HIV status of their partners before they marry, many argue that mandating premarital testing actually disempowers women because it takes decision-making power out of their hands.

Premarital testing also increases stigmatization of people living with HIV. AIDS activists say that organizations requiring premarital testing tend to portray people who test positive in a stigmatizing manner. People who test positive for HIV face increased discrimination in nearly every aspect of life, including employment and societal and family life. Fear of stigma may lead people who are at risk of infection to avoid the test by obtaining a fake marriage certificate, by marrying in an unregistered ceremony, or by opting out of marriage altogether.

CONCLUSIONS

Public health officials agree that it is in the interest of the public to test for HIV infection and to identify sero-positive individuals¹⁴. Arguing of the bioethical issue surrounding the mandatory test, Redden¹⁵ said, "Bioethical issues such as mandatory HIV testing for pregnant women and newborns require a delicate and difficult balance between public health interests and respect for individual privacy. The stigma attached to HIV positive status is grave and vilifying. This makes the privacy of individuals of paramount importance... But this concern for individuals and their privacy - as a means of preserving their freedom - does not amount to a workable strategy for the welfare of a community". This argument was supported by Etzioni¹⁶ who wrote, "It should be noted... that privacy is not an absolute value, and does not trump all other rights or concerns of the common good." Despite the human rights issues and potential socio-cultural negative implications of mandatory PHT, the authors feel the idea of mandatory premarital HIV testing as a public policy can contribute to control HIV/AIDS as with increasing HIV prevalence there is associated morbidity and mortality.

There are large benefits to individuals, women, children and society as early detection and treatment of HIV has been proven to be a successful way to improve not only the survival but also the quality of life of HIV positive patients. Mandatory PHT prevents the person at the receiving end of the HIV mainly women, it reduces prenatal infection, and helps reduce orphanage due to lose of parents for HIV/AIDS associated complications. While policies that can

concurrently satisfy both individuals and the public are preferred, the common good should get primacy in light of the pandemic nature of HIV infection.

The authors also agree that mandatory PHT may not be a good policy if it is employed by governments for the sake of testing. Mandatory PHT should be a part of a grand strategy to address the problem of HIV infection. The strategy should include a reasonable treatment and public awareness campaign that involves community, church, and political leaders.

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Study of Fingerprint Patterns in Diabetes Mellitus Patients

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ABSTRACT

100 patients diagnosed as suffering from diabetes mellitus were included for the study. The male patients were 50 in number and the female patients were 50 in number. About 50 male and 50 female volunteers were included as control group. The finger print patterns observed between diabetic individuals and controls. Diabetic patients showed increase in frequency of number of whorls as compared to control group. This finding was common to both the sex. Diabetic patients also showed decrease infrequency of ulnar loops as compared to the control group. This finding was also common to both the sexes.

Keywords: Fingerprint patterns, Diabetes Mellitus

INTRODUCTION

Fingerprint is unique and is genetically determined. Diabetes mellitus is also determined genetically. The incidence and prevalence of Diabetes mellitus has increased globally, especially in developing countries like India. Diabetes mellitus causes significant morbidity and mortality. Diabetes mellitus is more prevalent in the population. Since both Fingerprint patterns and Diabetes mellitus are genetically determined, there appears to be a correlation between the two. If such correlation exist between them that would definitely be a screening aid as well as diagnostic aid in individuals who carry a particular dermatoglyphic pattern. This helps in taking preventive measures by the concerned individual genetically related to the diabetic patient¹.

MATERIALS AND METHOD

The study of fingerprints in diabetes mellitus patients conducted in Navodaya Medical college Hospital and Research center, Raichur, Karnataka, Indi,

during the period Jan to June 2013. A predesigned proforma containing the details such as Name, age, sex, and disease condition i.e. Diabetes mellitus, given to the patients. Data collected from the patients after obtaining their informed consent. The fingerprint recorded using the stamp pad. The smeared fingers of both hands were printed on a durable plain paper which consisted of ten different blocks for ten fingers of right hand and left hand respectively. Both rolled and plain prints of right and left hand were taken. After obtaining the fingerprints, the details of diagnosed condition such as presence of Diabetes mellitus was gathered. The patterns observed with the help of a powerful hand lens. Each finger in the finger print slip assigned a number, e.g. the first number given to the left little finger and 10th number to right little finger. The results so obtained tabulated systematically and separately for both the genders. Observations recorded and analyzed. Comparisons of fingerprints between normal healthy subjects and patients suffering from diabetes mellitus described in detail.

RESULTS

Table I: Comparison of Fingerprint patterns in Male Diabetic patients and control group.

Pattern	Right Hand			Left Hand		
	Diabetics	Controls	Significance	Diabetics	Controls	Significance
Arch	4%	7%	Significant P=0.001	4%	7%	Not Significant
Whorl	60%	39%	Significant p<0.001	58%	33%	Significant p<0.001
Radial loop	3%	1%	Not Significant	2%	2%	Not Significant
Ulnar loop	33%	53%	SignificantP<0.001	36%	58%	Significant p<0.001

Table II: Comparison of Fingerprint patterns in Female Diabetic patients and control group.

Pattern	Right Hand			Left Hand		
	Diabetics	Controls	Significance	Diabetics	Controls	Significance
Arch	9%	12%	Not Significant	11%	20%	Significant P=0.001
Whorl	55%	22%	Significant p<0.001	57%	21%	Significant p<0.001
Radial loop	1%	1%	Not Significant	1%	3%	Not Significant
Ulnar loop	35%	65%	Significant p<0.001	31%	60%	SignificantP<0.001

Table 1 shows the comparison of Fingerprint patterns in Male Diabetic patients and control group. Diabetic patients showed increase in frequency of number of whorls as compared to control group. Diabetic patients also showed decrease infrequency of ulnar loops as compared to the control group. This finding is common to both the hands. Radial loops were not significant in both diabetics and control group among male sex.

Table II shows the comparison of Fingerprint patterns in Female Diabetic patients and control group. Diabetic patients showed increase in frequency of number of whorls as compared to control group. Diabetic patients also showed decrease infrequency of ulnar loops as compared to the control group. This finding is common to both the hands. Radial loops were not significant in both diabetics and control group among female sex.

DISCUSSION

A study revealed that percentage of arches was more in diabetic group than in the control group. It also showed an increased frequency of arches in diabetic males and females. The difference was more marked in diabetic females, difference being more on the left side².

In another study, males showed an increase in radial and ulnar loops and arches and decrease in whorls. Females showed an increase in ulnar loops and a decrease in whorls³.

Fingerprint features in yet another study revealed a high TRC i.e. Total ridge count value that was more frequent in both sexes of Diabetes mellitus patients compared to control group⁴.

Another study revealed that in female diabetics there was increased incidence of simple arch pattern. Increased incidences of total finger ridge count and absolute finger ridge count noticed both in male and female diabetic patients⁵.

In Maturity onset diabetes mellitus, a study observed the decrease in mean value of TFRC (Total finger ridge count) and AFRC (Absolute finger ridge count), increase in arches and decrease in whorls⁶.

CONCLUSION

The study fingerprint pattern in Diabetes mellitus patients explores the association of finger print pattern with the diseases known to carry the risk of inheritance, hereditary or genetic determination such as diabetes mellitus. This study helps siblings of diabetic parent or parents to take preventive measures for reducing the risk of developing such disease conditions. This study also helps as a screening aid or diagnostic tool to individuals with particular fingerprint pattern, threatened with the risk of developing Diabetes mellitus. Thus, such studies are beneficial for reducing morbidity and mortality, thereby contributing to community health and social accountability.

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Qualitative Analysis of Blood and General Debilities in Farmers with Chronic Exposure to Pesticides - A Cross Sectional Study

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ABSTRACT

Agriculture is an age old occupation in the world with majority of the population working in fields. Pesticides are inevitable part of agriculture. Inadvertent and unscientific use of pesticides has caused many health hazards to mankind. It is on rise because of marketing strategies instituted by profitable companies, especially in the developing countries. India is one of the victims of such situation as majority of the adult population is engaged in agriculture which makes them vulnerable for exposure to harmful effects pesticides. This can be worse if little or no protection is used while handling pesticides. Acute poisoning is detectable with prominent signs and symptoms, whereas chronic poisoning which go unnoticed may culminate into irreversible sequels like neurological deficits, skin diseases, ocular problems, respiratory diseases etc...

Added to this there is severe dearth of studies related to the chronic poisoning due to pesticide use and there is no exact data available to the burden of morbidity. Hence a cross sectional study of the farmers in regions of rural Belgaum which is known for high usage of pesticides conducted aiming at detection of pesticide compound in the blood by TLC method and to analyze the safety measures used.

On analysis we found that majority of study group were literates i.e., 66% and an astonishing number i.e, 94% had an exposure to pesticides for 10-20 years. But still half were not aware of the health hazards caused by the inappropriate handling of pesticides. 76% from the group did not use any sort of protection but only 2% of them used proper PPE, 54% tested positive for various pesticides and among them majority i.e 32% tested positive for chlorpyrifos; 12% DDT and 10% quinolophos.

We found a strong correlation with respect to the duration of exposure, pesticide compound present in the blood and the neurological symptoms and also found that various lack of awareness and knowledge, lack of personal protective measures to be used while handling pesticides were contributing to a greater extent.

Keywords: Pesticide, Chronic exposure, Blood, Thin Layer Chromatography

INTRODUCTION

No growth and development comes without sacrifices. But when growth is attended with threat to mankind then it's time to introspect, whether health or development. Same scenario is seen with farmers of India where poisoning due to pesticides is common in them. Added to this India has more than 50% of

productive population engaged in agriculture making it global hub for marketing pesticides. India is the largest producer of pesticides in Asia and ranks twelfth in the world for the use of pesticides with an annual production of 90,000 tons.¹ An estimated 200,000 people die every year in developing world due to pesticide poisoning and is increasing according to the existing

reports.² Though unintentional chronic poisoning kills far fewer people it is apparently a health problem in places where highly toxic pesticides are used,³ especially when little or no protection is instituted,⁴ hence risking a large number of agricultural workers including their family members for exposure to various pesticides directly and indirectly.⁵

Exposure to pesticides both occupationally and environmentally causes a range of human health problems.² These range from temporary acute effects like irritation of eyes, excessive salivation to chronic diseases like neurological disorders⁶, dermatitis², cancer, reproductive and developmental disorders etc.⁶

In India there is no exact data available to the burden of morbidity due to chronic poisoning. There is, thus, a need to determine exact extent of the problem and to develop appropriate strategies to manage chronic cases with available resources in this country and especially in our set up.⁷

In the rural setup of Belgaum, in the northern part of Karnataka which was selected for our study, is a fertile land with very good water sources, and one of the sites of our study is situated on the banks of a river. Hence because of the good yield, multiple crops are grown in a year in these areas and thus the use of pesticides in great amount. Emphasising the need to look into the hidden iceberg that is, the various health problems associated with chronic exposure to the pesticides and analyse the presence of pesticide in the blood.

METHODOLOGY

Objectives

- 1) To analyse the presence and type of pesticide in the blood.
- 2) To study the pattern and types of general debilities among the farmers chronically exposed to pesticides.

Study design: cross sectional study of farmers chronically exposed to pesticides in rural Belgaum with Randomised selection of sample size and control size each being 50 in number over a period of 2 months.

Study material: Interview, general physical examination and blood sample of farmers chronically exposed to pesticides. Blood analysis was done in

Poison Detection Centre, Dept. of Forensic Medicine & Toxicology, J.N. Medical College, Belgaum.

Consent: written informed consent taken from the farmers and volunteers.

Selection criteria: Inclusion criteria: Male farmers of all age group chronically exposed to pesticides for a period of more than 10 years. The period of exposure is ascertained by interviewing and history taking.

Exclusion criteria: Suffering from any other systemic illness (not related to exposure) and deliberate intentional poisoning.

RESULTS

A total number of 100 adult male subjects, with study group comprising of 50 members and 50 being in the control group, were interviewed, medically examined and blood samples were collected at the field.

Among the study group highest numbers of individuals were seen in the age group of 30 - 39 years and 50 -59 years both being 30%, followed marginally by 40-49 years (28%) and none of them were below 19 years of age. Among the study group, 66% were literates and 44% were illiterates.

The period of exposure, majority i.e., 78% in the study group had exposure for 10-15 years; followed by 10% of them with 16-20 years of exposure.

Regarding the knowledge pertaining to the harmful effects, handling and protective measures 50% of the study group were aware, but with respect to following it, especially use of personal protective equipment (PPE) only 2% in the study group were using proper protection; 22 % used just cloth to cover their face while spraying; and the rest and bulk i.e, 76% from the group did not use any sort of protection.

Table 1. Prevalence of the disorders

Disorder	Study Group	%	Control Group	%
Nail	17	34	03	06
Sclera	11	22	03	06
CNS	31	62	08	16
CVS	02	4	00	00
RS	12	24	00	00
GIT	08	16	04	08
Ocular	17	34	04	08
Skin	05	10	00	00

Table 2. Examination of the central nervous system

CNS Disorder	Study group	%	Control group	%
Headache	15	30	06	12
Fatigue	06	12	02	04
Tremors	01	02	00	00
Cognition	01	02	00	00
Concentration	01	02	00	00
Memory	05	10	00	00
Tingling	16	32	00	00
Numbness	01	02	00	00
Pain	06	12	00	00

Systemic examination of the respiratory system in the study subjects revealed that 12% of them had dyspnoea; 8% had features of asthma and 2% had severe shortness of breath. There were no respiratory symptoms in the control group subjects.

It was also noted that most of the study subjects had complaints of ocular symptoms ranging from redness (22%), irritation (18%), watering (12%), pain (8%) to diminished vision (4%). Whereas in the control group, 6% of them had redness of eyes, and only one complained of irritation in the eyes and 10% of the study group had dermatitis; whereas there were no skin problems with the control group.

Table-3

Type of compound	Study group		Control
	Positive cases	%	
Quinalphos	05	10	None
Chlorpyrifos	16	32	
Ddt	06	12	
Monocrotophos	00	00	
Triazophos	00	00	
Dimethoate	00	00	
Dichlorvos	00	00	
Carbosulfan	00	00	
Dicofol	00	00	
Profenofos	00	00	
Total	27	54	

Table-4

Total positive cases	27	
Period of exposure 10-15 yrs	21	77.77
Unaware of protective measures	17	62.96
Used no PPE	19	70.37
Used cloth occasionally	08	29.63
CNS disorder	19	70.37
Tingling	14	51.85
Pain parasthesia	06	22.22

Table-4 shows the prevalence of various contributory factors precipitating the symptoms among the positive subjects. 77.77% among the total 27 study subjects who tested positive for various pesticides, were exposed for more than 10-15 years; 62.96% were unaware of any knowledge of protective measures to be adopted while handling the pesticides; 70.37% of the subjects were not using any personal protective equipments/ measures; while 29.63% used cloth to cover their face while spraying. Among the positive tested subjects i.e, 27, 70.37% had various CNS disorders of which 51.85% had tingling sensation; and 22.22% had complaints of pain parasthesia.

It was noted that 87.5% of the study subjects complaining of tingling sensation were positive for presence of pesticides in their blood giving a direct correlation between presence of pesticides and neurological symptoms. Similarly all the study subjects complaining of pain parasthesia were positive for presence of pesticides.

DISCUSSION

Food and Agriculture Organization WHO recommends that Ia (extremely hazardous) and Ib (Highly hazardous) pesticides should not be used in developing countries.⁶ It also suggests that class II (Moderately hazardous) pesticides be avoided. But as per our study farmers were using moderately hazardous pesticides regularly.

All the study and control subjects in our study were male, and the age group ranged from 20-69 years old with concentration of the study group in the age group of 30 - 39 years and 50 -59 years i.e the productive age group, and most of them were moderately built and nourished with no chronic diseases. Majority of the study group were literates i.e., 66% unlike a study by S. K. Rastogi⁴ where majority were illiterates.

An astonishing number of the study group i.e, 94% had an exposure for 10-20 years, which was far more when compared to a study conducted by Sosan MB,⁸ wherein 50% of the study group had >20 years of exposure. Whereas our study is similar with the statistics of a study done by Chitra Grace.A¹ in which majority had an exposure to various pesticides for more than a decade.

Half of the farmers in our study were not aware of the health hazards caused by the inappropriate

handling of pesticides and the rest of them had gained this knowledge mostly from their co-farmers, and few gained it from the retail shop keepers selling the pesticides. But with respect to following it, especially personal protective measures, only 2% in the study group were using proper protection; 22 % used just cloth to cover their face while spraying and the rest and bulk i.e, 76% from the group did not use any sort of protection which is similar as per studies conducted by Chitra Grace. A,¹ and Bhoopendra Singh,² wherein it was found that majority of the farmers did not bother about safety.

In accordance with the previous studies,^{7, 9, 10} farmers experienced a variety of the signs and symptoms related to pesticide poisoning. With respect to the chronic ailments in the study group a clear majority of the symptoms was seen when compared to the controls. CNS symptoms were more commonly prevalent among the study group (64%) when compared to the control group (16%), followed by nail and ocular symptoms (34% each), respiratory- 24%, GIT- 16%, sclera 22% and skin -10%.

As per study by Chitra Grace.A¹, there was higher prevalence to various ocular symptoms among the farmers associated with a prolonged exposure to pesticides, whereas in a study by Chandrasekharan Nair¹¹ the burden of prevalence of ocular problems was similar to our study.

Chandrasekharan Nair¹¹ also noted that the prevalence of respiratory problems was a major finding in their subjects. But in our study neurological symptoms was a major burden though respiratory symptoms in the farmers were also in a significant amount.

Bhoopendra Singh² observed that gastrointestinal problems, dermal problems formed a major bulk; in our study though they did not constitute a major bulk, but were seen in significant number of farmers.

On analysis of the blood in the study subjects, 54% tested positive for various pesticides and the majority i.e 32% tested positive for chlorpyrifos; 12% DDT and 10% quinalofos and giving us a picture of the most common type of pesticide used in this region. Though few of the pesticides are banned, their use is still rampant in the rural areas. Among the positive cases, majority of the farmers though literate, were unaware of any protective measures to be used while handling the pesticides; most of them didn't use any sort of protective equipments and were exposed

for more than a decade. Most of them had CNS disorders with headache, tingling and pain parasthesia being the major symptoms.

Limitations of the study

- The study group being very small, major confirmatory conclusions cannot be drawn
- Only the direct exposure in the male farmers are taken in the study
- Regions taken for the study does not exactly represent the whole population
- Pesticide standards used in TLC were limited to set of common pesticides. If other compounds though present in the blood sample could not be tested positive.

CONCLUSION

A total number of 100 cases were studied with 50 each in the study group and the control over a period of 2 months. All the subjects were males. Middle aged adults constituted the bulk in study group, with most of them having informal education only. All the study subjects were exposed to the pesticides for more than a decade, with a majority (88%) being exposed to 10-20 years. Only 2% in the study group used proper protective measures. 62 % of the study group had CNS symptoms as compared to only 16% in the control group. In the Central nervous system disorders in the study subjects, 32% of them had tingling sensation, 30% chronic nagging headache, 12% both fatigue and pain parasthesia. In the study subjects 12% had dyspnoea and 8% asthma. Whereas the control group had no symptoms pertaining to the respiratory system. As compared to the control group, most of the study subjects had complaints of ocular symptoms in the form of redness (22%), irritation (18%), watering (12%), pain (8%) and diminished vision (4%). 54% of the study group was positive for various pesticide compounds in their blood on examination by TLC. Among them 32% tested positive for chlorpyrifos; 12% for DDT and 10% for quinalofos.

Despite some limitations, this study has shown that agricultural workers have a distinct pattern of chronic disease prevalence than other populations related to the use of pesticides in the long run. These results from limited data sources are not sufficiently comprehensive and would underestimate the actual number of occupational diseases in agriculture. Since no national-

level official data are collected focusing on agricultural worker's health, intervention programs such as surveillance systems are required to investigate the impact of distinct aspects of agricultural work and to prevent occupational diseases among them.

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Profile of Poisoning Cases in JNMCH, District Aligarh: A Prospective Study

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ABSTRACT

The availability of poisons and the deficiency of health services in the developing world is leading to a great economic and social set back. It has been found that easy access to large number of pesticides, rodenticides and other daily use chemicals and their ignorant use is leading to hazardous outcome in form of increased number of cases of poisoning related deaths. Recent industrialization and over use of insecticides has lead to a extensive proliferation of toxic chemicals. There is urgent need to devise mechanisms soon for strict regulation of availability and use of these chemicals. Other forms of poisoning includes over dose of prescription drugs such as hypnotics and anti-anxiety agents. Therefore there is need to put emphasis on regulation of dispensing these drugs over the counter and also developing newer antidotes for drug overdoses. With the above considerations there is need for further deepening our thought on prevention and regulation of drugs and chemicals.

The study conducted in our setup, which is placed in north central India shows poisoning cases in the young age group (20-30 years). The incidence of poisoning was found more in cases from the rural area than urban. Married person showed more incidence than unmarried. Manner of death being most commonly suicidal followed by accidental and homicidal poisoning. Aluminum phosphide showed the highest incidence as compared to other agents of poisoning.

Keywords: Poisoning, Suicide, Aluminium Phosphide

INTRODUCTION

Every day around the world around 700 people die from poisoning and many more suffer infirmities due to poisoning (WHO 1999). Agricultural poisoning cases are found in almost all regions of the developing world and in almost all the age and income group. More than three million Poisoning cases occur world wide causing around 2, 51,881 deaths annually. Almost 99% of the cases are found in the agricultural workers in the developing countries.

Suicidal and homicidal poisoning are more common in India due easy access to various poison such as insecticides, pesticides, industrial chemicals and pharmaceutical drugs. Accidental poisoning in children is now on an increase due to unrestricted access to all these agents in their surrounding environment. In developing countries must commonly self poisoning due to agricultural pesticides is seen. The first report of pesticide poisoning in India was from Kerala in 1958, where over 100 people died after

consuming wheat flour contaminated with parathion. (ICMR Bulletin 2001)²

In the rural China pesticide poisoning accounts for over 60% of the suicide cases. Similarly a high proportion of suicides are due to pesticides in rural area of Sri Lanka (71%), Trinidad (68%) and Malaysia (>90%)⁴. A Poisoning study in the United States reported an increase in mortality rate in cases of accidental poisoning from 1.9 to 2.3 deaths per 100.000 populations from 1985 to 1986. The common causes among adults were opiates and related narcotics as well as local anesthetic drugs.⁵ In south India a study during the period January 2005 to September 2008 showed that among 1045 cases of poisoning 68.40% cases to be intentional where 31.60% of the cases were accidental poisoning.⁶

At UCMS & GTB hospital Delhi a study showed that 10.57% deaths were due to poisoning and most of the poisoning cases were either suicidal or accidental. The incidence was more in the 2nd decade of life.

Aluminum phosphide was the most commonly used poison followed by insecticides and alcohol.¹³

MATERIAL AND METHOD

This was a prospective study of acute poisoning cases that was carried out in the department of Forensic Medicine through the emergency department of the hospital in collaboration with the department of general Medicine and the department of pediatrics at JN Medical College AMU, Aligarh.

All the cases of acute poisoning over a period of one year reporting to the emergency section of the hospital were noted. Elaborate history was elicited and clinical examination was performed to diagnose the cases of poisoning and find the circumstances under which the poisoning occurred. The diagnosis of the nature of poison consumed was based on reliable clinical history, examination, the identification of remnants of the container from which the poison was consumed, vomitus (if any) and also the gastric aspirates.

The following parameters were taken into consideration.

1. Age, sex, marital status, socioeconomic status, place of residence of the patient (Rural / urban).
2. Date and time of admission of the poisoning case in the hospital.
3. The type of poison patients consumed.
4. Whether the poisoning was accidental, homicidal or suicidal in nature.
5. The final outcome of the treatment of the patients whether expired, discharged or left against medical advice (LAMA).

RESULTS AND DISCUSSION

A total of 430 cases were studied in one year. The details of each patient were entered into a specifically prepared performa for the study and evaluation.

Monthly Distribution of Poisoning Cases. (Table 1).

Maximum cases were seen in the month of June (47 cases) followed by in decreasing order – October (44), September (41), December (40), May (39), Hence a seasonal variation was observed having highest incidence in summer (28.60%) followed by (in descending order) –rainy season (27.67%), winter

(22.79%) and autumn (20.93%). This study is similar to Dash SK et.al⁷, Dalal JS et al.⁸, and Mohanty MK, et. al.⁹ This trend seems to be associated with crop production and storage timing as the availability of insecticides (aluminum phosphide) is maximum during summers.

Mode of Poisoning (Table 2)

Maximum cases were found to be suicidal in nature (70.23%) followed by Accidental (20.47%), Homicidal cases (6.28%) and in 3.02% cases, mode of poisoning remained unknown. Our findings are consistent with studies of Chugh SN et.al,¹⁰ Abebe M¹¹, Tinoco R et.al¹², Aggarwal NK, et.al¹³, Sharma BR et.al¹⁴, Singh VP et.al¹⁵, Arun M et.al¹⁶, Unnikrishnan B et.al¹⁷ and Vikram A et.al¹⁸. But differs with Malangu N¹⁹ and Khadgawat R et.al²⁰. The ever-increasing demands and stress of the modern lifestyle could be the single most probable factor responsible for the increase in the number of suicides. Among children all of the cases were Accidental (100%) as the result of other studies has indicated like Leveridge YR²¹, Gupta SK et.al²², Islam MN et.al²³ and Logaraj M et.al²⁴.

- a) Suicidal cases male vs. female (Table-3): High incidence was found among males (60.93%) as compared to that of females (39.07%).
- b) Homicidal cases males vs. female (Table-4): High incidence was found among males (88.89%) as compared to that of females (11.11%).
- c) Accidental cases male vs. female (Table-5): High incidence was found among males (68.18%) as compared to that of females (31.81%).
- d) Known poisons vs. Unknown poisons (Table 6): shows that 327 (76.05%) cases were of known poisonous agents whereas in 103 (23.95%) cases the type of poison could not be detected

Types of Poisons Consumed (Table-7):

Aluminum phosphide leads over other agents comprising 90 cases (27.52%) followed Organo phosphorous compounds, 59 cases (18.04%) then Rat poison (Zinc Phosphide) 52 cases (15.90%). Pharmaceutical agents/ drugs were noted in 50 cases (15.29% of 327 cases). Among pharmaceutical agents, Benzodiazepine group drugs (Diazepam, Alprazolam, Nitrazepam etc.) were most commonly abused agents apart from a few cases of antidepressants and NSAIDs. Snake bite poisoning cases also made their presence registered in our study which were three (03) in

numbers. Our study shows results similar to the studies Chugh SN et.al,¹⁰ Aggarwal NK, et.al¹³, Sharma BR et.al¹⁴, Singh VP et.al¹⁵. Among children our study is very close to the studies Leveridge YR²¹, Islam MN et.al²³ and Litovitz T et.al²⁹.

Table 1: Month wise distribution of poisoning case

Name of Month	No. of cases	Percentage (%)
January	28	6.5
February	26	6.04
March	27	6.28
April	37	8.60
May	39	9.07
June	47	10.93
July	37	8.60
August	34	7.91
September	41	9.53
October	44	10.23
November	30	6.98
December	40	9.30
Total	430	100

Table 2: Mode of poisoning cases

Mode of poisoning (Nature)	No. of Cases	Percentage (%)
Suicidal	302	70.23
Homicidal	27	6.28
Accidental	88	20.47
Unknown	13	3.02
Total	430	100

Table 3: Suicidal cases male vs. female

Sex	No. of cases	Percentage (%)
Males	184	60.93
Female	118	39.07
Total	302	100

Table 4: Homicidal cases males vs. female

Sex	No. of cases	Percentage (%)
Males	24	88.89
Female	3	11.11
Total	27	100

Table 5: Accidental cases male vs. female

Sex	No. of cases	Percentage (%)
Males	60	68.18
Female	28	31.81
Total	88	100

Table 6: Types of poisons consumed

S.No	Type of Poison	No. of cases	Percentage (%)
1	Aluminium Phosphide	90	20.39
2	Rat poisons (Zinc Phosphide)	52	12.09
3	Insecticide (Organo Phosphide)	59	13.72
4	Pharmaceutical Agents/ Drugs	50	11.62
5	Alcohol Intoxication	15	03.48
6	Acids	17	03.95
7	Alkali	09	02.09
8	Kerosene	09	02.09
9	Petrol	01	00.23
10	Peppermint Oil	01	00.23
11	Spirit	01	00.23
12	Phenyl	05	01.16
13	Hydrogen Peroxide	01	00.23
14	Copper Sulphate	03	00.69
15	Naphthalene Balls	02	00.46
16	DDT	02	00.46
17	Opium	01	00.23
18	Bhang	01	00.23
19	Dhatara	04	00.93
20	Morphine	01	00.23
21	Snake Bite	03	00.69
22	Unknown Agents/ Poison	103	23.095
	Total		100

Table 7: Outcome of aluminum phosphide poisoning cases

Outcome	No .of cases	Percentage (%)
Expired	69	76.67
Discharged	13	14.44
Lama	8	8.89
Total	90	100

Table 8: Outcome of organophosphorous poisoning cases

Outcome	No .of cases	Percentage (%)
Expired	11	18.96
Discharged	44	75.86
Lama	3	5.17

Table 9: Outcome of rodenticide poisoning cases

Outcome	No .of cases	Percentage (%)
Expired	16	30.77
Discharged	34	65.38
Lama	2	3.85
Total	52	100

Outcome

Of the 430 cases 253 cases (58.84%) were discharged after successful treatment, 33 cases (7.67%) left against medical advice during the course of treatment and 144 cases (33.49%) died during the treatment. Of the 253 cases (58.84%) who were treated successfully and discharged, 164 (58.99%) were males and 89 (58.55%) were females. And of the 144 cases (33.49%) expired, 91 (32.73%) were males whereas 53 (34.87%) were females. Out of a total of 33 cases who left against medical advice, 23 (8.27%) were males and 10 (6.58%) were females. Studies coherent with our results are of studies studies Chugh SN et.al,¹⁰, Abebe M¹¹, and Vikram A et.al¹⁸.

The reason for this high mortality rate in our study is obviously because of a significantly high incidence of Aluminum phosphide poisoning. As there is no specific antidote available for Aluminum phosphide, other reasons for a high mortality due to poisoning cases in Government hospital like ours, may be the shortage of specific antidotes, lifesaving drugs and advanced modern equipment. Infrastructural facilities like emergency care, analytical and diagnostic laboratories etc. are also lacking in most of the hospitals. The absence of a specialized toxicology wing, even in a tertiary care hospital, is very much felt.

- a) Outcome of aluminum phosphide poisoning (Table-8): Maximum number of patients expired (76.67%). 14.44% patients were treated and discharged and 8.89% patients left the hospital against medical advice.
- b) Outcome of Organophosphorous poisoning (Table-9): Maximum numbers of patients were treated and discharged (75.86%), 18.96% patients expired and 5.17% patients left the hospital against medical advice
- c) Outcome of rodenticide poisoning (Table-10): Most of the patients were treated and discharged (65.38%). 30.77% patients expired and 3.85% patients left the hospital against medical advice

Summary

1. More poisoning cases in males than females.
2. More poisoning cases in young age group (20 to 30 years).
3. More poisoning cases were from rural areas as compared to urban.

4. The Incidence of poisoning cases was seen more among married males and females as compared to the unmarried ones.
5. Maximum admissions were seen during Mid-day hours and in the evening, reason being the peak time of maximum activity of a person.
6. Maximum numbers of case were seen in summer followed by rainy and winter season..
7. Most of the cases took place at home.
8. The majority of cases in our study were of suicidal poisoning followed by accidental poisoning and homicidal cases.
9. Maximum numbers of case were of aluminum phosphide followed by organophosphates, and rat poison (rodenticides).
10. Most of the patients were successfully treated and discharged with the exception of aluminium phosphide poisoning cases in which mortality was very high

SUGGESTION

1. To improve public health education through media campaigns.
2. Clear labeling of the products which may be poisonous in nature.
3. Restriction of sale and strengthening the legislation on availability of poison to a common man.
4. Establishment and promotion of poison information centers all over the country.
5. Proper health care policy planning, so as to equip the hospital/health care centers for proper diagnosis and effective treatment of poisoning cases.

The fundamental dictum being "prevention is better than cure", most of the poisoning deaths can be prevented or at least reduced by combined efforts of all concerned.

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Pattern of Poisoning among Female Populace in and around Belgaum

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ABSTRACT

Acute poisoning is an imperative medical emergency moreover one of the leading causes of death in developing countries. Incidence of poisoning, as reported is 13-fold higher in developing countries than in highly industrialized nation. This study accomplished at Belgaum, North Karnataka to make preliminary evaluation about poisoning cases etiologies. The aim of the study was to know various age groups of female involved and choice of poisoning. Data were collected from the cases admitted with acute poisoning in Poison Detection Center of Forensic Medicine & Toxicology, J.N. Medical College, and KLE's Dr. Prabhakar Kore Hospital & MRC, Belgaum, Karnataka, India. During 4 years and 5 months of the study period, total 682 cases of poisoning were registered, out of which 314 were female (46%). The common age group in female involved is in between 21 and 30 years. Organophosphorus was the most common poison. This study serves as pilot project for more detailed retrospective and prospective studies in the future. Organophosphate compounds were the most generally abused essence due to its easy accessibility and availability. Strict legislative measures over the sale of poison and increase in public awareness about the seriousness of the problem through health education should be undertaken to reduce the burden.

Keywords: Female, Poisoning, Belgaum

INTRODUCTION

According to WHO (1999) more than three million poisoning cases have been reported out of which 251,881 deaths occur worldwide annually, of which, 99% of fatal poisoning occur in developing countries, predominantly among farmers due to various kinds of poisons, including poisonous toxins from natural products are handled¹. In developed countries, the poisoning claim 1 to 2 percent of total annual mortality but in developing countries like India, it varies from 15 to 30 percent². The cause, pattern and results of poisoning in particular community depend on a variety of factors such as easy availability of particular poison, the sophistication of the populace, the stress

of environment and the quality of medical care³. In South East Asia pesticide ingestion is endemic⁴ whereas in Pakistan, urban population is mostly exposed to house hold chemicals⁵.

Women, in these days, have a lot of balancing to do between home and workplace, including balancing between social and personal requirements. This routine multitasking activity leads female into stress. According to the World Bank, Mortality rate; adult; female was 160.66 per 1;000 female adults in India in 2011⁶. A detailed information about the nature of poisoning cases in a particular area is not only important for essential for introducing the new and evaluating the old preventive measures.

The key objective of the present study was to determine the approach of poisoning as well as common age group among females, prone for poisoning. It is difficult to say that which of the age group is most susceptible for poisoning in Belgaum that is north zone of Karnataka, India consequently we can do some efforts to bring some positive change.

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MATERIAL AND METHOD

Study was carried out from 29 September 2008 to 28 February 2013. During the period of this study total 682 cases of poisoning were registered in which, 314 were females, in Poison Detection Center, Forensic Medicine & Toxicology, J.N. Medical College, and KLE's Dr. Prabhakar Kore Hospital & MRC, Belgaum, Karnataka, India.

All poisoning cases were screened by colour test & thin layer chromatography and further confirmed by UV Spectrophotometer as well as enzymatic analysis.

The various agents involved in poisoning cases were categorized under the heading of pesticides,

drugs, alcohol & others. Pesticides mainly comprised of organo phosphorus compound, bromodilone, pyrethyroid and other. Drugs encompassed mainly were sedative/ antidepressant. Alcohol cases were mostly due to consumption of ethanol and phenol.

Indigenously designed data collection forms were used to obtain data including the demographic origin of patients, age and gender as well as poison involved.

RESULT

During the year 2008-2013, total 682 cases of acute poisoning were registered among them 314 cases were females.

Table 1: Shows the age pattern of poisoning cases during four years and 05 months period. The majority of the poisoning cases were in the age group of 21-30 years.

Age group	Frequency	Insecticide	Sedatives	Drug paracetamol	Bromodilone	Dhatara	Alcoholic group
0-10	12	11	—	—	1	—	—
11-20	96	55	22	5	10	1	3
21-30	142	73	35	1	16	1	16
31-40	34	19	9	—	2	—	4
41-50	18	5	6	—	3	—	4
51-60	8	4	2	—	1	—	—
61-70	2	1	1	—	—	—	—
71-80	2	—	1	—	—	—	—
Total	314	168	76	6	34	2	27

Table 2: Shows that in majority of cases of poisoning were due to pesticide. Amounting to 43.31% of cases followed by 26.75 % due to drugs mainly sedative and paracetamol and few cases were of alcohol poisoning.

Broad category of Poison	Pattern of poisoning	Number of cases	Total
Pesticide			
Organo phosphorus		136	201
Bromodilone		33	
Pyrethyroid		16	
Carbamate		16	
Drugs			
Sedatives	Diazepam	18	84
	Benzodiazepine	60	
	Paracetamol	06	
Alcohol			
Phenol		21	27
Ethenol		06	
Dhatara		02	02
Grand Total			314

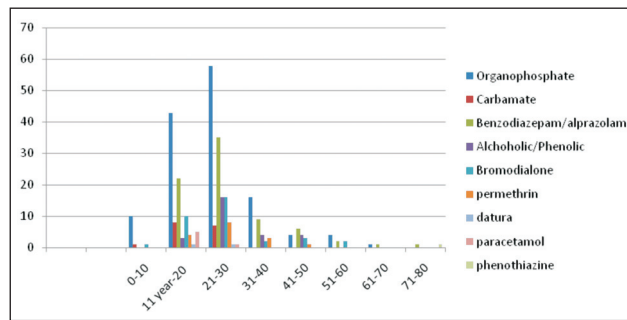


Fig. 1. Shows the nature of poison exposed in different age groups among female. The majority of the poisoning cases were in the age group of 21-30 years followed by age group 11-20 years.

DISCUSSION

Poisoning is a significant health hazard ⁷ and paucity of medical attention towards poisoning cases are making it more challenging. Mortality due to poisoning, 0.5-1 % in developing countries where as it is upto 10 -20 % in developing world ⁸.

The incidence of 314 female cases of poisoning in a solitary hospital over a period of four years and five months in the Belgaum district, Karnataka , emphasizes the seriousness of the problem of poisoning in this part of the country.

There are prominent differences in the pattern of poisoning between the more sophisticated western countries and a developing agricultural country such as India. The vast majority of cases of poisoning in western countries are due to drugs, mainly barbiturates (Myschet1964 and Kesel 1965) ^{9,10} . In contrary, country like India, majority of poisoning cases are due to pesticides, whereas drug poisoning cases are less compared to western countries. In our center, 26.75% drug poisoning cases were reported so far.

Kessel (1965) in Scotland and Swinscow (1951)^{10,11} in Britain found a female preponderance of attempted suicide under the age of 40. This could be a reflection of a greater sense of family responsibility, changes in social environment stress associated with marriage, pregnancy, child bearing dependency interpersonal differences, maladjustment with spouse, domestic violence related dowry harassment are the major factor in India women. Cooper et al (1994)¹² mental or physical illness loss of love in relation, mainly affective disorders predominate in poisoning cases of both the genders. Women are more likely to suffer from depression and stress out than their cool male counterparts ¹³ .

With In this study, the poisoning trend appears similar with pesticide predominating over other poison⁸ mainly due to green revolution and industrialization, they have become household items of the agriculturists¹⁴.

The cost of setting up Poison Information Centers which will provide general information and guidance for treatment of such cases would be moderately low compared with the cost of the loss of young and useful lives. Most of these deaths are among young females between the ages of 11 and 30 years. This is an important reason for setting up poison units in this country as the vast majority of people who take poison are young adults indulging in an act, often as a demonstration, and taking a poison whose potency they are unaware of and whose sale cannot be effectively controlled.

Women, in these days, have a lot of balancing to do between home and workplace, including balancing between social and personal requirements. The issues of maternity, menopause, parenthood, gender roles, conditions at home and workplace, familial and social support and others often blight women's lives in the long run. Gradually it is becoming difficult task for female to give her best in each responsibility .She struggles to maintain the equilibrium between each responsibility. Struggle is one of the leading causes of mental stress. There is a strong relationship between social support and mental stress and trauma in women.

Quantity and quality of leisure time distribution between the genders is an interesting index of how women get burdened with stress for either natural or social obligations. Multinational Time Budget Data Archive and the Australian Time Use Survey suggest that women are now bearing a "dual burden" as both family providers and family carriers. Although men and women have similar quantities of free time, when the character of leisure is considered the gap between genders reemerges. Absence of reciprocal and joint emotion management within family is a nagging stressor for women. Mostly mothers handle the bulk of the parental responsibility such as educational and emotional care of children. This can be physically both and psychologically draining.

Other stress factors that can occur in this stage of adulthood such as the illness or death of a parent, grown children leaving home and in some cases, change in the pattern of emotional relationships with one's spouse, add to the ongoing physical stress. These

all factors lead them to stress some time they are not able to cope up and find out some easy solution that is poisoning.

Comparatively to male poisoning cases the female poisoning cases in this zone is less but not too less to be ignored. Further researches are required to know the main causes of female poisoning. Government should take some serious steps against poisoning so that the mortality due to poisoning can be reduced.

Limitation of Study

Number of patients in this study is very small nevertheless it may be taken as an ignition to conduct more studies about the comparative role of in acute organophosphorus in female poisoning.

CONCLUSION

This study provides updated information on the epidemiology of acute poisoning among Female in north Karnataka, India. Organo phosphorus followed by anti depressant drugs were commonest cause of mortality in our study.

Most important in the management in order to have a good outcome is rapid transport to hospital, early diagnosis and complete atropinization.

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Ethical clearance

The approval for this study was obtained from Jawahar lal Nehru Medical College Institutional Ethical Committee (IEC) , Belgaum , Karnataka and informed consent was provided by the patients.

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Estimation of Height from Ulnar Length by Regression Equation Method in Haryanvi Population

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ABSTRACT

Ulnar length and body height have a direct relation with each other, although the exact calculation of this relation could not be determined with precision. This relation between ulnar length and body height has been questioned and studied by scientific researchers and medical professionals all over the world, and the results of one such study done in PGIMS Rohtak may not only help us to predict one from the other but also whether the relationship between the two is significant or not.

Keywords: Anthropometry, Correlation, Ulnar length, Total body height

INTRODUCTION

Body growth is a vital process and is measured by measuring the height of a person, which itself is a sum of the length of certain bones and appendages of the body. It represents certain relationship in form of proportions to the total stature. This relationship is useful anthropologically to find racial differences and also medico-legally when only parts of the deceased body are available.

Height estimation by measurement of various long bones has been attempted by several workers with variable degree of success. Each worker has derived his own formula for calculating the stature from long bones. However, ulna measurement has not frequently been used for this.

The ulna is a long bone on the medial side of the forearm. Proximally the ulna has a bony process called the olecranon process which articulates with the humerus. Distally the ulna bears a styloid process. The olecranon is subcutaneous and easily palpable. Its position depends on the angle of flexion-extension of the elbow joint. In extension, its tip is in line with the epicondyles of the humerus and in full flexion three bony points make an equilateral triangle. The whole length of the subcutaneous border of the ulna is palpable down to the styloid process^{1,2}. Ossification of the ulna begins at the 8th week of fetal life. The proximal epiphysis fuses with the shaft in 16th year

and the distal epiphysis unites with the shaft in 20th year¹.

The ulna length has been shown to be a reliable and precise means in predicting the stature of an individual^{3,4}. The forearm bone Ulna is mostly subcutaneous throughout its length and easily approachable for measurement. Hence, an effort has been made to find out the correlation between ulna length and body height in population of Haryana.

MATERIAL & METHOD

For present study, total 145 (80 male and 65 female) asymptomatic, healthy medical students belonging to various regions of Haryana were selected. Their age ranged between 18 to 25 years. The study was conducted from January to march 2013 in Department Of Forensic Medicine, PGIMS, Rohtak.

The left ulnar length was measured from the tip of the olecranon process to the tip of the styloid process, with the elbow flexed and the palm spread over the opposite shoulder with the help of the tape. Height of the individual was measured in standing erect anatomical position with standing height measuring instrument. The measurements were taken at a fixed time between 2.00 to 4.30 p.m. to eliminate diurnal variation and by the same person to avoid personal error in methodology. All datas were subjected to statistical analysis of correlations coefficients and

regression equations between Height and Ulnar Length for estimation of height from ulnar length in Haryana Population.

OBSERVATIONS & RESULT

Table shows various important parameters. The correlation coefficient between height and ulna length is positive (0.34 in males and 0.37 in females), suggesting that it is significant.

Table 1. Sshows Mean Height, Mean ulna length, correlation coefficient®, regression coefficient (b) and value of constant (a) in 80 Males and 65 Females.

	Male	Female
Total Number	80	65
Mean height (cm)	172.75	159.10
S.D. of height	6.111	6.048
Mean ulna length (cm)	26.7	25.1
S.D. of ulna length	2.33	3.31

Correlation Coefficient(r)(Height and Ulna Length)
0.34397 0.370357

No such type of study was carried out in Haryana. In the present study the formula is derived as under.

Regression Equation

For Male: $H = 0.9119U + 148.34$

For Female: $H = 0.7168U + 141.1$

Where H = Total height

U = Ulna length

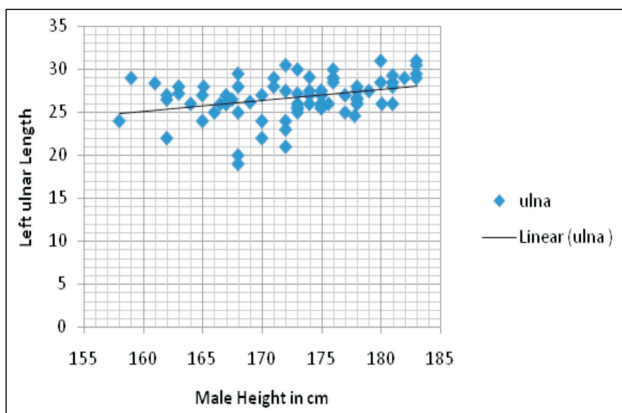


Table 2. The graph shows showing inter-relationship of left ulnar length and height of a male individual.

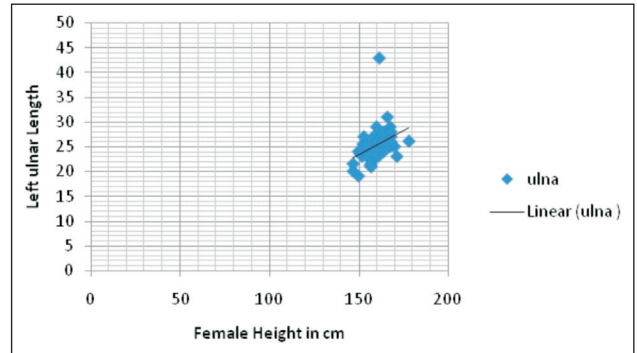


Table 3. The graph shows showing inter-relationship of left ulnar length and height of a Female individual.

DISCUSSION

The present study is based on the measurements of ulna length and body height of total 145 students aged between 18 to 25 years of age. Obtained data was analysed and an attempt was made to find out correlation and to derive a regression formula between body height and ulna length of an individual.

Allbrook D derived regression formulae for estimation of stature from the length of Ulna as- Stature: $88.94 + 3.06(\text{ulnar length}) \pm 4.4$ (Standard error)⁵. Sarojini Devi et al derived computed correlation coefficient (r = 0.619 for male and 0.584 for female) and Regression equation formula for estimation of stature by using upper arm length among living population of Maring tribes of pallel area, Chandel district, Manipur.⁶

Mondal et al in 2009 selected 20-50 years of males in Burdwan district and adjacent areas of West Bengal, results showed that mean height: 164.32cm, length of Rt.Ulna:27.13cm & of Lt.Ulna:27.01cm. Correlation Coefficient for Rt.Ulna:0.78 & Lt.Ulna:0.68.⁷

Ilayperuma et al in their study on a total of 258 subjects with an age span of 20-23 years in Sri Lanka Population derived regression equations for stature estimation as follows:

For male: Height = $97.252 + 2.645 (\text{ulna length})$

For females: Height = $68.777 + 3.536 (\text{ulna length})$

For both male and female (combined): Height = $57.385 + 4.047(\text{ulna length})$.⁸

In 2011 Thummar et al Conducted study consisted of 310 subjects between 20-40 years of age in Gujarat and derived two separate Regression equation formulae:

For Male : $Y_1 = 81.11 + 3.117X_1$, $Y_2 = 65.76 + 3.667X_2$,

For Female: $Y_1 = 17.10 + 5.314X_1$, $Y_2 = 18.95 + 5.335X_2$,

For Combined: $Y_1 = 21.17 + 5.212X_1$, $Y_2 = 14.92 + 5.440X_2$,

where, Y=Height, X_1 = Rt.Ulna length, X_2 =Lt.Ulna length.⁹

Mondal et al in 2012, conducted study in the Burdwan Medical College Hospital on 300 females, it finding showed that the mean of the heights was extrapolated as 153.83cm, with a standard deviation of 6.32. Similarly, the means of the left and the right ulnar lengths were calculated as 24.46cm (with a Std. deviation of 1.18) and 24.55cm (with a Std. deviation of 1.17) respectively .The correlation coefficient (r) of the height and the left ulnar length was 0.823 (p=0.002), with a significant regression coefficient (b) of 4.39 (p=0.001).¹⁰

In the present study also, as mentioned above a good correlation of body height was observed with ulna length and it was highly statistically significant with statistical significance of 0.001 in males and 0.002 in females.

The correlation coefficient between height and ulna length is + 0.34 in male and + 0.37 in female which is highly significant. It means there is a strong bond between height and ulna length and if either of the measurement (ulna length or total height) is known, the other can be calculated and this would be useful for Anthropologists and Forensic Medicine experts.

Height is more if the length of Ulna is more. Ulna size and height are both based on many factors such as gender, genetics, health and environment. Some of these factors are subject to change due to genetic abnormalities, disability, poor nutrition and hormonal imbalances and these variables can affect the relation of height to ulna size.

CONCLUSION

The mean ulnar length in male and female in all age groups from 17 years to 25 years is 26.7 and 25.1cm respectively. Height of male individual is 6.47 and female is 6.33 times the length of his/her ulnar length. The estimation of height from various long bones, head

length and hand length has been attempted by many workers. However, ulnar dimensions have not frequently been used for this purpose. The present study deals with the observations on correlation of total standing height with ulnar length in students of Haryana.

The results of the present study show that ulnar dimensions can be used as predictive values for stature estimation in forensic and medical investigations. However, one has to be careful because these results and the regression equations in particular can only be applied to the population from which the data have been obtained. When means of ulna measurements were compared with other studies (Mondal et al 2009⁷; Ilayperuma et al 2010⁸; Thummar et al, 2011⁹), differences were found between the populations. With this findings it is clear that by the measurement of one (ulna length or total height) the other can be calculated and this fact may be of practically use in Medico legal cases (M.L.C.) investigations. Thus the results of the present study will provide useful information to various Anthropologists and Forensic Medicine Experts.

Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: Taken

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Estimation of Postmortem Interval by Measuring Level of Ascorbic Acid in Vitreous Humour

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ABSTRACT

Establishing the postmortem interval is one of the frustrating challenges faced by forensic experts, particularly when limited information about deceased is available. In the past and today also estimation of postmortem interval mainly relied on physical changes after death such as the degree of rigor mortis, postmortem staining, cooling of body, changes in eye, decomposition changes, contents of stomach bowel and contents of urinary bladder.

The chemical tests to determine the postmortem interval have been increased largely in the last few decades, which are based on changes occurring in the body immediately or shortly after death. These changes occur in various body fluids such as whole blood, serum, CSF, aqueous and vitreous humour. In this study vitreous humour ascorbic acid concentration were investigated to predict postmortem interval.

Keywords: Postmortem Interval, Vitreous Humour, Ascorbic acid

INTRODUCTION

Forensic Medicine is the branch of medicine which deals with application of medical knowledge to aid in the administration of justice¹. In case of autopsy examination, the time of death is sometimes extremely important question almost invariably asked by police officers. So determination of time since death is the most important medicolegal issue in any postmortem examination. Accurate determination of postmortem interval applies not only to criminal law, where accurate determination of time since death may either exclude or include a suspect or accused of particular homicide but also to civil law, in which ascertaining the exact time of death is of practical necessity in setting family, social and business matters². Determination of accurate time of death is extremely difficult because

timing of onset and the rates of postmortem changes are usually governed by unpredictable endogenous and exogenous factors³.

The analysis of body fluid such as vitreous, blood and CSF in relation to their postmortem chemical changes is a useful supplementary procedure. The present study was conducted in Bikaner with the aim to find out the correlation between ascorbic acid concentration in vitreous humour vis-a-vis postmortem interval. Vitreous humour is selected because it is relatively stable, easy to sample during postmortem examination and its composition is quite similar to that of aqueous fluid, CSF and serum. It is relatively free from contamination by blood, bacteria and products of the postmortem autolysis⁴.

AIMS & OBJECTIVE

- To establish correlation between postmortem interval and vitreous ascorbic acid concentration.
- To detect difference between level of vitreous ascorbic acid concentration in right and left eye, if any.

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- To deduce the rate of increase or decrease of vitreous ascorbic acid concentration per hour.
- To derive co-efficient of correlation between postmortem interval and vitreous ascorbic acid concentration.
- To derive a formula for determination of postmortem interval within reasonable time limit by putting vitreous ascorbic acid concentration.
- Value of vitreous ascorbic acid concentration in relation to age, sex, temperature and cause of death.

REVIEW OF LITERATURE

- Nauman⁵ (1959) did the first extensive study on 211 postmortem vitreous fluids for glucose, urea, creatinine, chloride, phosphorus, sodium, potassium and calcium. He demonstrated a rise of vitreous potassium, phosphorus and urea after death but did not attempt to correlate this with the postmortem interval.
- Jaffe⁶ (1962) studied on 31 autopsies and found that ascorbic acid level had fallen slowly during first 20hrs.
- Gantner, Caffrey and Sturner⁷ (1962) obtained 74 specimens in which the time of death was known. They found that individual samples of vitreous ascorbic acid showed considerable variation from subject to subject. Samples showed sufficient variation to suggest that base line levels of ascorbic acid were too variable (2.0 to 22.0 mg/100ml) at the time of death. But sequential sampling technique actually showed a rise in ascorbic acid concentration in vitreous for the first 5 hrs after which the level slowly declined.
- Lie⁸ (1967) studied 88 cases and stressed the necessity of withdrawing all fluid possible from the globe and avoiding forceful aspiration of vitreous as important factor in getting accurate results.

MATERIAL&METHOD

The present study was carried out in Department of Forensic Medicine, in association with Biochemistry Department of S.P. Medical College & Associate Group of Hospitals, Bikaner.

Source of sample

This study was carried out on medicolegal cases of death, who were admitted in S.P. Medical College &

Associated Group of Hospitals, Bikaner and died subsequently. The information regarding time of death was collected from hospital records. The samples were taken immediately to Department of Biochemistry, S.P. Medical College, Bikaner for analysis.

The exclusion criteria were

All the cases where the time of death was unknown or body in advanced stage of decomposition or the extracted sample became hemorrhagic or cases of ocular disorder or cases of head injury involving orbit or amount aspirated is less than 0.5 ml were excluded from this study.

Estimation of Ascorbic Acid Concentration

Vitreous ascorbic acid was estimated by using 2, 4 – dinitro phenylhydrazine (DNPH).

Principle: The protein free filtrate is incubated at 37°C with 2, 4 – dinitrophenylhydrazine. During incubation ascorbic acid is converted to dehydroascorbic acid which react with 2, 4 – dinitrophenylhydrazine to give hydrazone which gives red or yellow colour compound by action of sulphuric acid and this colour is compared with that of standard ascorbic acid solution treated under identical conditions.

Procedure: Protein Free Filtrate: In a small test tube 0.2 ml of vitreous was added followed by 0.8 ml Trichloro acetic acid (10%), mixed well and allowed to stand for 5 min and centrifuged 0.5 ml of supernatant solution was used for estimation which is equivalent to 0.1 ml of vitreous humour. For estimation of vitreous ascorbic acid 3 test tubes were taken marked T, B and S for Test, Blank and Standard respectively.

In the test tube marked T, 0.5 ml of protein free filtrate (= 0.1 ml of vitreous) and in blank (B), 0.5 ml of T.C.A. was added. 0.2 ml of working standard ascorbic acid solution was added with 0.8 ml of Trichloro acetic acid and mixed well and 0.5 ml of this mixture was added to the test tube marked 'S' which is equivalent to 0.1 ml of standard (0.001mg) ascorbic acid.

Thereafter 0.2 ml of DNPH was added in all the 3 test tubes mixed and incubated for 3 hours at 37°C. After incubation, these test tubes were kept in ice bath and added with 0.8 ml of chilled 65% H₂SO₄ mixed well and allowed to stand for 30 min at room temperature then 0.5 ml of 65% H₂SO₄ was added in each test tube to make the volume 2.0 ml in each test tube.

CALCULATION

Reading of standard (S) was corresponding to 0.001 mg ascorbic acid.

Therefore reading of test of (T) would corresponding to

$$= \frac{0.001 \times T \text{ mg of Ascorbic Acid}}{S}$$

The aforesaid amount of ascorbic acid is present in 0.1 ml of vitreous humour.

So 0.1 ml of vitreous was corresponding to

$$= \frac{0.001 \times T \text{ mg of Ascorbic Acid}}{S \times 0.1}$$

100ml of vitreous contained
 Ascorbic Acid $\frac{T}{S}$ mg%

OBSERVATION**Table No. 1: Distribution of cases according to age and gender**

S. No.	Age groups in year	Male	Female	Total	%
1.	0-10	03	01	04	02.00
2.	11-20	23	12	35	17.50
3.	21-30	48	37	85	42.50
4.	31-40	27	12	39	19.50
5.	41-50	15	07	22	11.00
6.	51-60	05	03	08	04.00
7.	61-70	04	01	05	02.50
8.	71-80	01	00	01	00.50
9.	81-90	01	00	01	00.50
	Total	127	73	200	100.00

Table No. 2: Distribution of cases according to cause of death Causes of Death

Gender	Trauma	Burn	Poisoning	Natural Death	Total
Male	69 (54.33%)	20 (15.74%)	33 (25.98%)	05 (3.93%)	127
Female	17 (23.28%)	31 (42.46%)	24 (32.87%)	01 (1.36%)	73
Total	86 (43.0%)	51 (25.50%)	57 (28.5%)	06 (03.0%)	200
% Cases	43	25.5	28.5	3	100

Table No. 3: Distribution of cases according to time since death and cause of death

Time since death (hrs)	Causes of death				Total	%
	Trauma	Burn	Poisoning	Natural Death		
0-1	02	00	00	00	02	01.00
1.1-3	11	06	01	00	18	09.00
3.1-6	17	09	13	00	39	19.50
6.1-12	25	14	17	03	59	29.5
12.1-24	29	19	25	02	75	37.5
24.1-36	01	01	00	00	02	01.00
36.1-48	00	02	00	01	03	01.50
48.1-64	01	00	01	00	02	01.00
64.1-72	00	00	00	00	00	00
Total	86	51	57	06	200	100.00

Table No. 4: Vitreous Ascorbic acid concentration vis-à-vis Cause of death

Cause of death	Trauma	Burn	Poisoning	Natural Death
No. of Eyes	172	102	114	12
Time since death (hrs)	Ascorbic Acid concentration in mg/100ml			
0-1	5.20	-	-	-
1.1-3	3.67	3.91	4.10	-
3.1-6	3.80	3.40	4.50	-
6.1-12	3.93	4.10	3.70	4.10
12.1-24	2.60	2.60	2.50	3.60
24.1-36	0.80	0.95	-	-
36.1-48	-	0.90	-	0.80
48.1-72	0.80	-	1.10	-
>72	-	-	-	-

Table No. 5: Showing level of Vitreous Ascorbic Acid ion concentration in different age groups vis-a-vis Postmortem Intervals

Age in yrs	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	Mean
No. of Eyes	8	70	170	78	44	16	10	2	2	
Time since death (hrs)	Ascorbic Acid concentration in mg/100ml									
0-1	-	4.55	-	5.85	-	-	-	-	-	5.2
1.1-3	-	4.05	3.41	3.78	3.63	4.7	-	-	5.85	3.8
3.1-6	6.95	4.35	3.60	3.45	4.10	3.10	4.10	-	-	4.24
6.1-12	3.00	3.90	3.80	4.45	3.60	4.20	2.75	3.15	-	3.61
12.1-24	3.00	2.20	2.70	2.30	3.20	2.45	-	-	-	2.64
24.1-36	-	-	0.90	-	0.90	-	-	-	-	0.9
36.1-48	-	-	0.85	-	-	0.80	-	-	-	0.83
48.1-72	-	1.10	0.80	-	-	-	-	-	-	0.95
>72	-	-	-	-	-	-	-	-	-	0.0

Table No. 6: Vitreous Ascorbic acid ion concentration in right and left eye in different age groups vis -a-vis Postmortem Intervals

Age in yrs	0-10		10-20		20-30		30-40		40-50		50-60		60-70		70-80		80-90	
No. of Eyes	8		70		170		78		44		16		10		2		2	
Time since death (hrs)	R	L	R	L	R	L	R	L	R	L	R	L	R	L	R	L	R	L
	Ascorbic Acid concentration in mg/100ml																	
0-1	-	-	4.50	4.60	-	-	5.80	5.90	-	-	-	-	-	-	-	-	-	-
1.1-3	-	-	4.00	4.10	3.40	3.40	3.80	3.60	3.50	3.70	4.80	4.60	-	-	-	-	5.90	5.80
3.1-6	6.90	7.00	4.40	4.30	3.60	3.60	3.40	3.50	4.10	4.10	3.20	3.10	4.10	4.10	-	-	-	-
6.1-12	3.00	3.10	3.90	3.90	3.80	3.80	4.50	4.40	3.60	3.60	4.20	4.20	2.80	2.70	3.10	3.20	-	-
12.1-24	3.00	3.00	2.20	2.30	2.70	2.70	2.30	2.30	3.20	3.20	2.40	2.50	-	-	-	-	-	-
24.1-36	-	-	-	-	0.90	0.90	-	-	0.80	1.00	-	-	-	-	-	-	-	-
36.1-48	-	-	-	-	0.80	0.90	-	-	-	-	0.80	0.80	-	-	-	-	-	-
48.1-72	-	-	1.10	1.10	0.80	0.80	-	-	-	-	-	-	-	-	-	-	-	-
>72	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table No. 7: Showing comparison of Vitreous Ascorbic Acid ion concentration according to temperature in cases having approximately same time since death

S.No.	Temperature (oC)	No. of cases	Range Ascorbic Acid Conc. mg/100ml	Mean + SD
1.	10-20	12	0.8 - 6.5	3.3 + 1.83
2.	20-30	18	0.9 - 5.8	3.4 + 1.27
3.	30-40	10	1.1 - 4.5	3.2 + 1.18

We have calculated the following statistics

1. Coefficient of correlation

2. Regression equation

Coefficient of Correlation: It was calculated using INDOSTAT software. The linear correlation of the vitreous ascorbic acid concentration was found statistically insignificant ($r=0.027$) therefore the coefficient of correlation could not be derived.

Regression Equation: The same was calculated by using INDOSTAT software.

The regression equation was as under

- Postmortem Interval = $24.39 + 3.98 \times AA$

DISCUSSION:

In this study 127 (63.5%) were males and 73 (36.5%) were females (Table no-1). The majority of cases were from trauma (43%) followed by poisoning (28.50%), Burn (25.50%) and natural death (03%) respectively (Table no-2). The overall range of time since death was 0 to 72 hrs. of studied cases and maximum number of cases were in the range between 12.1 to 24 hrs (37.50%) followed by 6.1 to 12 hrs (29.50%). None of the case was reported beyond 57 hrs of time since death (Table no-3). There was statistically insignificant correlation of vitreous ascorbic acid concentration in relation to various causes of death (Table no-4).

The level of ascorbic acid in vitreous humour was observed to decrease upto 3 hrs then increase upto 6 hrs of postmortem interval and then again slow decline (Table no-5). Our findings were not consistent with Gantner, Caffey and Stunner⁷ (1962) who observed increase in ascorbic acid level during first 5 hrs and then slow decline. The findings of our study were also not consistent with Jaffe⁶ who observed slow decline within first 20 hrs of postmortem interval. For all the age groups the $P > 0.05$ was not statistically significant. Therefore we could conclude that the age does not significantly affect level of ascorbic acid concentration in vitreous humour.

The present study showed that there was no statistically significant difference in levels of vitreous ascorbic acid concentration between the two eyes of body (Table no-6). In the present study we could not find any relation between vitreous ascorbic acid concentration and cause of death. We observed that

age and sex factor has no appreciable role in the changes in level of ascorbic acid concentration in the vitreous humour after death.

From this study we found that there was no effect of environmental temperature on the levels of ascorbic acid concentration in the vitreous humour after death (Table no-7).

Coe⁹ (1989) in his study observed that external and internal factors influence the postmortem vitreous biochemistry. The external factors are sampling techniques, instrumentation and the environmental temperature of the body during the postmortem interval. The major internal factors possibly influencing the postmortem vitreous biochemistry are the age of individual, the duration of terminal episode, manner of death and presence or absence of nitrogen retention.

It is necessary to remove whole of the fluid from the eye that can be aspirated because the vitreous humour next to the retina has a highest concentration of solutes than the central portion of the globe until putrefaction sets in and also vitreous must be aspirated slowly to avoid tearing loose fragments of the tissue. Such tissue fragments grossly distort the electrolytes in the vitreous since it is from such cells that most of electrolytes are derived⁸.

Presently the use of postmortem vitreous biochemistry for the Postmortem Interval estimation has been limited because of the different conclusions reached by different workers and the lack of uniformity in their equations. So this topic needs further research to bring into use.

CONCLUSION

The results of present study lead to following conclusions

- Level of ascorbic acid in vitreous humour was observed to decrease upto 3 hrs then increase upto 6 hrs of postmortem interval and then again slow decline. So it is statistically insignificant.
- No significant differences existed for vitreous ascorbic acid concentration in the same pair of eyes at identical postmortem interval.
- Factors like age, sex, cause of death and environmental temperature did not influence the vitreous humour ascorbic acid values.

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Ethical Clearance : The study was cleared by the Institutional ethical committee headed by Principal, S.P. medical College & Associated Hospitals, Bikaner.

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Analysis of Homicidal Deaths at SMS Hospital, Jaipur- A Prospective Autopsy Study

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ABSTRACT

Violence is a significant public health problem and homicide is a severest form of violence depriving a human being of his fundamental right to live. In present study 82 cases of homicidal deaths were studied. The incidence of homicidal death was 2.3% during the study period. Males were victimized Three and half times more than females. Majority of cases were in 21-40 years of age comprising of 38 cases (46.34%). Majority of victims were married; 65 cases (79.2%), with the incident occurring in the month of July in 13 cases (15.86%) and land dispute was the main motive in 33 cases (40.2%). Injuries were inflicted by blunt weapons in significant number of cases; 48 cases (58.54%) which were followed by injuries by sharp weapons and firearm weapons in 10 cases (12.2%) each. Majority of homicidal deaths resulted from Head injury (51.22%). The information gained from this type of analysis can be used by law enforcement authorities to curtail the amount of violence present in today's society.

Keywords: Homicidal Death, Blunt Weapon, Land Dispute, Head Injury

INTRODUCTION

Violence is a significant public health problem and homicide is severest form of violence, depriving a human being of his fundamental right to live. Homicide is an act of a human killing another human¹. Homicide is prevalent widely almost all over the world. Investigations of homicide have hefty impact in court trials of any judicial system of the country. Every day, the news papers scream headlines about the rising incidence of these most horrific crimes taking place in different parts of the country especially in metropolitan cities. This is probably due to rapidly increasing population; urbanization; poverty; unemployment; frustration; illiteracy; prevalent economic; social and political environment; insurgency; terrorism; drug addiction; easy availability of weapon; and the widening gap between the rich and the poor. Young offenders are becoming increasingly violent and this is a cause for concern, as they are tomorrow's generation. Medico legal autopsies not only give the cause and manner of death but also give important statistical data related to legal incidents in the cities

and regions where the autopsies are conducted. Investigation of a homicidal death can never be complete without a detailed post-mortem examination. The detailed analysis and scientific interpretation of autopsy finding is imperative to reconstruct the crime scene. The main objective of this analysis was to analyze the information to determine trends in homicide cases in Jaipur region during the study period.

MATERIAL AND METHOD

The present study is made on the deaths occurred due to alleged homicide according to the Inquest and First information Report made by the relatives and attendants at the mortuary of SMS hospital, Jaipur during the study period May 2012 to April 2013. The material regard to them, as Inquests, First information reports, Statements made by the relatives, Hospital records, Panchanamas of scene of offence etc., are collected from the Police, apart from the Postmortem examination reports from the Department. Some information is also collected in person from the relatives, who attended the mortuary at the time of postmortem examination, where ever it is possible. Post mortem examination of the case was carried out as per the standards after collecting the above information; a data sheet is prepared and filled, to analyze it.

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OBSERVATION AND RESULTS

Total 3150 medico-legal autopsies were done during study period, Out of which 82 cases (2.60%) were of homicidal deaths. In the total of 82 cases, male preponderance is seen by 64 cases in comparison to 18 cases of female, in a ratio of 3.55: 1.0. People in 21-30

years age group are more vulnerable to homicides as 24 deaths occurred in this group followed by 41-50 years, in which 16 deaths occurred. Among them, 30 are from low socio-economic status, 44 are from middle class and 8 are from high socio-economic status. Illiteracy is seen among 22 cases. 25 cases are educated up to secondary level.

Table 1: Showing Age, Sex, Socioeconomic and Educational Status of Alleged Homicide Victims.

Age Group	Male	Female	Total (%)	Socioeconomic status	No. (%)
0-10	0	2	2	Lower	30 (36.58)
11-20	8	4	12	Middle	44 (53.65)
21-30	18	6	24	Upper	8 (9.75)
31-40	12	2	14	Educational status	No. (%)
41-50	15	1	16	Illiterate	22 (26.83)
51-60	6	2	8	Upto secondary	25 (30.48)
61-70	4	1	5	Senior secondary	10 (12.2)
71-80	1	0	1	Graduate	13 (15.85)
Total	64	18	82	Post graduate	12 (14.63)

Table 2: Showing Marital Status of the Victim

Marital status	Male	Female	Total (%)
Married	54	11	65(79.2)
Unmarried	10	7	17(20.8)
Total	64	18	82(100)

Regarding the marital status, 54 of males and 11 of females are married, 10 males and 3 females were unmarried.

Table 3: Showing Distribution of 82 Victims of Homicidal Deaths according to their Domiciliary Status and the Month in Which Crime was Committed

n =82

Month in which crime was committed	Victim belonging to Rural population	Victim belonging to Urban population	Total (%)
January	05	01	06 (7.32%)
February	05	02	07 (8.54%)
March	02	02	04 (4.87%)
April	04	00	04 (4.87%)
May	06	02	08 (9.76%)
June	09	02	11 (13.41%)
July	07	06	13 (15.86%)
August	01	01	02 (2.44%)
September	02	02	04 (4.87%)
October	10	00	10 (12.20%)
November	06	00	06 (7.32%)
December	04	03	07 (8.54%)
Total (%)	61 (74.39%)	21 (25.61%)	82 (100%)

Most of the criminal incidences in rural regions of the country were found to show a rise in numbers in

the months ranging from May to July in summers and in October in the autumn season.

Table 4: Showing Distribution of 82 Victims of Homicidal Deaths According to the Motive behind the Crime

n =82

Motive behind attack	< 10		11-20		21-30		31-40		41-50		51-60		61-70		> 71		Total		Total (%)
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
Revenge	00	00	01	01	02	00	02	00	01	00	00	00	00	00	00	00	06	01	07 (8.54%)
Property & Financial Disputes	00	00	00	00	05	00	03	00	04	00	01	00	00	00	00	00	13	00	13 (15.86%)
Land disputes	00	00	00	00	04	02	05	00	08	01	05	02	04	01	01	00	27	06	33 (40.25%)
Momentary rage (Impulse)	00	01	02	00	04	00	01	01	02	00	00	00	00	00	00	00	09	02	11 (13.42%)
Sexual jealousy	00	00	01	03	01	02	00	00	00	00	00	00	00	00	00	00	02	05	07 (8.54%)
Defense	00	00	03	00	00	00	00	00	00	00	00	00	00	00	00	00	03	00	03 (3.65%)
Ransom	00	01	01	00	00	00	01	00	00	00	00	00	00	00	00	00	02	01	03 (3.65%)
Dowry	00	00	00	00	00	02	00	01	00	00	00	00	00	00	00	00	00	03	03 (3.65%)
Unknown	00	00	00	00	02	00	00	00	00	00	00	00	00	00	00	00	02	00	02 (2.44%)
Total (%)	00	02	08	04	18	06	12	02	15	01	06	02	04	01	01	00	64	18	82 (100%)

$\chi^2 = 24.617$; 8 dF; P= 0.002; < 0.05; Sig.

Maximum number of homicides occurred for land disputes (40%) followed by property and financial matters comprising of 16% cases. These were followed by eleven cases where an episode of homicidal event

occurred as a result of a momentary rage. The cases of homicide for land disputes were significantly reported in this study.

Table 5: Showing Distribution 82 of Victims of Homicidal Deaths according to the Cause of Death

n =82

Cause of death	Age group								Total (%)
	< 10	11-20	21-30	31-40	41-50	51-60	61-70	> 71	
Head injury	00	03	11	07	13	05	03	00	42 (51.22%)
Stab injury	00	02	03	02	00	00	00	01	08 (9.76%)
Multiple injuries	02	01	01	00	01	02	01	00	08 (9.76%)
Pressure over Neck	00	01	04	02	00	00	00	00	07 (8.53%)
Gun shot	00	03	03	02	01	00	01	00	10 (12.2%)
Poisoning	00	01	02	01	01	01	00	00	06 (7.32%)
Burn	00	01	00	00	00	00	00	00	01 (1.21%)
Total (%)	02	12	24	14	16	08	05	01	82 (100%)

$\chi^2 = 03.39$; 1 dF; P= 0.068; > 0.05; NS

In this study, the majority of homicidal deaths resulted from head injury (51%), followed by 12%

deaths due to gunshot injuries; about 10% deaths each due to multiple injuries and stab wounds.

Table 6: Showing Distribution of 82 Victims of Homicidal Deaths According to the Weapon Used to Inflict the Attack

n =82

Weapon	< 10		11-20		21-30		31-40		41-50		51-60		61-70		> 71		Total		Total(%)
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
Blunt	00	00	04	00	09	03	08	00	12	01	05	02	03	01	00	00	41	07	48 (58.55%)
Sharp	00	01	00	02	04	00	02	00	00	00	00	00	00	00	01	00	07	03	10 (12.19%)
Firearm	00	00	03	00	03	00	02	00	01	00	00	00	01	00	00	00	10	00	10 (12.19%)
Pressure over neck	00	01	00	01	00	03	00	02	00	00	00	00	00	00	00	00	01	07	07 (8.54%)
Poison	00	00	01	00	02	00	00	00	02	00	01	00	00	00	00	00	06	00	06 (7.32%)
Burn	00	00	00	01	00	00	00	00	00	00	00	00	00	00	00	00	00	01	01 (1.21%)
Total	00	02	08	04	18	06	12	02	15	01	06	02	04	01	01	00	64	18	82 (100%)

$\chi^2 = 29.736$; 5 dF; P= 0.000; < 0.001; Very Sig.

Majority of the homicidal attacks were committed by use of blunt weapons (58.55%). The use of blunt weapons for an episode of homicidal attack was reported significantly in this study. Sharp weapons and firearm weapons were put to use in 10 cases each (12.19%).

Table 7: Showing Patterns of Injuries in 82 Victims of Homicidal Deaths

Type of Injury	Number of cases	Percentage
Laceration	37	45%
Abrasion	28	34%
Bruise	13	15.8%
Incised & Stab wound	12	14.6%
Diffuse Swelling	12	14.6%
Firearm	10	12.2%
Pressure over Neck	07	8.5%
Burn	01	1.2%
Poisoning	06	7.3%

In 22 cases (27%) there was a single offending injury present which resulted in death of the victim with no other associated injury. In the rest of 60 cases (73%), there was more than one injury in the victims of homicidal deaths.

DISCUSSION

This study was undertaken to study the pattern of injuries in culpable homicidal deaths (excluding deaths due to rash/ negligent act) including those amounting to murder and those not amounting to the crime of murder; along with their socio-demographic profile at Jaipur region during the study period; 2012-13. In our study, male: female (M:F) ratio was 3.5:1. Among the 82 victims included in study population, there were 64 males (78.05%) and 18 females (21.95%). Similar findings were observed in various other Indian studies^{2,3} and considerably lower than 6:1⁴.

In our study, the most commonly affected age group was 21-30 years (29.27%) followed by 41-50 years (19.51%) and 31-40 years (17.09%). Most of the other contemporary studies also reported 21-30 years to be the most commonly affected age group^{5,6,7}. Majority of the victims in our study belonged to the most productive age groups between 21-50 years (65.86%). Most of the victims 65 (80%) were married and unmarried victims were 17 (20%). The marital statuses for the different age groups were consistent with the legal marriageable age, not much expected from the pattern of marriageable ages prevalent in traditional Indian society. Our results are quite similar

to 76.36%^{3,5} but slightly higher than 50%⁸. We observed higher incidences in the months of May, June, July and October reaching up to about 10% victims in each month. This indicates a seasonal variation in occurrence of criminal episodes being more in summer and autumn seasons. This can be attributed to the seasons following harvest when the rural population of our country is relatively free as compared to the months when they are busy with the agricultural work. Not much authors have assessed this variable of crime in their studies except Mohanty MK et al⁹ who reported a higher incidence in winters.

In our study, the maximum number of homicides occurred for land disputes (40%) followed by property and financial matters comprising of 16% cases. These were followed by eleven cases (13.42%) where an episode of homicidal event occurred as a result of an impulse. The cases of homicide for land disputes were significantly reported in this study. Revenge was not a major cause of homicide in our study accounting for only 8.54% cases contradictory to most studies report it to be responsible in maximum number of cases as by other authors^{7,8,9}. In this study, head injury remained the most common cause of death (51.2%) in victims of homicide. In about 32% cases, death occurred as a result of shock and hemorrhage resulting from firearm wounds (12.2%); stab wounds (9.76%) and multiple injuries (9.76%). In 8.5% cases, asphyxia played a role in causation of death due to application of pressure over the neck of victim by the assailant. Administration of a poisonous substance with the intention to cause death was reported in 7.32% cases. Burns as a means of committing homicide were observed in only a single case in our study. Our results are in accordance to many authors^{5,8,9} but contradictory to Gupta A et al.¹⁰ who reported shock and hemorrhage to be the most common cause of death followed by head injury.

Our study reports the use of blunt weapons as a means of committing homicide in a significant number of cases (58.55%). Similar findings have been reported by other Indian studies^{6,8,9,11}. However, our results are contradictory to many other studies where sharp weapons were used as the most common weapon for commission of homicide^{10,12}. The most common site of infliction of blunt force trauma in our study was the head region followed by neck by means of strangulation, both accounting for 89.75% cases. This is in accordance to most studies^{2,5,8}. 78.05% victims died due to mechanical injuries. Among them

Lacerations were the most common type of injury seen in 45% victims followed by (28%) with bruises (15.8%); incised & stab wounds and diffuse swelling (14.6% each) and firearm wounds in 12.2% cases. Majority of the fatal injuries were seen over the head region (54.8%). Buchade C et al⁶ reported abrasions followed by contusions were the most common mechanical injury in victims of homicidal deaths. In their study, similar to ours head and neck regions were the most commonly injured body part followed by abdomen in contrast to our study where peripheries and chest were the next to be offended. Considering the internal organs, head injury being the most common pattern of injury, brain was the most commonly affected internal organ in more than half of the cases.

CONCLUSION

Homicide is one of the worst forms of crime. State, society and legal officers should take firm steps to control this heinous crime. Socioeconomic wellbeing, removal of poverty and enhanced employment opportunities will also help to check it. The information should be used to develop public safety measures to decrease the amount of violence and to aid those who are the primary targets.

Conflicts of Interest: Nil

Source of Funding: Nil

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Cheiloscopy for Sex Determination - A Study

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ABSTRACT

Establishing an individual's identity in post-mortem issues can be a very difficult and tedious process. Lip prints are considered to be unique and thus can lead us to important information and help in a person's identification.

Objective: The objective of this study was to ascertain the use of lips prints in sex differentiation and to test the applicability of Tsuchihashi (1970) classification for identification of lip patterns and Vahanwala et al for identification of sex when applied to North Indian boys & girls.

Methodology: A total of 150 subjects, 75 males and 75 females were selected from among the students of Babu Banarasi Das College of Dental Sciences, Lucknow while noting the name and sex of the respective individuals. After applying lip stick evenly, a lip impression was made. The lip print was then analyzed and interpreted to determine the sex of the individuals.

Result: We found that 93.3% lip prints of males were correctly identified and 96.0% lip prints of females were correctly identified. Type 1' (40.0%) and Type 1 (37.3%) was most commonly seen in females and Type 3 (50.7%) was most commonly seen in males.

Conclusion: Along with other available methods, cheiloscopy can also serve as a very important tool in the individual's identification based on the characteristics arrangement of lines appearing on the red part of the lips.

Keywords: Cheiloscopy, Lip Prints, Forensic Odontology, Human Identification, Sex Determination, Sex Identification

INTRODUCTION

One of the major problems faced by man in earlier days was to establish the identity of an individual. [1,2,3] Identification is the establishment of a person's individuality. Acharya and Taylor have defined identity as 'the characteristics by which a person may be recognized'. [4,1,5]

Identification of humans is required for personal, social and legal reasons. It may help in the settlement of property between families, facilitate remarriage, and allow the cremation or burial of the body, according to religious and cultural customs. It may also include cases of mass disasters and insurance claims. [1,6,7]

The traditional methods for personal identification include anthropometry, finger prints, sex determination, age estimation, measurement of height, and differentiation by blood groups, DNA and odontology. [7,8]

Mouth allows for a number of possibilities for identification of an individual. [8] Lip prints are considered to be specific and unique and hence can be helpful in identifying a person positively. [9,10]

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Tsuchihashi (1974) named the wrinkles and grooves visible on the lips as 'sulci Labiorum rubrorum'. In Japanese the figures formed by these sulci are called 'figura linearum labiorum' which means lip prints and its examination is known as 'cheiloscropy'.^[11, 12,13,14] Cheiloscropy (from the Greek words *cheilos* - lips, *skopein* - see) is the forensic investigation technique that deals with identification of humans based on the grooves and wrinkles present on the lip.^[10,13] Labial cord forms the junction of the lip, skin and mucosa which is seen as a white wavy line. The mucosal area also known as Klein's zone, is covered with wrinkles and grooves forming a characteristic pattern- the lip print.^[8, 9]

Lip patterns can be seen as early as the sixth week of intrauterine life.^[8, 9] Lip prints are genotypically determined and are unique for each individual.^[13] Hereditary factors are suspected to have some influence on the lip print patterns as studies have shown that lip prints of parents and children and those of siblings are similar.^[15, 16]

According to Ball (2002) vermilion border has minor salivary glands, and the edges of the lips have sebaceous glands, with sweat glands in between them. They secrete oil and moisture which helps in the development of lip prints.^[2]

Lip prints do not change during the life of a person and also does not vary with environmental factors. They may alter for sometime due to minor trauma, inflammation and diseases however they recover their original form.^[11, 12]

Apart from personal identification, it can also be used for sex identification, criminal investigation during robbery, quarrel, murder, sexual harassment and rape.^[15,17,18]

HISTORICAL REVIEW

First anthropologist to describe the furrows on the red part of the lip was Fischer in 1902. However in 1932 Edmond Locard recommended the use of lip prints in personal identification. In 1950, Synder reported in his book *Homocide Investigation* that 'the characteristics of the lips formed by lip grooves are as individually distinctive as the ridge characteristics of finger prints'. In 1967 Suzuki, made a detailed investigations of the measurements of the lips and the method for its extraction to obtain useful data for application in forensic science. Later in 1970, Suzuki

and Tsuchihashi conducted studies on different populations to elaborate the practical use of cheiloscropy.^[19,20]

classification scheme

Many authors have described different patterns of lip prints in different population. In 1967, Santos was the first person to classify lip prints. He divided into simple wrinkles and Compound wrinkles. Simple wrinkles included Straight line, Curved lines, Angled lines and Sine shaped curve. Compound wrinkles included Bifurcated, trifurcated, Analous.^[4,11,19]

Tsuchihashi later in 1970 proposed a separate classification, dividing the pattern of grooves into six types: [FIGURES 1]^[5,13,20]

Type 1: Clear -cut vertical grooves that run across the entire lips

Type 1': Clear -cut vertical grooves that do not cover the entire lips.

Type 2: Branched grooves

Type 3: Intersected grooves

Type 4: Reticular grooves

Type 5: Grooves that do not fall into any of the type 1-4 and cannot be differentiated morphologically (undetermined).

Caldas *et al.* 2007 analyzed the anatomical aspects i.e., thickness and position of lips and concluded that lips can be horizontal, elevated or depressed.

Thickness of lips i.e. thin lips, medium lips and thick lips varies according to the race. Thin lips are more common in the European Caucasian whereas thick or very thick lips are usually seen in African Americans).^[8, 9]

With the current status of cheiloscropy in mind, this study was carried out to study the peculiar lip patterns, its role as indicator of sex of an individual and to identify the most common lip patterns in study population.

AIMS AND OBJECTIVE

The prime objective of the present study was to ascertain whether sex of an individual can be determined with help of lip prints and to test the applicability of Tsuchihashi (1970) classification for

identification of lip patterns and Vahanwala et al (2000) for identification of sex when applied to Lucknow (Indian) boys & girls.

MATERIALS AND METHOD

This study was carried out in the Department of Oral Medicine and Radiology, Babu Banarasi Das College of Dental Sciences, Lucknow. A total of 150 healthy subjects, 75 males and 75 females were selected while noting the name and sex of the respective individuals. Subjects having any of the congenital abnormalities, inflammation, trauma and orthodontic treatment and individuals with known hypersensitivity to lipsticks were excluded from the study.

STUDY MATERIAL

Materials used were a red colored lipstick, lip brush, cellophane tape, white bond paper and a magnifying glass. ^[4]

Technique

A Dark colored lipstick was applied, evenly on the vermilion border. The subjects were asked to rub both the lips to evenly spread the applied lipstick. A lip impression was made on a strip of cellophane tape on the glued portion. It was then stuck on to a white paper. [FIGURE 2] This served as a permanent record. The lip prints were coded in order to not to disclose the name and sex of the print analysis.

In this study we followed the classification of patterns of the lines on the lips proposed by Tsuchihashi (1970). For classification, the middle part of the lower lip (10mm wide) was taken as study area in accordance with Sivapathasundaram et al (2001) as this fragment is almost always visible in any trace. ^[2,3,6]

The sex of the individuals was determined as per the descriptions given by Vahanwala et al. ^[5,9]

Type 1, Type 1': Patterns Dominant - Female

Type 2: Patterns Dominant - Females

Type 3: Pattern present – Male

Type 4: Male

Type 5: (Varied pattern) – Males

Same patterns in all quadrants – Females

The impression was subsequently visualized with the use of a magnifying lens. The number of lines and furrows present, their length, branching and combinations were noted. ^[6]

RESULTS

The results obtained were verified from the coded data collected at the beginning of the study. The data was analyzed with Chi- Square test to assess sex differences in lip print patterns. Kappa Statistic was use to study the relation between original gender and predicted gender.

- No two lip prints matched with each other, thus establishing the uniqueness of the lip prints.
- Type 1 and Type1' were most commonly seen in females whereas Type 3 was seen most commonly in males. [GRAPH 1]
- 70 males were correctly recognized as males and 72 females were correctly identified as females on the basis of their lip prints. [TABLE 1]
- In detection of males sensitivity was 93.3 % and specificity was 96.0 % and the Diagnostic Accuracy was 94.7%, whereas in detection of females sensitivity was 96.0% and specificity was 93.3% and the diagnostic accuracy was 94.7%.

Table 1. Predicted gender pattern

Total	Gender Predicted		Gender Male	Gender female
	150	Male	73 (48.7%)	70(93.3%)
	Female	77(51.3)	5(6.7)	72(96.0)

k=0.893;P<0.001 (Kappa Statistic) % Accuracy=94.7 %

DISCUSSION

Cheiloscopy is similar to fingerprint analysis, and is an important sub speciality of forensic odontology.^[8]

Lip prints are unique and permanent and are, therefore, referred to as "persistence" lip prints.^[4,7] In recent years, new lipsticks have been formed that do not leave any visible trace after contact with surfaces such as glass, clothing. Though they are invisible, the impressions of theses lip prints can be taken using materials such as powders (aluminum powder, graphite powder, magnetic powder), fluorescent dyes (Nile blue and Nile red), Chemicals (Sudan black, Ninhydrin and Iodine) ^[19, 13]



Fig. 1. Various lip prints pattern

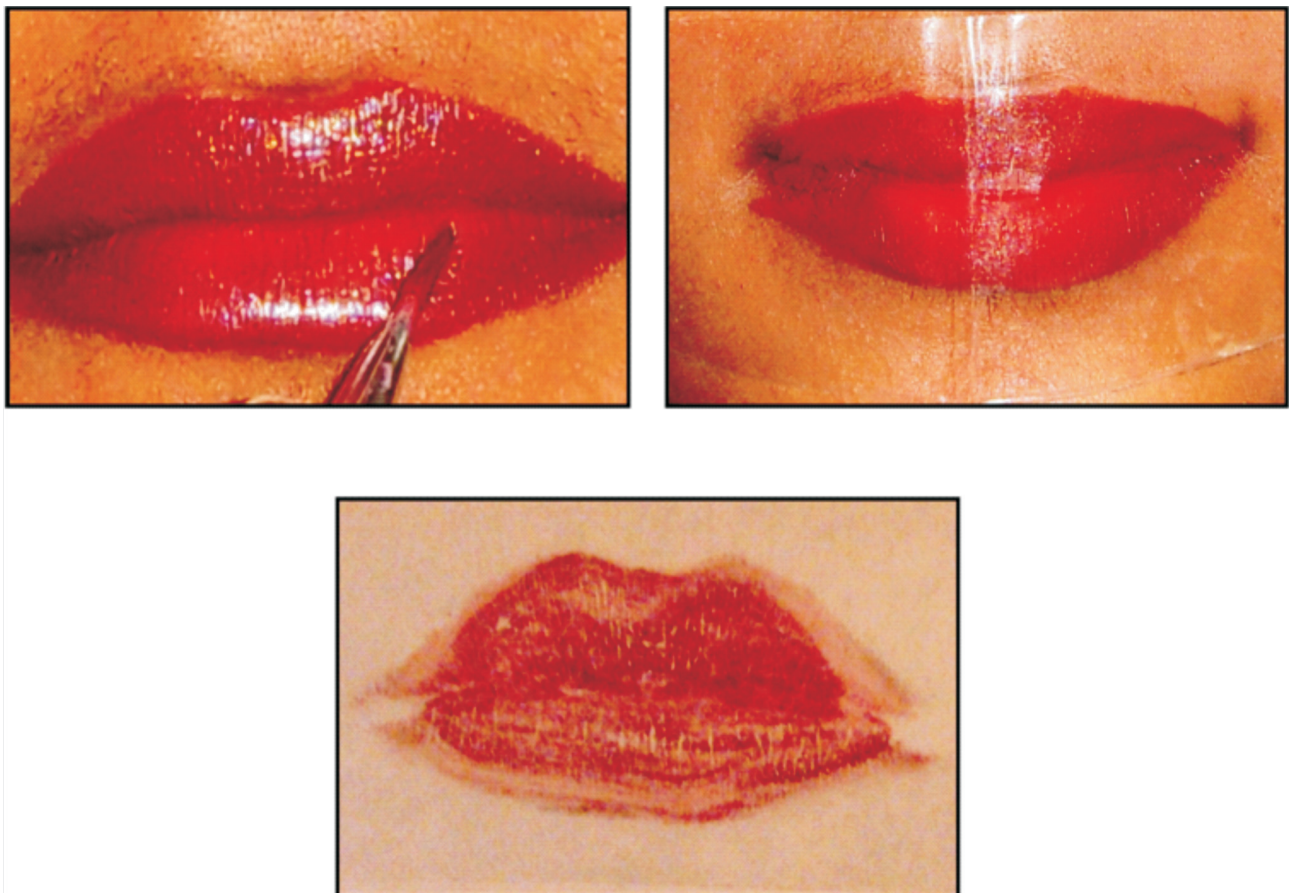
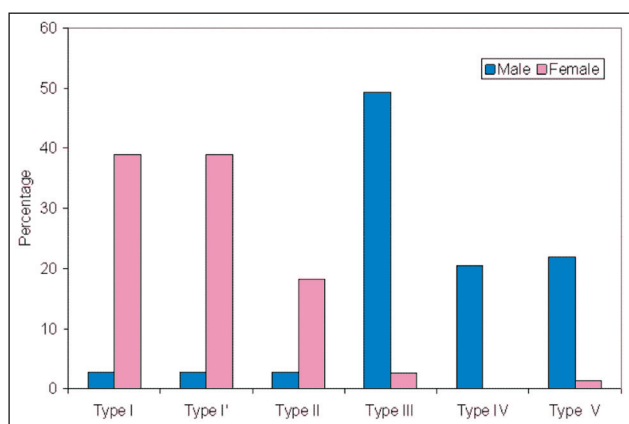


Fig. 2. Procedures involved



Graph 1. Distribution of number and type of lip prints pattern among male and females

In this study we found type 1 and type 1' patterns to be dominant in females while type 3 patterns were dominant in males. In addition we observed that no lip prints matched with each other and that lip print pattern was unique to every individual. 70 males were correctly recognized as males and 72 females were correctly identified as females on the basis of their lip prints.

We found that Tsuchihashi classification for identification of lip patterns and Vahanwala et al for identification of sex when applied to Lucknow (Indian) boys & girls was accurate.

The results of the study were in accordance with the studies done by renowned authors in the past.

According to a study by Vahanwala et al. (2000), type 1 and type 1' patterns were found to be dominant in females while type 3 and type 4 patterns were dominant in males. In another study by Vahanwala and Parekh, it was shown that all four quadrants with the same type of lip prints were predominantly seen in female subjects and male subjects showed the presence of different patterns in single individuals. In another study Sharma P, Saxena S, Rathod V (2009), type 1 and type 1' patterns were found to be dominant in females while type 3 and type 4 patterns were dominant in males.^[5, 6, 7]

CONCLUSION

Identification of an individual whether living or dead is often a demanding and time consuming process. However results from our study are quite promising as it indicates the uniqueness and permanence of lip prints. Besides, the procedure of lip

print analysis is very simple and inexpensive. Therefore, it may be recommended that the lip prints can be used as a reliable aid to human identification in the field of forensic science. However, further studies should be conducted on a large number of individuals in northern India to establish the efficacy of the use of lips prints in sex differentiation and to test the applicability of Tsuchihashi (1970) classification for identification of lip patterns and Vahanwala et al for identification of sex.^[8, 20]

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Lunar Cycle Affecting Unnatural Death: A Reality or Myth

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ABSTRACT

Introduction: The effect of lunar cycle on human behavior has always been the area of interest for the researchers worldwide. It is accepted in academic literature as 'The Transylvanian Effect'. While some has drawn results in favor of this, some also has rejected this hypothesis on the basis of negative results. This study aims to find out the effect of lunar cycle on unnatural deaths.

Material and method: The present retrospective study has been conducted for the period of 7 consecutive months i.e. June 2012 to December 2012 based on autopsy record of the unnatural death cases. During this study period total no. of unnatural Death cases were 1054. These cases were brought to the Department of Forensic Medicine, IMS, BHU, Varanasi and have been analyzed retrospectively.

Result: The incidence of unnatural deaths in and around full moon and new moon days were compared with that of other days of the month by taking 5 days average and shown on the red line of the graph. The result shows rise and fall in the incidence and it is not related to some specific dates of a month, rather it was random.

Conclusion: It is concluded that there is no correlation between lunar cycle and occurrence of unnatural deaths.

Keywords: Lunar Cycle, Unnatural Death, the Transylvanian Effect

INTRODUCTION

The idea that Planets and stars affect human health and psychology is a popular belief in astrological science in India. However, there are some debates about these effects and their extent and quality.

The word 'lunacy' is derived from Luna, the Roman goddess of the moon. The possible influence of the lunar cycle on human psychology and physiology is the phenomenon now known as 'The Transylvanian Effect' in academic literature¹. The mystery of moon attracted studies worldwide on different variables. This includes its effect on onset of labor², crime^{3, 4, 5}, suicide rate⁶, psychopathologies⁷, survival after surgery in lung cancer⁸, serum ion fluctuations⁹, stock

market fluctuations¹⁰ and so on. While some studies reported a positive association^{3, 9, 10}, some shows no significant association as well^{2, 4, 5, 6, 7, 8}.

A study shows that the hypothesis of a relationship between the moon's phases and human behavior is not supported by the evidence of a large number of studies conducted by many independent investigators all over the world¹¹. In spite of that we want to test again for the lunar influence on unnatural deaths. Our study differs from previous works in three aspects, inclusion of new moon days, focusing days adjacent (2 days before and after) to full moon and new moon dates as well, and the use of new method for analyzing data.

MATERIAL AND METHOD

The present study is carried out at department of forensic medicine, Institute of Medical Sciences, Banaras Hindu University, Varanasi. Relevant information and subjective data have been collected from medico legal autopsy register. Data is analyzed

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retrospective for the period of seven months. Cases of accident, suicide or homicide are confirmed by investigating officer and corroborative findings at medico legal examination.

RESULT

Cases of unnatural deaths which occurred between June 2012 and December 2012 were studied. 7 full moon days and 8 new moon days occurred during this period and total death by any manner during this period was 1054.

The hypothesis that incidence of unnatural deaths occur more in and around full moon days or new moon days or both as compared to other days of the month. But results show that the 5 day moving average of neither full moon days nor new moon days shows peak

which is significantly distinct from the 5 day moving average for any other day of the different months. Rather it gives a random pattern in different days of a month.

No. of Unnatural Deaths

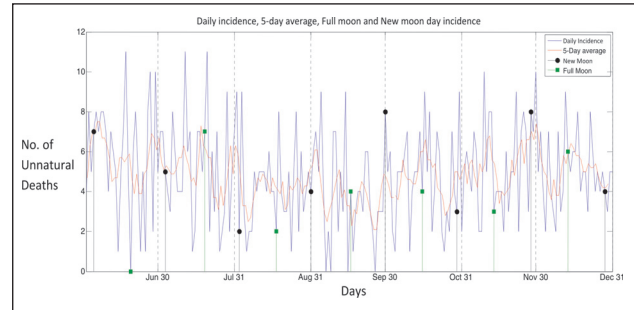


Fig. 1: Showing daily incidence, 5-day average, full moon and new moon day incidence.

Table 1: Date wise distribution of unnatural deaths in different months

Date\Month	June	July	August	September	October	November	December
1	4	7	9	6	5	5	5
2	8	7	2	7	6	6	7
3	5	5	9	5	2	5	4
4	7	4	3	9	1	4	2
5	8	3	1	4	5	7	7
6	7	8	2	0	5	6	4
7	8	6	2	2	5	2	3
8	8	4	5	0	6	2	2
9	7	4	4	7	7	10	7
10	4	4	5	7	1	5	3
11	7	11	5	2	4	8	4
12	6	6	5	5	5	8	9
13	5	7	4	3	5	3	6
14	1	1	6	9	7	4	5
15	5	2	4	0	4	4	6
16	7	7	4	4	9	4	6
17	11	7	2	1	5	2	8
18	5	5	8	3	8	6	4
19	0	7	4	4	2	3	5
20	6	11	3	4	4	5	5
21	8	2	3	3	7	5	3
22	5	6	5	6	6	9	8
23	1	3	1	6	2	2	6
24	5	7	5	3	1	7	4
25	1	1	8	2	3	8	5
26	8	2	2	0	2	7	4
27	10	3	6	3	7	3	5
28	2	9	3	3	4	8	4
29	10	2	4	3	3	7	3
30	5	5	5	8	9	10	5
31	-	7	4	-	2	-	5

-  New Moon Days
-  Full Moon Days

DISCUSSION

To start with the hypothesis, the incidence of unnatural death increases in and around full moon days or new moon days or both. To prove this hypothesis, 5 day moving average of each day of the month is taken. If there was any correlation between full moon day and new moon day with the incidence of unnatural death, the red line would have shown a distinct peak or fall on full moon days or new moon days or both. But this is not the case as the red line in the graph rises and falls irrespective of the specific dates. So basically there is no pattern in the incidence of crime and different days of a month.

It has been postulated that this change of behavior may be attributed to 'Human Tidal Waves' because of gravitational pull of moon^{3,4}. Others assumed that one probable mechanism is fluctuations in body fluid levels congruent with moon phases, and therefore the serum sodium and lithium levels in male rabbits in different moon phases were evaluated⁹. Some studies do support that there are changes in human physiology and psychology with relation to lunar cycle^{3,9,10} but others^{2,4,5,6,7,8} didn't find any association. A study¹¹ shows that most of the study which tested the lunar influence on human behavior did not find any association. This negative result is consistent with our study as well.

Although our study is negative, an elaborate study with larger sample and longer duration is required to confirm this hypothesis. The pitfall in this work may be the duration of this study which is 7 months and 1054 cases only were taken into consideration. Also, different variables like suicide, homicide, accidents are taken collectively in this study. May be a study done individually for these variables may show different results.

In this study, we took new moon days in consideration along with full moon days which is not the case with many other studies. Also we took two days back and forth of new moon and full moon days which is again strength of our study. Five days moving average was also a unique way of analyzing data for this study.

So on the basis of this study; we conclude that there is no correlation between lunar cycle and unnatural deaths of any type.

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Conflict of Interest: Nil

Source of Funding: This research was not financially supported by any funding agencies.

Ethical Clearance: The present study was approved by "Institutional Ethical Committee" of Institute of Medical Sciences, Banaras Hindu University, Varanasi. All the information has been taken under consideration of medical ethical committee.

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An Epidemiological and Medicolegal Study of Electrocutation in Varanasi, India

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ABSTRACT

Introduction: The passage of a substantial current through the tissue can cause skin lesion, organ damage and death. Fatalities are usually accidental, in both domestic and industrial environment. Cases of injury or death from electric shocks occur when the electrical main breaks or when the two end fall on a person, thus making a short circuit, or when workman grasp the ends of a live wire, or stands on one with the other in his hand.

Material & Method: The present retrospective study has been conducted for the period of 5 consecutive years i.e. 2009 to 2013 based on autopsy record of the unnatural death cases resulting from electrocution deaths. During study period total no. of unnatural Death cases were 10185 and deaths due to electrocution were 147. These cases were brought to the Department of Forensic Medicine, IMS, BHU, Varanasi and have been analyzed retrospectively.

Findings: Unnatural deaths reported during the study period due to deaths were averaging 147. Male electrocution deaths dominated over female in the ratio of 10.3:1. Predominant age group were found to be 31-40 years (34%) followed by age group 21-30 years (29%) and 11-20 years showing (15%) reflecting that young adults were more involved in such type of deaths. Most of the deceased were from the unknown marital status (86%) followed by married (7%) and unmarried of (7%) are equal. Involvement of rural population is more (97%) than urban population (2%). Religion wise Hindus (95%) predominated over other religions.

Conclusion: Analysis of data for retrospective study suggests that age, sex, habitat, marital status, religion and manner of death significantly affect community. In the present study electrocution death was 7th most common cause of death after road traffic accident, burn, poisoning, Violent Asphyxial death, railway accident, firearm injury, in Varanasi region.

Keywords: *Electrocution, Electric Shock, Electro Trauma, Work Related Accident, Forensic Medicin*

INTRODUCTION

The passage of a substantial current through the tissue can cause skin lesion, organ damage and death. This injury commonly called electrocution, though some would use this term only if death occurs. Fatalities are usually accidental, in both domestic and industrial environment. Suicides from electricity have increased in recent years, especially in Germany.

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Homicide are rare but is recorded and, in the USA, electricity has again become a means of judicial execution¹. Cases of injury or death from electric shocks occur when the electrical main breaks or when the two end fall on a person, thus making a short circuit, or when workman grasp the ends of a live wire, or stands on one with the other in his hand. Mode of electrocution may be accidental, homicidal, suicidal, judicial, iatrogenic. Effect of electricity depend on nature of current, resistance of body and duration of current. Cause of death in electrocution cardiac arrest, spasm of respiratory muscles, paralysis of respiratory center and due to complications i.e. burn, infection, injury². The passage of electric current through human body is capable of producing wide range of effects varying from significant localized muscular spasm and

little or no contact burns to instantaneous death with little or no burns or extremely severe burning. Fatal electrocution may be domestic, industrial and due to lightning³. Voltage is the fundamental forces that cause electricity to flow through a conductor and is measured in volts. Alternating current is 4-5 times as dangerous as an equal voltage of direct current. Amount of current that will flow through or over the body may be determined by the formula $A=V\div R$. Where A is the current in amperes, V is the potential difference in volts and R is the resistance of the body in ohms. Electrocution is rare at less than 100 volts and most death occurs at more than 200 volts. In India the voltage of domestic supply is usually 220 to 240 volts alternating current with 50 cycles per cycle. Electric injury consist of fatal electrocution, electric shock and burn⁴. Scene visit and examination of the device must be done with technical person who has knowledge of electricity and devices. Common risks are unskilled workers, children's and elderly, damp environment and damaged houses⁵. India is considered to be a developing country estimated population 1.2 billion inhabitants. Varanasi is the district province in India occupying an area of 4535 km². It accommodates almost 367684 [2011 census] of the total Indian population. It is inhabited by people of different cultural background⁶. Electricity is the flow of an atom's electrons through a conductor. Electrons, the outer particles of an atom, contain a negatives charge. If the electrons flow from an object through a conductor, the flow is called electric current. Four primary terms are used in discussing electricity: voltage, resistance, current and ground⁷.

MATERIAL AND METHOD

Present study is carried out at forensic medicine department, Institute Of Medical Sciences, Banaras Hindu University, Varanasi. Relevant information and subjective data like age, sex, habitat, marital status and manner of death of electrocution of victims have been collected from medico legal autopsy register. Data are analyzed retrospective for periods of five years. Cases were included in group of electrocution death on the basis of confirmation by investigating officer and corroborative finding at medico legal examination.

FINDINGS

The present study was undertaken from 1st January 2009 to 31st December 2013; Table 1: Out of 10185 medico-legal autopsy cases conducted during the study period total of 147 cases (1.4%) of death from

electrocution death were recorded at Institute of Medical Sciences, Banaras Hindu University, Varanasi Uttar Pradesh, India. Table2: Describes age and sex wise distribution of electrocution death. More deaths in 31 to 40 years of age group total (34 %) in both male (34 %) and female (31 %) and before this age group and after this age group case are progressively less in number. Table3: Distribution of electrocution deaths in relation to marital status. In male married are nil i.e. (0 %), male unmarried are (5.97%), and most of the case are male of unknown marital status i.e. (94.03%) of total male cases. In female 77% are married, 15 % of female are unmarried and in rest marital status is unknown i.e. (8%). In our study male electrocution deaths dominated over female in the ratio of 10.3:1. Table 4: Incidence of electrocution death in rural areas (97%) is more common than urban areas (2%) and unknown habitat status in (1%) cases. Table 5: Describes distribution of electrocution death in relation to manner of death in our study shows that about all electrocution death is accidental in manner (99%). and 1 % is unknown. Suicidal and homicidal cases are nil. Table 6: Year wise frequency of total autopsy in relation to electrocution death from 2009 to 2013 are follows as 19%, 20%, 19%,20% and 21% respectively. This correlates with electrocution death as 22%, 16%, 22%, 16% and 23% respectively. Percentage of total autopsy is more or less static average 20%, but percentage of total electrocution death are average 20%. Table7: Distribution of electrocution death on the basis of religion. In Hindu electrocution death are most common i.e. 95%, in Muslim are 3%, unknown 1% and in Christian nil.

Table1: Show that incidence of electrocution death was 1.4% in our study which is significantly more than (0.6%) result of the other study⁷ and in few studies¹¹ the incidence was lower (2.02%). This difference in the incidence may be due to geographical variation in the population. Table 2: Shows that most of the electrocution death (34%) is common in 31 to 40 years age group, followed by the age group 21 to 30 years in our study, Which goes in contrast (30.39%) of another study^{11,14,15}, where most common age group is 21-30 years. Table 3: Shows married person 7% equal to unmarried person 7%. In our study male electrocution deaths dominated over female in the ratio of 10.3:1, this high incidence may be because male are more exposed to stress and occupational hazard compared to female. In our study male electrocution deaths dominated over female in the ratio of 10.3:1, which is about similar to other study (9.72:1)¹⁵. Some other

study contrast to it which show male are so much higher ratio ^{7,12} and another study show that this ratio is less than our study ^{8,10,11}. Table 4: Shows that in our study electrocution deaths are more common in rural areas (97%) than urban areas (2%). This difference may be due to unawareness in use of electric device. This contrast with other study where this value reverses rural area (36.86%) and urban area (63.14%)¹⁶. Table 5: In our study show that about all cases of electrocution are accidental in nature which is about similar to other study ^{7,9,15}. This is may be due to electric devices failure or improper use of devices. In our study show that homicidal electrocutions are nil this prove other study ^{7,8}. Table 6: Shows that on the basis of year wise study from 2009 to 2013, five year study .In our study the average number of total electrocution 29.4 per year, other study show that this rate is 4.45 per year⁸, and 3.2 per year ¹³. Table 7: Shows that most of the electrocution death victims were Hindus (94%) followed by Muslim (3.5%), this is due to religious basis and more percent of Hindu population in and around Varanasi area.

CONCLUSION

Electrocution death accounted for 1.4% of total autopsied cases in the 5 years study. Most of the electrocution death cases are at 31-40 years age group (34%). Male: female ratio is 10.3:1. Most of the electrocution deaths are in unknown marital age (86%) than married (7%) and unmarried (7%). electrocution

deaths in rural area (97%) are more than urban (2%). Manner of death was found to be accidental (99%). In five consecutive years 2009 to 2013 electrocution deaths autopsy incidence progressively not changing. Most of the electrocution death occurred amongst Hindu (95%).

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Conflict of Interest: Nil

Source of Funding: This research was not financially supported by any funding agencies.

Ethical Clearance: The present study was approved by "Institutional Ethical Committee" of Institute of Medical Sciences, Banaras Hindu University, Varanasi. All the information has been taken under consideration of medical ethical committee.

Statement of informed consent

Statement of Human and animal rights

Table1: Incidence of electrocution death

Total no. of autopsy conducted in 5 year 2009 to 2013	electrocution death	%
10195	147	1.4

Table2: Age and sex wise distribution of electrocution Deaths.

Age(in year)	Total		Male		Female	
	NO.	%	NO.	%	NO.	%
0-10	6	4%	6	4%	0	0%
11 -20	22	15%	20	15%	2	15%
21-30	43	29%	39	29%	4	31%
31-40	50	34%	46	34%	4	31%
41-50	9	6%	8	6%	1	8%
51-60	14	10%	13	10%	1	8%
61-70	1	1%	0	0%	1	8%
>71	2	1%	2	1%	0	0%
Total	147	100%	134	100%	13	100%

Table 3: Distribution of electrocution death in relation to marital status

Marital Status	Male		Female		Total	
	NO.	%	NO.	%	NO.	%
Married	0	0.00%	10	77%	10	7%
Unmarried	8	5.97%	2	15%	10	7%
Unknown	126	94.03%	1	8%	127	86%
Total	134	100.00%	13	100%	147	100%

Table 4: Incidence of electrocution death in rural and urban areas

Habitat	Total	%
Rural	142	97%
Urban	3	2%
Unknown	2	1%
Total	147	100%

Table 5: Distribution of electrocution death in relation to manner of death

Manner	Total	%
Suicidal	0	0%
Homicidal	0	0%
Accidental	146	99%
Unknown	1	1%
Total	147	100%

Table 6: Year wise frequency of total autopsy in relation to electrocution death

Year	No. of total autopsy	%	Electrocution death	%
2009	1986	19%	33	22%
2010	2025	20%	23	16%
2011	1974	19%	33	22%
2012	2081	20%	24	16%
2013	2129	21%	34	23%
Total	10195	100%	147	100%

Table 7: Distribution of electrocution death on the basis of religion

Sr.No.	Religion	No. of electrocution death	%
1	Hindu	140	95%
2	Muslim	5	3%
3	Christian	0	0%
4	Unknown	2	1%
	Total	147	100%

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An Epidemiological and Medicolegal Study of Violent Asphyxial Death at Varanasi, India

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ABSTRACT

Introduction: Unnatural deaths due to violent asphyxia have a serious psychological and social impact on the family and community. Violent asphyxial deaths include death due to hanging, strangulation, suffocation and drowning. The aim of this study is to find out how violent asphyxial deaths affect incidence, age, sex, habitat, marital status, religion, manner of death and its medico legal consequence.

Material & Method: The present retrospective study has been conducted for the period of 5 consecutive years i.e. 2009 to 2013 based on autopsy record of the unnatural death cases resulting from Violent asphyxial deaths. During study period total no. of unnatural Death cases were 10215 and deaths due to violent asphyxia were 887. These cases were brought to the Department of Forensic Medicine, IMS, BHU, Varanasi and have been analyzed retrospectively.

Finding: Unnatural deaths reported during the study period due to violent asphyxial deaths were averaging 8.7%. Male violent asphyxial deaths dominated over female in the ratio of 2.1:1. Predominant age group were found to be 21-30 years (34%) followed by age group 11-20 and 31-40 years showing (20%) and (19 %) reflecting that young adults were more involved in such type of deaths. Most of the deceased were from the married group (22%) followed by unmarried (11%) and marital status of (67%) people were unknown. Involvement of rural population is more 76% than urban population (11%). Religion wise Hindus (84%) predominated over other religions.

Conclusion: Analysis of data for retrospective study suggests that age, sex, habitat, marital status, religion and manner of death significantly affect community. In the present study Violent asphyxia was 4th most common cause of death after road traffic accident, burn, poisoning in Varanasi region.

Keywords: Traumatic Asphyxia, Suffocation, Violent Asphyxial Death, Domestic violence

INTRODUCTION

Common usage has led to the term asphyxia being equated with lack of oxygen, though etymologically the word means absence of pulsation¹. Violent asphyxial deaths include death due to hanging, strangulation, suffocation and drowning². Scene visit should be carried out as indicated by investigating officer³. Hanging is form of death produced by suspending the body with ligature round the neck, and the constricting force being the weight of the body. About 4.5 kilogram weight is enough to occlude blood

vessels of the neck. Typical hanging occurs when point of suspension is centre of the occiput but according to other authors, the ligature runs from the midline above the thyroid cartilage symmetrically upward on both side of the neck to the occipital region⁴. Atypical hanging when point of suspension other point. For this ligatures are used like rope, sari, bed sheet, dupatta, belt, electric wire. As various causes of death in hanging, most common is asphyxia and others like venous congestion, combined venous congestion and asphyxia, anoxia, cardiac arrest, fracture or dislocation

of cervical vertebrae. This is mostly suicidal but it may be homicidal or rarely accidental. Strangulation is defined as compression of the neck by force other than hanging, which include strangulation by ligature, throttling, mugging, bansdola, garroting. These are mostly homicidal but may be accidental and rarely suicidal. In suffocation, death result from occluding the air to enter the lungs by means other than that of compression of the neck, which includes smothering, choking, traumatic asphyxia, inhalation of irrespirable gases, gagging, burking. In drowning death occurs due to submersion in a liquid usually water and air column is replaced by it. This includes wet drowning, dry drowning, secondary drowning, and immersion syndrome.

MATERIAL AND METHOD

Present study is carried out at forensic medicine department, Institute Of Medical Sciences, Banaras Hindu University, Varanasi. Relevant information and subjective data like age, sex, habitat, marital status and manner of death of violent asphyxial death victims have been collected from medico legal autopsy register. Data are analyzed retrospective for periods of five years. Cases were included in group of violent asphyxia death on the basis of confirmation by investigating officer and corroborative finding at medico legal examination.

FINDINGS

The present study was undertaken from 1st January 2009 to 31st December 2013; Table 1: Out of 10215 medico-legal autopsy cases conducted during the study period total of 887 cases (8.7%) of death from violent asphyxial death were recorded at Institute of Medical Sciences, Banaras Hindu University, Varanasi Uttar Pradesh, India. Table 2: Describes type of asphyxial deaths. Hanging is most common form 52% and is more common in male 44% of all asphyxial death and less common in female 67% of all asphyxial death. Drowning is 2nd common form (40%) of total asphyxial death and its more incident in male 49% of all asphyxial death and less common in female i.e. 20% of all asphyxial deaths, suffocation 3rd in rank, 6% of all asphyxial deaths and is more common in female 10% of all asphyxial death and less common in male 4% of all asphyxial death, strangulation is 4th in rank 3% of all asphyxial death and is more common in male 2% of all asphyxial death and is less common in female 4% of all asphyxial death. Table 3: Describes age and sex wise distribution of violent asphyxial death. More

deaths in 21 to 30 years of age group total (34 %) in both male (30 %) and female (43 %) and before this age group and after this age group case are progressively less in number. Table 4: Distribution of violent asphyxial deaths in relation to marital status. In male married are least i.e. (0.17 %), unmarried are (6%), and most of the case are unknown i.e. (93%) of total male cases. In female 68% are married, 22 % of female are unmarried and in rest marital status is unknown i.e. (10%). Table 5: Incidence of violent asphyxial death in rural areas (76%) is more common than urban areas (11%) and unknown habitat status in 12% cases. Table 6: The distribution of violent asphyxial death in relation to its habitat. In rural area hanging 56% more common than other manners i.e. drowning 35%, suffocation 7%, strangulation 3% and it is least. In urban areas hanging is most common 64%, drowning 31%, suffocation 3% strangulation 2%. In unknown 12% habitat cases drowning is most common 88%, hanging 11 %, suffocation 5%, and strangulation 5 %. Table 7: Describes distribution of violent asphyxial death in relation to manner of death our study shows that all hangings are suicidal in manner. Drowning accidental 24 % and remaining is of unknown (99%) manner. In suffocation 29% are homicidal, 63% are accidental and 1 % is unknown. In strangulation all case are homicidal (71 %) in nature. Table 8: Year wise frequency of total autopsy in relation to violent asphyxial death from 2009 to 2013 Are follows as 19.44%, 20.01%, 19.32%, 20.37% and 20.84% respectively, This correlates with violent asphyxial death as 17%, 19%, 20%, 18% and 26% respectively. Percentage of total autopsy is more or less static average 20%, but percentage of total violent asphyxial death are progressively increasing from 2009 toward 2013 except in 2012 were slight decline occurs. But it is noted that in 2009 from 17 % rise occurs to 26% in year 2013.

Table 1: Show that incidence of violent asphyxial death was 8.7% in our study which is significantly more than result of the other study⁵ and in few studies^{6,9} the incidence was lower. This difference in the incidence may be due to geographical variation in the population. Table 2: Shows that most of the violent asphyxial death (34%) is common in 21 to 30 years age group in our study, which can be compared to other study⁶, followed by the age group 11 to 20 years. Which goes in contrast of another study⁶. Female predominance was noticed in our study and male to female ratio is 2.1:1. This high incidence may be because male are more exposed to stress and occupational

hazard compared to female which is similar to the observation reported in different studies⁶. Table 3: Shows that hanging was the commonest type of violent asphyxial death followed by drowning, which is consistent with the study of other authors^{6,5} On the basis of other studies drowning is the most common form of violent asphyxial death⁹. This is due to availability of water pools in this geographical area. Drowning is a common method of committing suicide especially more in nearby the sea, river, dam, canal and ponds etc. Table 4: Shows married person 22% more than unmarried 11%, the reason of fact could be that the amount of stress carried by married people in their life day today activity is more than the unmarried male or female which make more vulnerable this data consist same with other study⁶. Table 5: Shows those violent asphyxia deaths are more common in rural areas than urban areas. This confirms with other study⁹. Table 6: Shows that in violent asphyxial death hanging is most common¹¹ form (52%) followed by drowning, suffocation and strangulation. same as other study⁷. In my study there is no intoxication history on examination but the other study consist with that the most common type of deceased was an alcohol intoxicated male died because of hanging⁸. Table 7: Shows that all case of hanging are suicidal which is similar to other study⁶. which is commonest method to commit suicide. It is pointed out that all case of strangulations is homicidal in our study which is similar to other study⁶. Table 8: Shows that on the basis of year wise study from 2009 to 2013, five year study progressive increase incidence except in 2012, this may be due to more stressful life, this is relatively contrast with other study¹⁰. Table 9: Shows that most of the violent asphyxial death victims were Hindus (94%) followed by Muslim (3.5%), which is consistent with one of the study⁶, this is due to religious basis and more percent of Hindu population in and around Varanasi area.

CONCLUSION

Violent asphyxial death accounted for 8.7% of total autopsied cases in the 5 years study. Most of the violent asphyxial death cases are at 21 to 30 years age group (34%). Most frequent method of violent asphyxial death is hanging (52%) followed by drowning (40%), suffocation (6%) and strangulation (3%). Male: female ratio is 2.1:1. More violent asphyxial deaths are in married age (22%) than unmarried (11%). Violent asphyxial deaths in rural area (76%) are more than urban (11%). Manner of death was found to be suicidal in all hanging and all strangulation case are homicidal death. In five consecutive years 2009 to 2013 violent asphyxial death autopsy incidence progressively increases except in year 2012. Most of the violent asphyxial death occurred amongst Hindu (84%).

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Conflict of Interest: Nil

Source of Funding: This research was not financially supported by any funding agencies.

Ethical Clearance: The present study was approved by "Institutional Ethical Committee" of Institute of Medical Sciences, Banaras Hindu University, Varanasi. All the information has been taken under consideration of medical ethical committee.

Table1: Incidence of violent asphyxial death

Total no. of autopsy conducted in 5 year 2009 to 2013	Violent asphyxia death	%
10215	887	8.7

Table2: Age and sex wise distribution of Violent Asphyxial Deaths.

Age(in year)	Total		Male		Female	
	NO.	%	NO.	%	NO.	%
0-10	27	3%	12	2%	15	5%
11-20	180	20%	110	18%	70	25%
21-30	303	34%	182	30%	121	43%
31-40	166	19%	124	21%	42	15%
41-50	87	10%	76	13%	11	4%
51-60	62	7%	57	9%	5	2%
61-70	41	5%	30	5%	11	4%
>71	21	2%	13	2%	8	3%
Total	887	100%	604	100%	283	100%

Table 3: Profile of asphyxial death

Sr.No.	Type of violent asphyxia	Total		Male		Female	
		NO.	%	NO.	%	NO.	%
1	Hanging	457	52%	268	44%	189	67%
2	Drowning	354	40%	297	49%	57	20%
3	Suffocation	52	6%	25	4%	27	10%
4	Strangulation	24	3%	14	2%	10	4%
	Total	887	100%	604	100%	283	100%

Table 4: Distribution of violent asphyxial death in relation to marital status

Marital Status	Male		Female		Total	
	NO.	%	NO.	%	NO.	%
Married	1	00.17%	192	68%	193	22%
Unmarried	39	06.00%	63	22%	102	11%
Unknown	564	93.00%	28	10%	592	67%
Total	604	100%	283	100%	887	100%

Table 5: Incidence of violent asphyxial death in rural and urban areas

Habitat	Total	%
Rural	676	76%
Urban	102	11%
Unknown	109	12%
Total	887	100%

Table 6: Distribution of violent asphyxial death in relation to habitat

Sr.No.	Asphyxia Type of Violent	Rural		Urban		Unknown		Total	
		NO.	%	NO.	%	NO.	%	No.	%
1	Hanging	381	56%	65	64%	11	10%	457	52
2	Drowning	234	35%	32	31%	88	81%	354	40
3	Suffocation	44	7%	3	3%	5	5%	52	6
4	Strangulation	17	3%	2	2%	5	5%	24	3
	Total	676	100%	102	100%	109	100%	887	100

Table 7: Distribution of violent asphyxial death in relation to manner of death

Type of asphyxial death	Manner								Total	
	Suicidal		Homicidal		Accidental		Unknown			
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
Hanging	457	1	nil	nil	nil	nil	nil	nil	457	51%
Drowning	nil	nil	nil	nil	24	38%	330	99%	354	40%
Suffocation	nil	nil	10	29%	40	63%	2	1%	52	6%
Strangulation	nil	nil	24	71%	nil	nil	nil	nil	24	3%
total	457		34	100%	64	100%	332	100	887	100%

Table 8: Year wise frequency of total autopsy in relation to violent asphyxial death

Year	No. of total autopsy	%	Violent asphyxial death	%
2009	1986	19.44	150	17%
2010	2045	20.01	169	19%
2011	1974	19.32	178	20%
2012	2081	20.37	163	18%
2013	2129	20.84	227	26%
Total	10215	100	887	100%

Table 9: Distribution of violent asphyxial death on the basis of religion

Sr.No.	Religion	No. of violent asphyxial death	%
1.	Hindu	750	084.0
2.	Muslim	030	003.5
3.	Christian	003	000.6
4.	Unknown	104	119.0
	Total	887	100.00

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Price Control Mechanism of Patented Pharmaceuticals in India

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ABSTRACT

Patent grants monopoly to the Patentee. There is a tendency in pharma Patents amongst Patentee to overprice the drug rendering them out of reach of needy patients. Thus it is not affordable to the ordinary citizen at large and the poor are the worst sufferers. Due to the prohibitive cost of doing research, pharmaceutical companies overprice their medicines to recover the cost of doing research or to be able to conduct further research. Due to this overpricing the human rights of the sick and vulnerable are in a precarious. Lack of access to medicines is a threat to life to sick people, this violates right to life guaranteed in the Constitution besides other international declarations and covenants. Hence, the problem of un-affordability of medicine is a threat to life.

This research paper highlights the problem of common man and violation of human rights in spite of having legislation on price control and patents.

Keywords: Indian Pharmaceutical Industry, Patent, Price Regulation

INTRODUCTION

The pharmaceutical industry faces a rapidly evolving legal and regulatory environment. Government, drug companies and advocacy group like NGOs are involved in the issue of Patent right available to pharmaceutical industry, particularly in poor countries.

The choices made by each country about its Patent system and price regulation will have many ramifications influencing the size of future investment in medical research, the availability of the resulting therapies, how the financial burdens are distributed across countries, and finally the health of consumers.¹

There are fixed costs associated with launching new products, it would seem intuitive that both weaker price regulation and stronger intellectual property would facilitate entry by virtue of increasing firm profit.² Intellectual property can have a second important effect. While Patents indeed make local markets more attractive, they also convey control over launch decisions to multinational firms with global

interests multinational companies may delay or avoid selling drugs to lower-priced countries because there is no sufficient benefit for them in selling the drugs to such kind of countries, and they cannot earn money as much as they spend for producing the drugs. It should be against the legal philosophy which is called "Utilitarian Individualism". According to that the end of legislation is the "greatest happiness of the greatest number".³

Pharmaceutical price regulation is common in both developed and developing countries, although there is little agreement on its overall impact. Advocates of price regulation suggest that it lowers individual drug prices, lowers total drug expenditure, improves price information for insurers and consumers, and is necessary because market forces alone cannot ensure competition. Opponents believe that price regulation is cumbersome, encourages manipulation of accounting practices, creates scarcities (real or artificial), has no impact on patient or overall expenditure (because it encourages over-prescribing or the use of more expensive drugs), reduces innovation

and competition, and is unnecessary for most therapeutic needs if essential drugs are sold by generic name.

Where price regulation has been effectively enforced, it has achieved control of both individual drug prices and increases in drug prices. The control is more effective when the agency setting prices is also the main purchaser of drugs or the main reimbursement agency. However, the effect of lowering individual drug prices may be offset by prescribing and dispensing larger quantities of drugs or a different (and more costly) selection of drugs. International surveys have shown that in countries where on regulation exists prices are much higher compared with countries where direct or indirect controls operate.

Meaning and definition of price control

Improvements in health care and life sciences are an important source of gains in health and longevity globally. The development of innovative pharmaceutical products plays a critical role in ensuring these continued gains. To encourage the continued development of new drugs, economic incentives are essential. These incentives are principally provided through direct and indirect government funding, intellectual property laws, and other policies that favor innovation.⁴

Broadly there are two clear positions on the issue of pricing of drugs and they are known. One is that of pharmaceutical industry which wants no price control on drugs based on its argument that competition will bring down the drug prices. Industry has never explained how that theory works in pharmaceutical industry when physicians actually decide what brand of medicine the patients should buy for treating diseases. Industry also argues that India has the one of the lowest drug prices in the world although it has never attempted to substantiate this point. All major industry associations representing multinationals and large Indian drug companies have one stand that there should be no changes in the method of price fixation and the span of price control on drugs as proposed in the draft policy. DoP (Department Of Pharmaceuticals) had suggested that pricing of 348 essential drugs specified in the draft policy should be based on the weighted average prices of the three best selling brands of any product having same strength or combination. By proposing this, the policy seeks to discard cost

based pricing of formulations. The Union health ministry and the Planning Commission have taken objection to this position of the DoP on the ground that such a pricing policy can defeat the very purpose of making available the essential medicines at reasonable prices to the common man. An expert group under the Planning Commission is of the view that the prices of essential drugs should be capped with reference to the lowest formulation sold in the market. The position of the Health Ministry and the Planning Commission reflects the point of view of the patient community and health activists. Fixing prices of formulations based on market prices can actually push up the prices of most of the dosage forms from the current levels and may benefit only drug companies. Prices of most of the essential and widely used generic and patented drugs in India are already expensive because of the current ineffective drug pricing policy.⁵ Clearly, we need to find a better way to address this problem.

Mechanism of price control in India

There are two basic price mechanisms i.e. direct and indirect. Price controls can be applied either at the manufacturing or the retailing level.

Direct

Direct price mechanisms means governments set the sales price and prohibit sales at any other price. Alternatively, governments may negotiate favorable prices with manufacturers by leveraging their monopolistic power to set prices below more liberalized prices. Another method governments use to control prices is to set the reimbursement price of a new drug at artificially low levels. Since any price above that is set by the government is borne by the consumer the reimbursement price functions as the de facto market price. Finally, governments may regularly cut the reimbursement price of drugs already on the market.⁶

Indirect (moral suasion, threat, crowding out, and buyer power)

Indirect private drug prices have influenced government by not mutually inclusive as well as being invasive. To indirectly control private drug prices. Some of these methods of government influence may not be mutually exclusive, and some may be more invasive than others.

Reference Pricing

Reference pricing determines sales prices based on the prices in other countries or relative to existing therapies in the same country. Since reference pricing controls the reimbursement level and not the manufacturer's price, governments often view this Method as less restrictive than price controls. Many countries that moved from a liberal Approach to a regulated pharmaceutical market employ some form of reference pricing.

India is planning to rein in prices of expensive patented drugs to make medicines affordable to its predominantly poor population.⁷

Currently, patented drugs are free of price controls, but there are restrictions on the prices of 348 so-called "essential" drugs. Patented drugs are mostly imported by multinational drug makers and used to treat diseases like cancer and heart ailments.⁸

In 1986 the Indian government came up with the drug policy titled "Measures for Rationalization, Quality Control and Growth of Drugs Pharmaceuticals Industry in India" which one of the objectives was:

Ensuring abundant availability, at reasonable prices of essential and life saving and prophylactic medicines of good quality;

In 1995 the Drugs (Prices Control) Order came to existence, to regulate the prices of drugs. And finally Pharmaceutical Policy-2002 was enunciated to ensure abundant availability at reasonable prices within the country of good quality essential pharmaceuticals of mass consumption.

The Doha Declaration

The Doha Declaration recognized the gravity of public health problems afflicting many developing countries. It is a political statement enabling the developing countries to adopt the necessary methods to access to health care without fear of being dragged into a legal battle. It also provided for compulsory licensing and parallel imports of life saving drugs. Parallel or grey-market imports are not imports of counterfeit products or illegal copies.⁹ These are products marketed by the Patent owner (or trademark- or copyright-owner, etc) or with the Patent owner's permission in one country and imported into another country without the approval of the Patent owner.¹⁰

There is another mechanism for controlling the price of medicine and it is compulsory licensing. Compulsory licensing is a system whereby the Government allows third parties (other than the Patent holder) to produce and market a patented product or process without the consent of the Patent owner. This mechanism enables timely intervention by the Government to achieve equilibrium between two objectives - rewarding inventions and in case of need, making them available to the public during the term of the Patent. Through such an intervention mechanism, the Governments balances the rights of the Patent holder with its obligations to ensure working of Patents, availability of the products at a reasonable price, promotion and dissemination of technological invention and protection of public health and nutrition.¹¹

Conclusion and suggestions

The very fact that public health and access to medicines have been singled out as major issues needing special attention in TRIPS implementation indicates that health care and health care products need to be treated differently from other products.

The reasons for the lack of access to essential medicines are manifold. In many cases the high prices of drugs are a barrier to needed treatments. Prohibitive drug prices are often the result of strong intellectual property protection. Governments in developing countries that attempt to bring the price of medicines down have come under pressure from industrialized countries and the multinational pharmaceutical industry. The World Trade Organization (WTO) Trade-Related Aspects of Intellectual Property Rights Agreement (TRIPS) sets out the minimum standards for the protection of intellectual property, including Patents for pharmaceuticals.

Law cannot be static it has to be dynamic. It has to be modified to meet the requirements of the fast changing environment. Similarly, science is also not static and changes are taking place at a very fast pace. Since Patent is related to science & technology, the Patent legislations cannot also be static.

While TRIPS does offer safeguards to remedy Patent abuse, in practice it is unclear whether and how countries can make use of these safeguards when Patents increasingly present barriers to medicine access.

Public health advocates welcomed the Doha Declaration as an important achievement because it gave primacy to public health over private intellectual property¹² and clarified WTO Members' rights to use TRIPS safeguards. But the Doha Declaration did not solve all of the problems. The recent failure at the WTO to resolve the outstanding issue to ensure production and export of generic medicines to countries that do not produce may even indicate that the optimism felt at Doha was premature. Improving healthcare access via drug price control is akin to bailing out water without plugging the holes in a ship.

Compulsory licensing is another solution, for example, under WTO, TRIPS Agreement. Compulsory licenses are legally recognized means to overcome barriers in accessing affordable medicines. When granting compulsory licenses, it should not be granted to only one company so as to eradicate monopolization of the drug, rather, to allow open markets that allow competition to work across borders.

Compulsory licensing also can be used as a tool for controlling the price of medicine but because of following reason the regime of cheap drugs may be threatened:

- a. The large Indian pharmaceutical companies, which have been taken over by foreign companies, may no longer be willing to apply for a Compulsory License even if eligible. Their deterrent threat is thus emasculated.
- b. When government notifies a public emergency and recognizes the need for issue of a CL for a particular drug, adequately capable drug manufactures may not be available to come forward to apply for CL and work it at a reasonable cost.
- c. Some of the Indian companies taken over by multinationals were recipients of substantial grants as well as tax concessions. Others were transferred or allowed to work Patents owned by the Council of Scientific and Industrial research (CSIR) at concessional prices. Thus, a significant portion of their market value rose because of state support and they were catering to niche markets for relevant drugs. After their ownership changed to foreign control they may no longer be able to be recipients of tax concessions nor be allowed to work Patents owned by the CSIR at concessional prices. This, therefore, may lead to prices of medicines to go up.

Another solution is price control. However, the fact is that the previous price control regime in India - Drugs (Prices Control) Order 1995 - did not improve patient access to drugs, nor was it a success in other respects. This is because price control did not expand the market into rural areas or improve access to poor patients. Bringing drugs under price control also does not necessarily mean an increased ability of patients to buy these drugs. For instance, low prices of anti-HIV drugs have not resulted in improved ability of patients to buy them due to impediments such as few and far-flung Primary Health Centers and the non-availability of drugs.

On other counts too, price control will not achieve the objective of increasing access. Low-income households in India typically rely upon the public healthcare system. Inadequate healthcare infrastructure and low availability of drugs in the public system is a perennial problem. Therefore, there is need to eradicate the above mentioned barriers to accessing health care. Once the above barriers have been overcome then patients will be in a position to need medicines to cure them.

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Comprehensive Care for Victims of Child Abuse - Multi Disciplinary Child Protection Center (MCPC) in Mumbai, India

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ABSTRACT

Cases of child abuse are very common in occurrence in India. But very few cases of child abuse are reported to the authorities, even when the problem gets identified, lack of social awareness on the gravity of this issue and ways to deal with it makes it difficult to ensure any kind of support to the victimized child. The vulnerable population often approach hospitals with health related complaints. The health service providers are in a position to identify signs of abuse upon their patients. Thus the medical system is potentially powerful and capable of providing treatment beyond physical healing.

The MCPC (Multi-disciplinary Child Protection Center) works within the medical system and coordinate with the other support services holistically to protect the best interests of the child. MCPC, a joint venture of TNMC & BYL Nair Ch. Hospital, Mumbai and UNICEF, was started in February 2006 with Forensic Medicine as the nodal department for this initiative.

The case management for such victims follows a multi-system approach, wherein Forensic Medicine coordinates with all concerned departments within the hospital as well as outside. The main effort of this approach is to prevent re-traumatisation of the child and to ensure that the victim has access to proper medical, legal and psycho-social care through a single unit. Multi-system approach makes the services less intrusive, more child sensitive and child friendly thereby making them more responsive to the needs of children who have been abused or sexually exploited.

Keywords: Child Abuse, Multi-Disciplinary Approach, Quick Response Team, Multi-Disciplinary Child Protection Center

INTRODUCTION

Children are seen as an asset, a helping hand or as tiny adults who need care and looking after. Childhood is perceived as a carefree period. However, children are also considered as helpless and incapable of participating in the larger affairs of the world. This often results in children being at the mercy of adults who care for them. These caregivers often turn abusers and exploit children. Child abuse is commonly seen

as gross violation of a child rights and often receives a lot of legal and media attention due to its social impropriety and impact on the child.

In cases of child abuse and sexual exploitation, a Multi-disciplinary Team (MDT) is a widely accepted and commonly used approach globally¹. This method unites all the agencies involved in investigation of child abuse cases and facilitates their joint efforts towards the common goal of protecting children and convicting criminals. The relevant agencies include law enforcement officials, social workers, physicians of various specialities, lawyers, government officials and non-governmental organizations.²

At present all the different systems work more or less independently with little or no coordination with each other. Such an approach re-victimises the child repeatedly at every stage – treatment, investigation,

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prosecution and protection. An MDT approach makes such services less intrusive, more child sensitive and child friendly thereby making them more responsive to the needs of children who have been abused or sexually exploited.

Establishment of MCPC

The MCPC (Multi-disciplinary Child Protection Center) was formed keeping in mind the best interest of the child. The effort is to prevent re-traumatisation of the child and to ensure that the victim has access to proper medical, legal and psychosocial care through a single unit. The MCPC at TNMC & BYL Nair Ch. Hospital, Mumbai was established with UNICEF support in February 2006 and Forensic Medicine being the nodal department. The other departments such as Casualty, Paediatrics, Gynaecology, General Medicine, Psychiatry, and Medical-Social Work have been working in coordination with each other and NGOs to provide care and treatment to child victims of abuse and sexual exploitation.

OBJECTIVES:

- To develop a child-sensitive protection protocol for linkages among the systems of state government child welfare/development departments, the juvenile justice system, state-run institutions, childline, the police, the judiciary, hospitals and health centers, NGOs, schools, mass media and the local self government.
- To provide comprehensive medical, legal and social protection to child victims of abuse and sexual exploitation through rescue and rehabilitation, physical and psychosocial treatment of children and prosecution of offenders.
- To conduct training and sensitisation programmes for functionaries in all the relevant systems to prevent vulnerability of children to abuse and sexual exploitation and for ensuring children's rights to protection.
- To create awareness about children's rights to protection and adult's responsibility to ensure these rights among children, families and society in general.
- To carry out research on causes, manifestations and implications of child abuse and sexual exploitation in boys and girls, in different age groups, in different life situations; document the process and the effects of intervention; and develop innovative intervention approaches to child protection.
- To establish a code of conduct for intervention with child victims and standards for rights-based child protection services that are child-centered and child-friendly.
- To advocate for changes in policies and laws to prevent vulnerability of children to abuse and sexual exploitation and for ensuring children's rights to protection.
- To integrate issues and intervention with child abuse and sexual exploitation in the curriculum of the medical, legal, police and social work professionals.

Services

- **Health care:** MCPC has provided quick sensitive & transparent procedures for treatment, medicolegal examination and evidence collection. MCPC had given watchful interventions, where a child was accompanied by a counsellor at every stage.
- **Psychosocial care & counselling:** Occurrence of abuse causes serious psychological trauma to the child and guardians. Counselling aims at creating an opportunity for a child to assess a confidential, supportive and safe place.
- **Family support:** MCPC team had worked closely with families & child's guardians in order to prevent further subjugation, minimise child's vulnerability and to strengthen them as to support the child.
- **Networking:** MCPC had gone beyond medical care by networking with police, lawyers, child welfare committee (CWC) and NGO's.
- **Effective Referrals:** A successful referral is an important aspect of MCPC. These could include referrals to NGOs for follow up, residential care institutions for institutional care, other hospitals for specialised treatment, lawyers for legal follow-up etc.
- **Training:** MCPC had conducted trainings on this issue to sensitize the different agencies like police, lawyers, nurses, doctors etc.

- **Quick response team:** MCPC is able to develop and institutionalised a concept of quick response team (QRT), which has representation from relevant departments from the hospital.

OBSERVATION

During the period of 3 years (2006-2009) MCPC has handled 61 cases of child abuse and 511 cases of age verification of children who were rescued from exploitative conditions such as prostitution and child labour. During this period, cases were referred from various sources. These included other departments of the hospital like paediatrics, gynaecology, etc. where the case was identified, NGOs, CWC, Courts and Police.

The case management follows a multi-system approach, wherein a child protection officer coordinates with all concerned departments within the hospital as well as outside. A Quick Response Team (QRT) involving a panel of doctors from departments like Gynaecology, Paediatrics, Forensic Medicine, Surgery, Psychiatry and others has been formed. Whenever any incidence of child abuse is identified, the nodal department is informed and QRT reaches to carry out investigations.

The center makes sure that procedures are non-threatening and sensitive to children, who are already traumatized having faced abuse. Repeated disclosure of the happenings can add to the trauma faced by the child. Therefore personal history of the child is recorded by one trained doctor and it forms the basis for further required investigations for medical purposes, evidence collection, age estimation and other reasons.

Follow up of a case is an essential aspect which involves taking the parents into confidence, securing appropriate shelter for the child, working with the police and also with the judiciary, thereby having an opportunity to influence the enforcement and prosecution machinery to be child friendly. The social workers at the center accompany the child at every stage. Family visits are crucial to motivate family members to take required course of action to protect the child.

Most of the cases were referred to the MCPC after a significant time had elapsed since the abuse. Despite this, most of the victims were under a lot of stress and had still not overcome the trauma of the incident. This is also evident from the fact that almost all the victims

needed psychosocial support. Some were also referred for psychiatric treatment and therapy to be able to cope. Thus, it is extremely important to have a strong counselling component for any MCPC team.

Most of the victims had suffered long-term and multiple forms of abuse. In many case-studies, it is indicated that the victim was neglected or emotionally abused by the family before being trafficked or sold into the sex trade. In such cases, safe shelter and vocational training is important as they cannot go back home. Cases that are referred by the police or CWC also have a component of trafficking involved in them.

The case histories of the victims touch upon the extremely vulnerable situation of children. Children from extremely poor families, migrant families, and dysfunctional families are at a very high risk of abuse, exploitation and neglect.

The MCPC staffs have an important role in prosecution and this is often ignored. There is a lot of pressure from the abuser to tamper with evidence. A strong collaboration between MCPC and the referring agency can help ensure justice to the victim.

Challenges

- Ensuring follow up is one of the major challenges. Most parents wish to ensure basic medical services and be discharged at the earliest. They are insensitive to the child's need for counselling and healing. In cases referred by NGOs too, it is difficult to ensure continuity of services.
- Most parents are not keen on taking legal action for fear of shame and humiliation. They do not wish to file a police complaint as they are worried of police harassment.
- Cases of child abuse still do not receive the attention it deserves. In case of trafficked victims it is difficult to accurately identify the perpetrators. In other cases, the process is too long. As a result, the abuser often goes scot free.
- Finding appropriate agencies based on the needs of the victim are a challenge. This is particularly true for victims with disabilities or special needs.

DISCUSSION

According to the Study on Child Abuse 2007 ³, 53.22% children reported having faced one or more forms of sexual abuse. Children on street, children at

work and children in institutional care reported the highest incidence of sexual assault. Most children did not report the matter to anyone. This data is shocking particularly when most of us believe that our children are living safe and secure lives. It is time we came out of this complacency and looked at abuse as a common occurrence. An MCPC needs to have adequate referral mechanisms and a list of a wide range of agencies that can be contacted.

At present the center is primarily focusing on treatment and healing of the child, preventive measures are imperative in order to really protect the child from abuse. The center is planning to engage in community and school based work with the help of voluntary and community based organisations. There is a need to develop parental skills to enable them to identify and deal with incidences of child abuse in their families and communities. Similarly the teachers should become aware and equipped with knowledge of handling victims of abuse. They should know what to do and who to approach in cases of dire need.

CONCLUSION

Benefits of a multi-disciplinary approach are

- Less “system inflicted” trauma to children and families.
- Better agency decisions, including more accurate investigations and more appropriate interventions.
- More efficient use of limited agency resources of all concerned departments.
- The use of more capable professionals at each distinct step in the case.
- Detection of unreported cases where either the child or his parent is seeking treatment for some other ailments in other departments e.g. Psychiatry, Paediatrics, etc.

- To provide successful and prompt referral for child’s rehabilitation.
- Assistance to the NGO’s in the form of guidance & advice in difficult cases.
- Statistical data is compiled which helps in understanding the magnitude of the problem.

Given the alarming and widespread nature of the problem, the need of the hour is to make such systems and procedures integral to health systems across the country so that children get support when most needed and to aid in effective investigations and prosecution of abuser.

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Inter Observer Variation in Analysis of Palatal Rugae Pattern

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ABSTRACT

In comparative methods of identification, inter-observer variations always pose a predicament. Palatal rugoscopy, being a comparative mode of identification, is not an exception for such predicament. Each and every palatal print is unique and has great potential in the field of identification of living or dead. In the present study 25 palatal casts were analyzed by two independent observers one each from Medical and Dental fraternity. Statistical evaluation was done for inter observer variation in studying various shapes and directions.

Keywords: Palatal Rugoscopy, Comparative Identification, Inter Observer Variation

INTRODUCTION

Identification is recognition of an individual based on certain physical characteristics which are unique to each individual. The necessity of identification is very important from birth to death, and mistaken identity can lead to various problems from the medico legal point of view. Hence, identification of an individual is most important component in medico legal practice.

Forensic Odontology also called as Forensic Odontostomatology, may be considered as an art and science of dental medicine as applicable in resolving issues pertaining to law.

Forensic Odontology came into limelight in India after the conviction of accused in Delhi gang rape case with the help of reports given by a Forensic Odontologist.¹ But In India Forensic Odontology as a speciality is limited both in interest and practice.

Palatal rugae are the ridges on the anterior part of palatal mucosa, each side of the median palatal raphae behind the incisive papilla.²They are protected from trauma and heat by their internal location. Hence palatoscopy can be used in cases where dactylography is not possible for identification.

No two palatal rugae prints are alike, but inter observer variations can occur while reading the shapes.

This study has been conducted to compare the inter observer variations in reading the palatal rugae pattern in 25 cases, with one observer each from the Medical and Dental fraternity.

MATERIAL AND METHOD

This cross sectional study with sample size of 25 was carried out in the Department of Forensic Medicine and Toxicology, JSS Medical College, Mysore, India. Institutional ethical clearance was obtained and 25 students from JSS Medical College above the age of 18 were selected. Written informed consent was taken from all the subjects. Subjects with developmental anomalies involving maxilla as in cleft lip and cleft palate and subjects who have undergone palatal surgeries were excluded.

Materials used were Alginate, dental stone class 3, spatula, loading tray, plaster of paris, Hb pencil and digital caliper.

Alginate impressions of the maxillary arch of all the subjects were made and poured with dental stone. A plaster of Paris base was made for each cast and

preserved for interpretation. The casts were interpreted.

Palatal rugae were read based on length as

- Primary rugae : 5mm length or more
- Secondary rugae: 3mm to 5 mm in length
- Fragmentary rugae : 2mm to 3mm in length

Palatal rugae less than 2mm in length were not included in the study.

The following shapes were included in the study;

The curved rugae have a crescent shape. Wavy rugae are serpentine in shape. Straight rugae run directly from their origin to insertion. Circular rugae form a definite ring. Rugae are considered convergent when rugae with different origins joined on their lateral portions, whereas if two rugae have the same origin but they immediately branch out they are considered divergent. (Figure 1)

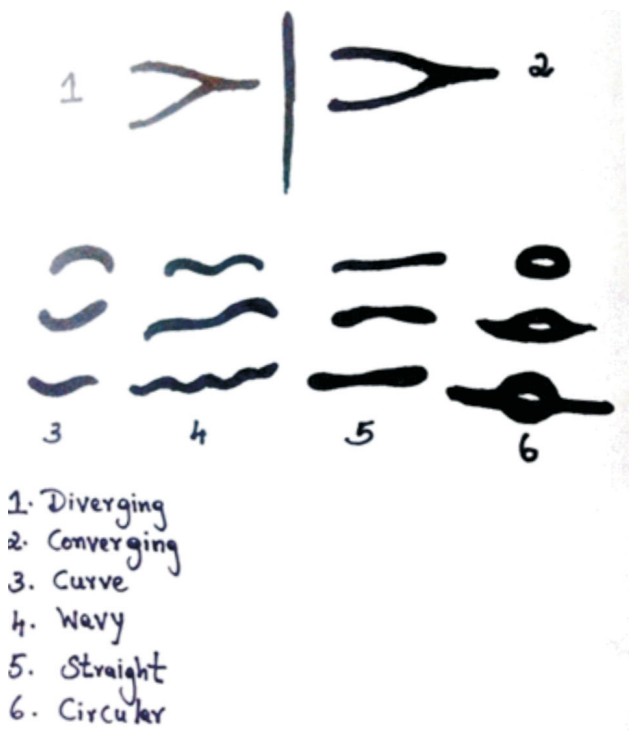


Fig. 1. Shapes of rugae

Data was entered in excel sheet and analyzed using SPSS version 20. Interobserver variations were assessed by reliability analysis and by obtaining reliability coefficient (Chronbach's Alfa). Alfa value more than 0.5 was considered to be significant agreement.

RESULTS

Table 1: Inter observer variation in counting number of rugae

Variable	Reliability coefficient Chronbach's Alfa	P
Total rugae	0.981	>0.0001
Primary rugae	0.955	>0.0001
Secondary rugae	0.696	>0.0001

Table 2: Inter observer variation in analyzing shapes of rugae

Shape	Reliability coefficient Chronbach's Alfa	P
curve	0.807	>0.0001
straight	0.853	>0.0001
wavy	0.844	>0.0001
circle	0.869	>0.0001
divergent	0.906	>0.0001
convergent	0.928	>0.0001

On counting the number of rugae and analyzing various rugae shapes, reliability of information collected between 2 observers had a reliability coefficient more than 0.5 in all the variables and they were found to be statistically significant.

DISCUSSION

There is a great potential for use of palatal rugoscopy in the field of identification. Because of their unique nature, palatal rugae can be used as efficiently as fingerprints in the field of identification. Various studies on palatal rugae pattern done in the past have shown racial variations^{3,4}, gender differences⁵. When a particular race is studied, geographic variations in rugae pattern were also noted.⁶ Most common identification methods used nowadays are fingerprinting and DNA profiling. Use of fingerprints can be limited in mutilated, burnt and decomposed body and DNA profiling is expensive. The advantages of palatal rugae as an ideal method of postmortem identification include⁷:

- They are protected from trauma by their internal location.
- They are insulated from heat by tongue and buccal fat pads.
- No two palates are alike in their configuration.
- Palatoprints do not change during growth.
- Palatal rugae reappear after trauma or surgical procedures.

- Rugoscopy is relatively cheap.

The disadvantage of palatal rugoscopy is that its recording needs a trained person and an antemortem record is necessary for comparison.

In a method where non quantitative parameters are studied, there is always a possibility of inter observer variations. In this study an attempt was made to find out the inter observer variations while counting the number of rugae and analyzing the various shapes of rugae.

In a study done by English Et al⁸ on pre and post orthodontic treatment casts, 9 evaluators compared 25 pre orthodontic casts with 125 casts to find out possible matches. Each set of pre and post orthodontic casts were matched 100% correct by 4 evaluators and the remaining evaluators matched 88% correct.

Study done by a group of workers in Mangalore⁹ on identification with the help of special computerized software using digital photographic images of rugae showed that 3 evaluators got 100% results and 2 evaluators got 99% results.

The above studies have shown that different observers could positively match the casts with minimal or no inter observer variations. In the present study palatal prints were analysed by 2 observers independently and the inter observer variations were minimal while assessing the number, shapes and direction.

CONCLUSION

Based on the above results we can positively state that inter observer variations are minimal while interpreting the palatal rugae pattern. Further study with a larger sample size and more number of observers from different fields can be done to validate the results of this study. Forensic odontology has lot of room for development in India. It can emerge as an alternate method of identification in mass disasters, mutilated, decomposed bodies and unidentified bodies.

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Study of Position, Length and Arterial Supply of Vermiform Appendix in South Indian Population

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ABSTRACT

30 specimens of adult cadavers of them 16 males and 14 females were studied. The positions of appendix were Splenic, Pelvic, Promonteric and mid-inguinal were 3.33% in both sexes. While retrocecal position was 20% and the retrocolic was 10% in both sexes but sub ceecal position was highest in males (10%) while 3.33% in females. The highest average length of appendix in males was 7.5cm and 6cms in females. The arterial supply was from inferior division of Ileo- Ceecal artery 99% and arterial loop was 1% in both sexes. This study is not only important for surgeons but this variation also signifies regional importance.

Keywords: Position, Length, Ileo-Ceecal Artery, Mesoappendix

INTRODUCTION

Despite extraordinary advances in modern radiographic imaging and diagnostic laboratory investigations, the diagnosis of appendicitis requires clinical acumen and surgical sense because of its inconstant or fluctuating anatomical position. Apart from these variations in length also causes surgical emergencies as appedicular artery is an end artery. Thrombosis of the artery is followed by appendicitis.

As appendix is an most constricted part of GIT like pharynx is more prone for infections⁽¹⁾, moreover normal appendix often contains fluid fecal material, exhibiting various degrees of inspissations and that fecal material consisted wholly undigested food, other foreign matter, small amount of mucus lymphocytes, epithelial cells occasionally parasitic worms and ova of parasites⁽²⁾. If becomes infected causes pain and tenderness. Hence attempt made to study the position length and arterial supply of south Indian cadavers.

MATERIAL AND METHOD

The specimen is collected from dissection theatre and mortuary followed by post mortem from B.L.D.E Medical College Hospital, Bijapur preserved in 10% formalin. The appendix and its arteries are cleaned with the help of forceps and scalp vein. The length of the appendix is measured with thread and scale.

OBSERVATION OR RESULTS

Table No. 1 shows various positions of appendix are studied. Splenic, Pelvic, Promonteric and mid-inguinal 3.33% in both sexes. 20% retrocolic 10% retrocolic observed in both sexes, but subcecal position was highest in males (10%) and lowest in females (3.33%)

Table No. 2 shows the present positions of appendix are compared with previous workers of India and abroad.

This table shows the length of appendix in both sexes. The highest average length of 7.5cms observed in males, 6cms in females.

Table No. 4 shows the length of appendix observed in present study was compared with previous workers of India and abroad.

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Table No. 5 shows the comparison of present arterial supply with previous workers of India and abroad.

DISCUSSION AND SUMMARY

In the present study the position of vermiform appendix (Table.1), the retrocecal position was highest (20%) followed by retrocolic (10%) in both sexes, but sub-cecal position was highest only in males (10%) while least in females (3.33%). The peculiar positions like promonteric and mid-inguinal were also observed in both sexes (3.33%). Which are the very rare incidences, which require surgical interruption. But the present study is more or less similar with previous workers of Nigerian⁽³⁾ and Indian⁽⁴⁾. In the present study position of retrocecal (20%) and retrocolic (10%) could be to serve the immunological purpose since appendix is a lymphatic organ though it is vestigial⁽⁵⁾⁽⁶⁾. As caecum is broader than length because it contracts and allows free movement of appendix⁽⁷⁾ Hence it can be hypothesized that movement or changing the position of appendix to act as scavenger or soldier for phagocytosis by producing antibodies.

In the present study the average length of the appendix is 7.5 in male varies and 6cm in female (Table. 3), but varies with studies of abroad (Table-4) and more or less similar with south Indian studies⁽⁴⁾. It indicates that the length of vermiform appendix has regional significance. In fact length of appendix is embryological and evolutionary entity rather than anatomical, because function of appendix appears to be immunological rather than digestive because it is strongly developed in children about 18-20 cms and get atrophies with age. Hence it can be hypothesized that there is a predominance of IGA globulins in the mucous secretions more in children than adult⁽⁸⁾. These immunoglobulins appear ontogenetical in nature⁽⁹⁾

Moreover, as vermiform appendix is degenerated part of the caecum which is influenced by the ecological, dietary and genetic factors⁽¹⁰⁾. Because choice of food in hominoid (or Anthropoids) lead to atrophy of appendix followed by evolution of man because the function of appendix was to neutralize the toxins swallowed with herbivorous diet but when palatable diet with frugivory adaptation was adapted atrophy of appendix commenced along with evolution of man preceded by hominoids.

It is also noted that, after adopting the complete erect posture appendix resumes coiled or semi-coiled

appearance and it is interesting to note that, mesentery of the appendix is formed by a very definite fold of serous membrane⁽¹¹⁾. Hence it can be hypothesized that, as there is no any support for the lower abdomen to overcome gravity and intra abdominal pressure hence length of the appendix might have coiled or semi-coiled to act as "shock absorber" with a definite fold of serous membrane to overcome gravity and intra abdominal pressure.

In addition to this it can also hypothesized that, length of the appendix may be proportionate to the degree of adaption of erect posture. Hence different length of appendix is observed in the present study (Table-4) could be due to representing different race or regional ancestry because race is an ongoing process.

In the present study arterial supply of the appendix is from inferior division of Ilio-cecal artery 99% and from arterial loop is 1% (Table-5) which is similar with south Indian study⁽¹²⁾. And certainly confirms the regional significance because constancy of arterial supply is a question which has occupied the attention of the morphologist from time to time but vascular supply of the any organ or tissue determined partly by morphogenetic factor and partly by mechanical convenience Hence there has to difference in blood supply owing the functional structural and positional consideration to keep the organ active. Therefore present blood supply varies with previous abroad workers (Table-5) which may lead to certain pathological problems, as meso-appendix has a free boarder which carries the blood supply to the organ by appendicular artery branch from Ilio-cecal artery⁽¹³⁾ since appendicular artery is an end artery. In our studies Inferior division of Ilio-cecal artery is quite proximal to appendix than any other branch but failure of meso-appendix to reach the tip of the organ marking more liable to become gangrenous and hence early perforation during inflammation may occur hence gangrene and perforation of appendix is lesser in India as compare to European countries.⁽¹⁴⁾

CONCLUSION

This study of position, length and blood supply will certainly help the surgeon to make optimal diagnosis and treatment of appendicitis which is most common problem in young adults. Moreover these positions, length, blood supply pattern has regional significance hence it warrants further immunological and ontogenetic study to throw more light upon these significant findings.

**Table No 1: Study of Various position of Appendix in both sexes.
Specimen = 30 (16 Male, 14 Female)**

Position	No. of Male	SpecimenFemale	Percentage		TotalPercentage
			Male	Female	
Splenic	1	1	3.33%	3.33%	6.66%
Pelvic	1	1	3.33%	3.33%	6.66%
Promonteric	1	1	3.33%	3.33%	6.66%
Sub- Caecal	3	1	10%	3.33%	13.33%
Mid- linguinal	1	1	3.33%	3.33%	6.66%
Retroceacal	6	6	20%	20%	40%
Retrocolic	3	3	10%	10%	20%
Paracaecal	-	-	-	-	-
Ectopic	-	-	-	-	-

Table No. 2: Comparison of Position of Appendix with Previous Workers of India and abroad with Percentage

Position	Leivls 1909	Wakely & Goldstone 1914	Wakely & Goldstone 1924	Donal Collins 1932	Wakely 1933	Peterson 1934	Shah & Shah 1943	Maisal 1951	Michel 1963	Baily & Love 1971	Srinivas 1973	Golalipur M. J 2003	Present Study 2012
SplenicPre-iliac	13.9	0.94	0.90	69.68	1.00	26.8	11.7	10.2	3.0	1.0	-	18.8	3.33
Post-iliac	-	0.05	-	0.98	0.04	-	15.6	-	15.0	5.0	52.0	2.06	3.33
Pelvic	42	32.11	27.5	7.9	31.01	42.2	16.6	58.6	51.0	18.5	8.0	33.3	6.66
Sub- ceacal	9.0	2.02	1.86	1.24	2.26	-	4.7	5.0	-	1.5	-	12.8	13.36
Paraceacal	-	-	-	-	-	-	-	-	-	-	-	-	-
Retroceaca & Retrocolic	35.0	64.38	69.2	19.50	65.28	31.0	51.1	26.7	31.0	74.0	40.0	32.4	60.01
Promon- teric	-	-	-	-	-	-	-	-	-	-	-	-	6.66
Mid-inguinal	-	-	-	-	-	-	-	-	-	-	-	-	6.66
Ectopic	-	0.04	0.03	0.05	-	-	-	-	-	-	-	-	-

Table No 3: Length of Appendix in both sexes (16 Male, 14 Female)

Size	Male	Female	Total Length Average
Longest	10 cms	10 cms	-
Shortest	5 cms	2 cms	-
Average	7.5 cms	6 cms	6.75 cms

Table No. 4: Comparison of Length of Appendix with Previous Workers of India and abroad

Workers &Year	Shortest(cms.)	Longest(cms.)	Average(cms.)
Marks & Blake (1906)	1.0	24.0	7.9
Deaver (1913)	1.0	23.0	8.9
Lewis (1918)	2.0	20.0	8.3
Robinson (1923)	1.8	23.0	9.2
Royster (1927)	2.5	20.0	7.5
Hafferi (1953)	2.5	20.0	9.0
Geetanjali HT & Lakshmi Prabha (2011)	4.2	10.3	5.9
Present Study (2012)	2.0	10.0	6.75

Table No. 5: Comparison of Arterial supply of Appendix with Previous Workers of India & Abroad

Workers & Year	Place of Study	Specimen of Sex.		Age	No. of Specimens	Source of Artery
		Male	Female			
Smith (1911)	New York	510	540	3-12 years	1050	Ant. Br of IC Artery
Koster & Winterobe(1928)	Brookly	-	-	10 -70 years	100	I.C Artery
Shah & Shah (1946)	North India	-	-	-	60	AC & PC branch
Hollinshed(1956)	New York	-	-	25- 50 Years	50	I.C Artery& its br.
Wekely, Homer Tylor(1960)	Britain	-	-	30- 45 Years	50	PC br. IC
Davis & Davis (1962)	Philadelphia	-	-	25- 50 Years	25	ID of IC artery
Bruece Wamsley& Rose (1964)	Edinburgh	-	-	Adult	35	IC artery absent
Devis (1964)	Livingstone	-	-	Adult	50	IC artery
Bailey & Love (1965)	London	-	-	Adult	60	IC artery & PC br.
Grant & Basmajan (1965)	Baltimore	-	-	Adult	50	ID of IC artery
Solanke (1970)	Nigeria	52	48	7-65 years	100	IC artery its br.
Srinivasaih (1973)	Bangalore(Cosmopolitan)	21	04	Adult	25	I D of IC artery
Present Study	Bijapur(South India)	16	14	25-40 years	30	ID of IC art. & loop betn. SD & ID of IC art.

IC = Ileo-cecal,

PC = Posterior Ceacal ID = Inferior Division

SD = Superior Division AC = Anterior Ceacal

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Infidelity was a Nidus, but the Victim was Fetus - A Case Report

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ABSTRACT

The infidelity is a worse nightmare referred as cheating, adultery, having extramarital relationship or unfaithfulness to one's own partner.

The present case report is an expert opinion case no.25/2013 booked U/S 143, 498(A), 306 No. 149 IPC. Specimen of a uterus and fetus was sent for an expert opinion from a Medical Officer to know the age of the fetus. On gross examination of the specimen it contained the uterus (not present in its entirety) and fetus present separately. The married life of a couple was been for 3 months and more. Diagnostic ultrasonography report shows fetus of 12 weeks. There had been series of quarrels in their family after marriage. The husband thinks that wife was unfaithful to him. So husband gave her to consume organophosphorus compound and later on hanged himself. On gross and radiological examination reveals the age of fetus is between 7-8 weeks. Uterus shows autolytic changes and placenta attached to postero-superior aspect of uterus.

Any examination of fetus we must consider anatomical and embryological development. The forensic experts should follow basic parameters in cases of fetal age estimation.

Keywords: Infidelity, Uterus, Fetus, Embryological development

INTRODUCTION

Infidelity (also referred to as cheating, adultery, or having an extramarital affair) is the subjective feeling that one's partner has violated a set of rules or relationship norms and this violation results in feelings of sexual jealousy and rivalry. Studies have reported that men are more likely to engage in extramarital sex if they are unsatisfied sexually, while women are more likely to engage in sex if they are unsatisfied emotionally. In general, marital dissatisfaction overall is the number one reason often reported for infidelity for both sexes¹.

CASE REPORT

The present case is concerned with the expert opinion no. 25/2013 and is booked U/S 143, 498(A), 306 No. 149 IPC. The father of the deceased filed a complaint on finding the body of his deceased daughter along with the body of her husband in their

own house. The couple had a history of married life of 3 months duration and during this time there had been series of quarrel in their family. The in laws of the deceased harassed and tortured her for dowry and so the deceased and her husband started to stay in a separate house. But when a diagnostic ultrasonography report revealed the fetus of 12 weeks gestation, the husband thought that his wife was unfaithful to him. So husband gave her to consume organophosphorus compound and later on hanged himself.

The post mortem was conducted by a medical officer of CHC Hebbal and the specimen (Figure 1) of uterus and fetus was preserved in 10% formalin and was sent to ascertain the age of fetus, to the department of Forensic Medicine and Toxicology, MRMC, Gulbarga. The specimen was sent for radiological examination (Figure 2) and the ossification centre of mandible and clavicle was found (appears at age of 7 weeks).



Fig. 1. Uterus and fetus



Fig. 2. Skiagram of fetus

On gross examination

Uterus

Shows autolytic changes and is not present in its entirety. The parts present are fundus and body of uterus, left and right fallopian tube and left ovary. The missing parts are cervix and right ovary. Weight of uterus - 86 gm. Dimension of Uterus: Length of uterus

- 6 cm, Width of uterus - 6.5 cm and Thickness of endometrium -1 cm. Pieces of placenta are attached to the postero-superior aspect of uterus. Diameter of attachment of placenta - 3 cm.

Fetus

Umbilical cord is present measuring 4 cm in length and its cut end is ragged (torn off). Eyes appeared as two black spots. Mouth appeared as a cleft and nasal bridge is present. Contour of hands and legs are well appreciated. The hands and feet are webbed. The anus appeared as a dark spot. (All these features are present at the end of 8 weeks). The external genitalia is still not distinguishable (can be distinguished after 12 weeks). Crown-Rump Length- 4 cm & weight of fetus- 5 gm.

DISCUSSION

In the present case, the breach of trust in the marital relationship has led to death of husband and wife including the fetus. Many societies in Indian culture are based on monogamous relationship. But however now a days it is relatively common for both men and women to involve in sexual activity with another person other than his/her spouse.

One study done by Roscoe, Cavanaugh, & Kennedy (1988) found that women indicated relationship dissatisfaction as the number one reason for infidelity, whereas men reported a lack of communication, understanding, and sexual incompatibility².

Glass & Wright (1992) also found that men and women who are involved in both sexual and emotional infidelities reported being the most dissatisfied in their relationships than those who engaged in either sexual or emotional infidelity alone³.

In case of abetment of suicide and harassment deaths in pregnant women one should perform proper internal and external examination during autopsy. A good knowledge of anatomy and embryology is important to support our opinion regarding the age of fetus. Radiological examination helps us to observe various ossification centre and to relate our findings to give an opinion.

Fetal development

Germinal Period (conception - 2 weeks)

Oocyte (female germ cell) is released from ovary and travels to uterine tube. Sperm fertilizes oocyte in

the uterine tube to form a zygote. Zygote travels up uterine tube, dividing continuously, forming blastomere (group of cells) also called morula. Morula (16-64 cells) enters the uterine cavity through narrow uterine ostium (1 mm) on 4th day. Blastocyst (attached morula) sinks into endometrium for approximately 6 days, completing implantation. It is also called precarious period because abortions are more common during this period⁴.

At 3 – 8 weeks

Embryo forms different layers of cells- Ectoderm, Mesoderm and Endoderm. Development of other pre-natal essentials are eyes appears as 2 dark spots (at 4 weeks), mouth appears as cleft (at 4 weeks), hands and feet are webbed (at 8 weeks), anus appears as a dark spot (at 8 weeks) and placenta begin to form (at 8 weeks). Length 1 cm at 4 weeks & 4 cm at 8 weeks. Weight two and half grams at 4 weeks & 10 grams at 8 weeks⁵.

Ossification Centers appears is Clavicle (at 7 weeks), Mandible (at 7 weeks), Maxilla (at 6 weeks) and Diaphysis of Humerus, radius and ulna (at 8 weeks)⁶.

At 3 to 6 months:

Eyes are closed and pupillary membrane appears (at 3 months). Convolutions begin to develop in brain (at 4 months). Lanugo hairs are seen on the body and skin is covered with vernix caseosa (at 4-5 months). Testes are seen close to the kidneys (at 6 months). Structurally complete but systems need time to mature. Length 9 cm at 3 months and 30 cm at 6 months. Weight 30 gm at 3 months and 700 gm at 6 months⁵.

Ossification centers appears in ribs. 5th, 6th and 7th ribs (at 8-9 weeks), 2nd, 3rd, 4th, 8th, 9th, 10th, 11th ribs (at 9 weeks) and 1st & 12th ribs (at 10 weeks)⁶.

At 7 to 9 months

Eyelids open and pupillary membrane disappears (at 7 months). Placenta weighs 500 gm (at 8 months). Testis present in external inguinal ring (at 7 months), left testis in scrotum (at 8 months) and both testis in scrotum (at 9 months). An ossification center appears in talus (at 7 months) and lower end of femur (at 9

months). Length 35 cm at 7 months and 45 cm at 9 months. Weight 900-1200 gm (at 7 months) and one and half to two kg (at 9 months)⁵.

Inderbir Singh mentioned that at 8th week (50 days) the elbow and knee are established, and fingers and toes are free. Eyes shift from lateral to frontal position. Primary centers of ossification are seen in many bones⁷.

According to Bernard Knight the examination of the ossification centers may be performed radiographically, which requires the advice of a radiologist, as the time of appearance may not be synchronous with visual identification of the centers⁸.

Dr. Sachin Sudarshan Patil et al conducted a study of estimation of gestational age by Crown rump length on 100 fetuses. This study correlates with the observation in our case⁹.

There are variations in calculating gestational age from ultrasonography. The Robinson and Fleming in 1975 developed a growth chart for predicting gestational age from CRL (Crown Rump-Length) was ± 5 days in first trimester. Later on one study done by Lily K Pemberton et al and they found that error of gestational age calculation was ± 8 days rather than ± 5 days in a study done by Robinson and Fleming. It is recommended that the CRL measurement be performed when the fetal head is in a "neutral" position. The authors concluded that the variation in measurement of CRL may be due to having no standard definition for what a "neutral" position of the fetal head is, thereby creating variation in measurements among different examiners who were using different interpretations of the "neutral" position of the fetal head¹⁰.

The accuracy in predicting the days of delivery is not clear due to the lack of reliable growth charts. Some authors argue that there is a necessity for growth charts for BPD (Bi Parietal diameter), FL (Femur Length), and AC (Abdominal circumference) in the first trimester because these measurements could provide more accuracy at predicting poor first trimester growth than merely CRL. However, many others argue that these biometric measurements are technically difficult and difficult to reproduce among different ultrasonographers¹⁰.

One study was done by Taipale P et al and they conclude that combining more than one ultrasonic measurement did not improve dating accuracy¹¹.

CONCLUSION

On gross and radiological examination it reveals that the age of fetus is between 7-8 weeks. While examining the fetus one should have good knowledge of anatomy and embryology to give opinion. The medico-legal experts should take skiagram of the fetus and consult with the radiologist for opinion regarding age estimation of fetus. In such cases, for age estimation of fetus, we cannot rely on USG. So morphological and radiological examination should be considered.

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Evaluation of Stature from Dimensions of Footprints

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ABSTRACT

Height of an individual is essential information to identify a person in any day-to-day portfolios such as employment forms, medical examination reports, police complaint, matrimonial advertisements, passports etc. Therefore, the estimation of height of an individual is, however of more compelling concern to clinicians, forensic and anthropology experts (1). As, suggested by anthropologist such as Dupertius and Hadden (2), Trotter and Glessner (3), the orthodox methods for evaluation of stature by forensic experts from skeletal remains are limited to bone lengths that are subjected to many sets of regression equations calculated for this purpose. Whereas, in this study a search through literature (4, 5, 6) revealed a few "rule of thumb" formulae developing a few regression equations (7, 8, 9) for estimating stature from the foot size. As, footprints have been accepted as evidence of identification in our courts and in many countries (10). More likely, footprints at a scene of crime left by a barefoot criminal are the type of evidence that is crucial to linking the suspect to the crime (11). Hence, it is imperative that a more intensive study of foot and footprints are a form of physical evidence that has tremendous value in a tropical country like India.

Keywords: Foot Prints, Stature, Regression Equations

INTRODUCTION

Height of an individual is essential information to identify a person in any day-to-day portfolios such as employment forms, medical examination reports, police complaint, matrimonial advertisements, passports etc. Therefore, the estimation of height of an individual is, however of more compelling concern to clinicians, forensic and anthropology experts (1). As, suggested by anthropologist such as Dupertius and Hadden (2), Trotter and Glessner (3), the orthodox methods for evaluation of stature by forensic experts from skeletal remains are limited to bone lengths that are subjected to many sets of regression equations calculated for this purpose. Whereas, in this study a search through literature (4, 5, 6) revealed a few "rule of thumb" formulae developing a few regression equations (7, 8, 9) for estimating stature from the foot size. As, footprints have been accepted as evidence of identification in our courts and in many countries (10). More likely, footprints at a scene of crime left by a barefoot criminal are the type of evidence that is crucial to linking the suspect to the crime (11). Hence, it is

imperative that a more intensive study of foot and footprints are a form of physical evidence that has tremendous value in a tropical country like India.

MATERIAL AND METHOD

The present study was carried out in the Department of Forensic Medicine, Sri Muthukumar Medical College Hospital and Research Institute, Mangadu, Chennai, India. During the period of December 2013 to May 2014, the study protocol was approved by ethical committee of the college. One hundred subjects of both sexes satisfied the criteria put forth for the study; the subjects were students of Sri Muthukumar Medical College Hospital and Research Institute, Chennai.

Inclusion Criteria

1. Normal healthy individuals both male and female in the age group of 20-25 years.
2. Their feet were verified that all toes were intact and no gross deformity.

Exclusion Criteria

1. Subjects both male and female below the age of 20 years and above the age of 25 years.
2. Physically disabled persons.
3. Foot with any infection
4. Individual with diseases related with growth eg. Distorted growth, hormonal imbalances (dwarfism, gigantism)

MATERIALS

Instruments: Rulers, Scales, T-squares, protractors, dividers, compasses, magnifying glasses, transparent metric grid.

Specialized equipments: Inkless footprint kit LE-25 with sensitized paper (alpha thermal paper) and synthetic sheet. Towellettes LE-44 (disposable cleaning towellette) and Anthropometer (to measure standing height)

Recording of Stature (Standing Heights)

The subject's stature (standing height) is measured with anthropometer. The body is vertical posture with heels together in barefoot and in contact with the vertical bar of the anthropometer. A wooden block is placed horizontally on the crown of the head to record the height in centimeters. This measurement is noted down into the foot measurement form.

Recording of Footprints

The subjects were made to sit on the stool and cleaned both their feet with towelettes LE-44. The footprint were made using inkless footprint kit LE-25, which leaves no printing residue on the bottoms of the feet. This collection procedure resulting in a "Standing" footprint being obtained from the right and left foot of each subject, one foot at a time at the place provided for it, with a moderate pressure for 10 seconds. The footprint sheets of both right and left feet of each subject are then collected for statistical analysis fig (1).

Landmarks for foot measurements

Measurements of all five digits were recorded for both the right and left footprints from the most anterior point on terminal phalanx to the most posterior point of calcaneum. Designated longitudinal axis (DLA) of the foot, as illustrated in fig (2) was attempted to

establish a definitive axial orientation for length measurements. The DLA enables one to take foot length measurements from specific landmarks along the foot the rear of the foot while keeping the line of measurements parallel to the DLA. Measurements taken parallel to the DLA, called parallel axial (axis) measurements, make it possible to get more precise evaluation of positional orientations of the toe. The parallel axial measurements end at a base line (BL) (fig. 2). By this methodology the maximum length of the foot from heel to each of the five toes is measured in parallel axial orientation.

Statistical Analysis

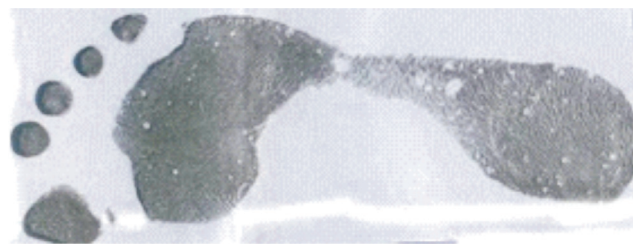


Fig. 1. "Standing" footprint on the alpha thermal paper

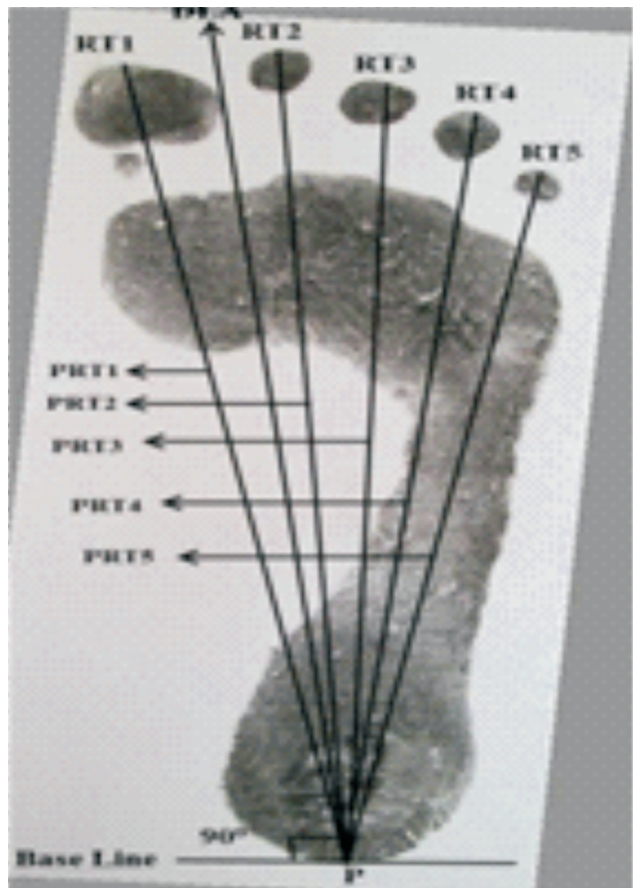


Fig. 2. Landmarks of measurements of footprint

The measurements recorded were entered in the appropriate columns of a tabulated sheets, a coding system was used for handling the data.

R.P.F.P – Right, parallel axis footprint

L.P.F.P – Left, parallel axis footprint

Statistical analysis of the data inputs was sorted in the software program separating the data on the basis of age and sex. Next selection of the toe length recording the highest measurements among the five toes and gave the results. The right and left toe lengths were next correlated using standard equations for correlation. Further, calculation of the mean and the mode values for the variables were recorded. The maximum toe length to stature ratio was calculated. The error values were evaluated. Later using standard statistical methods, constants for regression equations were calculated.

OBSERVATION AND RESULTS

The measurements were tabulated and analysed. The ratio indices were found. It is calculated by finding a simple ratio of the stature in centimeters to maximum length of the footprint in centimeters. The total number of subjects taken for study is one hundred. Among them 54 were males and 46 were females. Later, all the observed heights of the individuals were divided by the maximum length of the footprint (in centimeters-cms).

Evaluation of height

Among males, the maximum height recorded was 188 cms and minimum recorded was 159 cms, averaging about 172.9 cms (a mean value of height in males).

Among females the maximum height recorded was 169 cms and minimum recorded was 140 cms,

averaging about 162 cms (a mean value of height in females).

When analyzing about the height in males maximum number of males were in the range of 171-180 cms (mode value) were 37 in number. The number of males in the height range of 161-170 cms was 10 in number. Those with 180 cms and above were 5 in number. Two were having the height of 159 cms in the height range of 151-160 cms, refer table (1).

When analyzing about the height in females the maximum number of females were in the range of height 151-160 cms (mode value) i.e. 26 in number. The height of females i.e. 161-170 cms the number of females was 16 in number. The height of more than 170 cms was nil. Whereas less than 150 cms of height was found in 4 females, refer table (2).

Age wise distribution refer table (3 & 4).

Ratio index

A simple ratio of the stature in centimeters to maximum length of the footprints in centimeters i.e. ratio index was found for both males and females. In male the minimum footprint length recorded was 24.5 cms and maximum footprint length recorded was 28.5 cms refer table (5).

In female, minimum footprint length recorded was 19.5 cms and maximum footprint length recorded was 25.1 cms refer table (6).

When we analyse above the ratio indices for males it was found to be 6.45 as the minimum index and 6.69 as the maximum index (which we have taken as the average of both right and left foot length ratio indices).

For females the ratio indices were about 6.84 as the minimum index and the maximum index was 7.11 (here again the average of both right and left footprint length ratio indices was taken for consideration).

Table 1: Number of male subjects under different height category examined (in Cms)

Height range (In centimeters)	151-160	161-170	171-180	Above 180	Total
No. of Subjects	2	10	37	5	54

Table 2: Number of female subjects under different height category examined (in Cms)

Height range (In centimeters)	Less than 150	151-160	161-170	Total
No. of Subjects	4	26	16	46

Table 3: Number of male subjects examined with respective ages (in years)

Age in years	No. of subjects
20	10
21	8
22	14
23	12
24	10
Total no. of subjects	54

Table 4: Number of female subjects examined with respective ages (in years)

Age in years	No. of subjects
20	19
21	18
22	4
23	2
24	3
Total no. of subjects	46

Table 5: Maximum footprints length L.P.F.P in males (in Cms)

Maximum footprint length L.P.F.P (Cms)	24-25	25.1-26	26.1-27	27.1-28	28.1-29
Males	5	15	20	12	2
Total	54				

Table 6: Maximum footprints length L.P.F.P in females (in Cms)

Maximum footprint length L.P.F.P (Cms)	19-20	20.1-21	21.1-22	22.1-23	23.1-24	24.1-25	25.1-26
Females	1	0	15	16	10	3	1
Total	46						

DISCUSSION

In this study it was found that there is a linear correlation between the length of the footprint and the body height (stature) of an individual. The age limitation of the subjects is from 20 years to 25 years as the growth of the individual completes at the age of 20 years and ossification centre of the base of the first metatarsal in the foot unites at around 20 years. Also there is degeneration of stature after 25 years at the rate of 0.6 millimeter per year.

This research yielded a linear regression formula to estimate the height of an individual with ease and that too with minimal errors.

Average value of all the ratio indices in males was found to be 6.51. Where as the average value of all tests indices in females was found to be 6.97 by using this as a multiplication factor, we can easily estimate the height of an individual. With an error of about ± 2 centimeters which is admissible for any calculations. By multiplying this value i.e. the factor 6.51 for males and the factor 6.97 for females with the measured

maximum length of the footprint, we can estimate the height of an individual with an error of ± 2 centimeters.

CONCLUSION

The estimation of stature from the maximum length of the footprints by using the modern techniques (inkless footprint kit on the alpha thermal paper), which is tamper proof, yielded a highly precise results with hardly ± 2 centimeters as the error value so it can be made useful as a perfect technique along with other technique by the anthropologists and forensic investigators.

The regression formula derived is as follows

In Males

Stature (in cms.) = 6.51 X (Maximum Length of the footprint (in cms.) ± 2 centimeters).

In Females

Stature (in cms.) = 6.97 X (Maximum Length of the footprint (in cms.) ± 2 centimeters).

Moreover the estimation of stature from footprint is easy, economical and convenient. No specialized training is required to utilize the method. Thus this study has been able to add another method to the armamentarium we have for estimating stature.

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Skin Bank Organisation

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ABSTRACT

Skin allografts were first used at the end of the last century by Girdner. However, routine storage of human tissue developed only in the 1930s to 1940s when reliable preservation methods became available. The first proper skin bank was the US Navy Skin Bank, set up in 1949. Several skin banks were subsequently established and in most cases they were organized as multitissue banks. Small amounts of excess auto graft are commonly harvested during burn procedures, and typically these are discarded. However, the resources of a local skin bank may be used to preserve this tissue for a later autologous use.

Keywords: Skin allograft, Skin bank, Cadaver, Cryo-preserved

INTRODUCTION

In 1874, Thiersch¹⁰ published a report about a small series of patients on whom he later used partial-thickness grafts. Following the report, extensive trials led to cutting the grafts extremely thin to leave some of the surface epithelium behind to heal the donor site. This practice necessitated the use of little, thin chips of grafts, known in the English medical literature as "Thiersch grafts," "pinch grafts," "epidermis grafts," or "razor grafts"; these grafts were so generally unsatisfactory for resurfacing large areas that their use was soon restricted to application to small refractory ulcers. Banking of human skin did not begin until the early 1900s. Wentscher reported the transplantation of human skin that had been refrigerated for 3 to 14 days¹¹. Skin banking is a facility where the skin is collected from eligible donor and processed as per international protocol. The widespread use of allograft skin in the management of patients with extensive burn, traumatic and soft tissue injuries had a major impact on the number of skin banking facilities over the past 2 decades. Consequently the majority of skin banks have been founded in close proximity to regional burn centers or within the burn centre hospitals themselves. Skin banks must therefore maintain a close working relationship with regional burn centers not only to meet the specific needs of the burn surgeon but also to help generate community support for skin donation through combined educational outreach programs. As skin banking

facilities grew in number, it became apparent that policies and procedures required standardization.

Summary

A survey is made of the organization consideration that have to be faced in the setting-up of a skin bank, concern equipment, personnel, records and quality control. The methods of acquiring, processing, preserving and storing the skin are careful records must be kept of its origin and destination. Strict application of a predetermined protocol will ensure a regular supply of allograft for the plastic surgeon.

Personnel

The Skin Bank is a service, not a product. It is necessary to leave the processing and banking in the hands of a physician. The methodology requires a close co-operative relationship with the person in Records charge of a research. The Skin Bank is central service, available to the Plastic Surgery Department and especially to the Burns Unit.

History

Skin auto grafting was first described by Revering in 1871⁷. The clinical utility of allograft skin as a method for wound coverage followed shortly thereafter⁷. Girdner was the first to report the use of allergenic skin to cover a burn wound; however, it wasn't until 5 years later that Thiersch described the histological

anatomy of skin engraftment and later popularized the clinical use of split-thickness skin grafts. Banking of human skin did not begin until the early 1900s. Wentscher reported the transplantation of human skin that had been refrigerated for 3 to 14 days; however, it wasn't until the 1930s that blood and tissue banking took their place in the clinical practice of medicine.

Baxter explored the histological effects of freezing on human skin and identified the occurrence of ice crystal formation and tissue destruction in 1948¹. This was followed in 1952 by the pioneering research of Billingham and Medawar, demonstrating that skin could be effectively cryopreserved using glycerol². Girdner⁴ was the first to report the use of allogeneic skin to

Cover a burn wound; however, it wasn't until 5 years later that Thiersch⁸ described the histologic anatomy of skin engraftment and later popularized the clinical use of split-thickness skin grafts. Taylor subsequently demonstrated that the use of glycerol was associated with decreased ice crystal formation with freezing⁸.

The laboratory facilities should be independent of autonomous, having laminar flow, freezing control chamber, liquid nitrogen deposits, cold-resistant packets, computer registers, medical Staff (part-time), full-time nurses and laboratory assistants, Clinical record, death certificate, donation certificates, donation certificates, clinical study records.

Quality Control

Control on infection : Allograft skin has been reported to cause bacterial infection. It is imperative that skin banks perform microbial cultures before release for transplantation. Kealey reported the transmission of cytomegalovirus (CMV) in cadaver skin allograft⁵.

Maintenance of viability

Maintenance of cell viability and structural integrity are key to the engraftment and neovascularization of allograft skin, yet there has been no quantification of the viability necessary for allograft "take." Postmortem time lapse appears to have the single greatest effect on skin viability. May has demonstrated that the functional metabolic activity of the skin rapidly declines if the donor is not refrigerated within 18 hours of death⁶.

Availability of cadaveric human skin allograft

Skin banks must identify ways of increasing cadaveric skin donation while ensuring recipient safety from potential disease transmission. They must also reduce recovery and processing costs and maintain optimizing allograft quality despite the continuing need to use newer serologic and microbiologic tests to ensure tissue safety. To accomplish these goals, it may become necessary for skin banking options to become regionalized. Such an undertaking could improve tissue availability and ultimately increase use by surgeons.

Skin allograft donors

Living donors : For procurement of Skin grafts, the living donor needs to undergo a battery of investigations for preoperative evaluation followed by a surgical procedure under suitable anesthesia, hospitalization for at least 2-3 days, donor site healing time about 10 days and postoperative wound site pain. Maximum surface area that can be safely utilized for harvesting of skin grafts is 15 to 20% at a time. It is advisable to use only close relatives as living donors. The other alternative is to procure split thickness skin grafts from a cadaver and preserve them for use in future.

Cadaver donor: The concept of skin donation after death is not new and the first skin bank was established in USA around 1950. Skin grafts are expensive to procure and it is tough to get skin from living donors. Hence, skin from the dead is easier to use.



The concept of skin donation after death

The eye donation needs to be procured preferably within 2 hours death. But skin donation can be taken up to 12 hours and with precautions even up to 24

hours after death. The donation is possible if the deceased person was more than 16 years of age and was not harboring transmissible infections such as Hepatitis B, Hepatitis C and HIV. Those suffering from skin cancer, septicemia and with damaged skin e.g. Scleroderma, pemphigus; are not suitable donors.

Processing, preservation and storage

Timely Collection of Skin : Skin graft procurement should be done with shortest delay after death, though it can be procured up to 24 hours after death if the body is preserved in cold storage. Prolonged delay caused bacterial and fungal colonization of the donor skin.

Fluids: The solutions used for collection, processing and storage of the skin should be sterile and isotonic (e.g. M.E.M. 80%, F.B.S. 10%, antibiotic solutions 2%, cryo-protector agents if storage for freezing; DMSO 15% Glycerol). All opened bottles of solutions that might support microbiological growth must be stored below 100C and discarded after 24 hours.

Skin Collection Room, Workroom: When feasible, skin collection should be done in a room where environmental contamination can be minimized. Access to the area should be restricted during skin collection, and other activities - in the immediate area suspended to cut down on exogenous contamination.

The work area should be cleansed with disinfectant and appropriately draped, as outlined in each skin bank's procedure protocol.

Preparation and Collection of Skin : The body surface is divided into independent areas for removal and preparation; surgical removal of skin was carried out on defined areas. Each donor body area was subsequently prepared with a detergent surgical scrub.

It was then rinsed with sterile water. Then it was tinted with povidone-iodine and again rinsed with sterile water. This was wiped off with sterile 10 x 10 cm fine mesh gauge sponges and 70% isopropanol which was allowed to air-dry. After this the donor body was surgically draped exposing only the single area from which skin was to be removed.

The skin, 0.38 mm thick, was removed in 6-7 mm wide strips at least 20 cm long using an electric compressed air-driven dermatome. The dermatome

blades were changed and the dermatome itself cleaned with 70% isopropanol between removals of skin from different body sites.

The harvested skin from each body area was placed into separate sterile skin sterile screw-cap plastic containers covered with 4°C transport medium consisting of Eagle's M.E.M. balanced salt solution with 10% F.B.S. or pooled human sera and 2mM fresh L-glutamine and antibiotic solution 2% Peni. Strep-fuungizone. During processing for cryopreservation, the skin was placed in 4°C transport medium to which had been added 15% DMSO or glycerol maintained in refrigerated box at 4°C for 1-2 hours.

Residual microbiological evaluation: One 1 CMs full-thickness biopsy from each of the body areas was minced, and homogenized in 2 ml of sterile 0.9% NaCl for microbiological study in the bacteriological laboratory. If these equality control tests are done by an outside testing laboratory, the Director should satisfy himself as to the adequacy of the service.

Packaging and Labeling : Final packaging should be done as soon as possible after collection of skin in a specifically designated "clean area" or a laminar-flow unit equipped with HEPA filters. Sterile instruments, aseptic procedures and low temperatures should be used during all stages of processing and packaging to minimize contamination by micro-organisms and to maintain skin viability. The packaging materials should be sterile, physically suitable for the anticipated methods of storage (e.g. Gambro), inert under the customary conditions. (-186 Q of use, and sufficiently scalable to exclude external contamination). As soon as possible after filling, each sealed package of skin should be labeled with a unique identification number. The following additional information should be either on this package or on a secondary outer container or on an information sheet which would accompany the skin upon distribution :

Information sheet

1. The generic name of the product.
2. Instructions for thawing and use.
3. Donor blood type, if known.
4. Cryo-protective fluid composition, including, antibiotic and other supplements.

5. Name and address of the collecting skin bank.
6. Dimensions of the skin strip contained.
7. Required storage temperature.
8. A space for recipient identification.

Storage for Freezing: Skin that is to be frozen should be folded with fine mesh gauze or bridal veil covering the dermal surface before placement in a flat packet to ensure uniformity of the cooling process⁶. When skin is frozen for long-term storage, it is important that the methods used maintain cell viability and structural integrity. If the skin is not to be used "fresh", it should be cryo-preserved within 10 days of procurement in media changed every 3 days. If not changed in the first 72 hours, it must be frozen in the first 96 hours. The allograft should be treated with the cryo-protective agent for a sufficient length of time (1 to 2 hours) before freezing to ensure adequate protection. Freezing of viable skin grafts should be carried out using a system which allows a freezing ratio of 1 or 2°C per min until it reaches -100 V. The microprocessor maintains two registers of temperature, one of the chambers and the other of cryo-tube control (which is the temperature of the packets of skin). Applying the freezing program, previously obtained experimentally, the skin is stored submerged under liquid nitrogen in a liquid nitrogen refrigerator to -180 V.

Storage for Refrigeration: Split-thickness skin graft may be stored at 1°C to 10°C for several days following acquisition. It is sterile, if appropriate antibiotics have been added to the medium at an effective concentration. The viability of skin not used after one week cannot be assured. May (1982) demonstrated that glucose metabolism declines at a rate of 10% to 15% each day during refrigerated storage; therefore, it has been common practice to cryo-preserve skin within 5 to 7 days of refrigeration.

Distribution: Request for information. The skin bank must request the following information before release of skin for patient use :

Request for information

1. Recipient patient's name.
2. Patient's hospital registration number or similar identification.

3. Name of requesting physician.
4. Anticipated time and date of use.
5. Amount of skin required.
6. Part of body to be covered.

Distribution documents

1. Instructions for use.
2. The length of time the transportation vessel will maintain the skin in a usable condition.
3. Instructions for returning unused skin to the local dispensing bank.
4. The supplementary package label, if one is used.
5. A hazard warning concerning the handling of skin packages and the coolant in the transport Container.

Transportation and Use of Frozen Skin: The skin should be maintained at or below -70°C during transportation. Skin should be thawed using procedures which maintain suitable viability. One such procedure is rapid thawing in isotonic solution maintained at 35°C or 37°C. After thawing, open packages of skin may be kept at between 1°C and 10°C for up to 24 hours.

Results and conclusion

The strict application of the protocol of extraction criteria with regards to the exclusion of donors and the following of pure cryo-preservation techniques allow the availability of viable allograft in the hands of the plastic surgeon which permits temporary covering of anatomic structures in the case of traumatic avulsions, and in the treatment of large burns.

The cost analysis with respect to imported biomaterials is favorable and favors and stimulates research into new techniques.

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Ethical Clearance: Informed consent was taken.

Conflict of Interest: Nil.

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An Epidemiological Study of Hanging Cases Brought to the Gauhati Medical College and Hospital Mortuary for Medico Legal Autopsy- A Retrospective Study

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ABSTRACT

Hanging is a most common means of suicide. In this study during the period from July 2012 to June 2013, 11.40% of the death was due to hanging. The male to female ratio was 2.29:1 with 38.92% of the victim belongs to the age group 20-29 followed by 30-39 (18.04%). 54.11% of the victim belongs to lower class. About 25.63% of victims were mainly daily labourer followed by house wife 16.77%. Most of the victims were under matric 26.90% then illiterate 17.72%. Higher incident of hanging case was among married individual (61.07%). 87.03% cases were mainly Hindu followed by 11.08% of Muslim community. 50.63% cases occurred in the urban area. Majority of cases 85.75% occurs in the house and ropes (cotton) were commonly used ligature materials 24.05%. Majority of the knots were present behind the left mastoid (35.75%) followed by below the occiput (28.16%). 80% cases ligature was situated above the thyroid cartilage and 15% cases ligature was present over the thyroid cartilage and 5% cases ligature was present below the thyroid cartilage.

Keywords: Hanging, Suicide, Ligature mark, Asphyxia

INTRODUCTION

Mother Nature has set the rules such that life is followed by death. However suicide or deliberately ending one's life by man is perhaps as ancient as human civilization. Historically, the meaning of suicide has reflected the religious tradition of a giving culture. The Judeo-Christian tradition has held that life is a gift from God and taking it away is strictly forbidden. It is difficult to know the exact circumstance behind the act of suicide by a person behind unable to carry on with life or the burden of life in the society he lives in. Hanging has been recognized since ancient time to be a common mode of committing suicide and believed to be the best means for achieving a sure and certain and also painless means of death and that is why it is accepted as the means of judicial execution, i.e. the judicial hanging.

Hanging is a form of death produced by suspending the body with a ligature around the neck, the constricting force being the weight of the body or part of the body weight. Hanging remains to be one

of the common methods of committing homicidal and accidental hanging is rare. Internationally, death by hanging ranks among the most common method of suicide accounting for more than 50% of all suicides in Saudi Arabia and Hungary, while in Norway and Denmark it falls to second place with a frequency of 25% and 17% respectively. In the autonomous Spanish region of Galicia, hanging accounts for 65.6% of all suicides, while in the nearby region of Coimbra (Portugal), it occupies second place (13%) behind pesticide ingestion.

In India according to National Crime Bureau Report in 2009, hangings constitute 31.5% of suicide. A large number of victims who committed suicide by hanging were reported from Arunachal Pradesh (103 people), Dadar and Haveli (40), Andaman and Nicobar Island (106) and Sikkim (148). The present study also shows a number of 13.65% (338) of hanging cases in and around Guwahati.

Aims and objectives

- i. To evaluate the incident of hanging.
- ii. To evaluate the common victims of hanging as regards to their age, sex, marital status, socio-economic status, occupation, etc.

- iii. To evaluate the predisposing factors, place of occurrence, type of ligature materials used and injuries to neck structures.
- iv. On the basis of these evaluations to analyze remedial measures for controlling such incidents.

MATERIAL AND METHOD

The study is a descriptive study which was done in the mortuary of Gauhati Medical College and Hospital, for the time period from January 2010 to December 2011. The study was based on all deaths from hanging brought to the mortuary and the exclusion criteria being the cases of putrefied bodies.

OBSERVATION AND RESULTS

A total of 2476 medico-legal autopsies were performed in the department of Forensic medicine, Gauhati Medical College, Guwahati, during the period of 1st January 2010 to 1st December 2010. Out of these, 338 cases were the hanging cases, constituting 13.68% of the total autopsies performed.

Percentage of sex distribution: It was observed that the male victims outnumbered the female victims, the number being 234 (69.2%) in the male and that in the female 104 (30.8), the male female ratio being 2.25:1.

Nature of hanging: Most of the hanging cases were suicidal in nature (99.33%). Only one case (0.66%) of hanging was found homicidal in nature. There were no accidental hanging cases during this period.

Age and sex distribution: The number of hanging victims were maximum (144) among the age group between 21-30 years and that in the age group between 31-40 years was second (72) in the line (Figure 1).

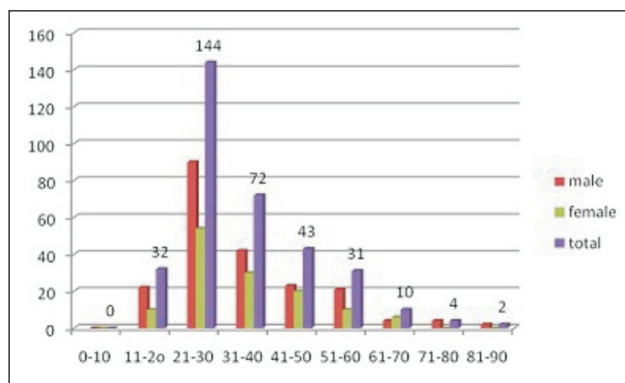


Fig. 1. Age wise distribution of cases

Socio economic condition of hanging victim: It was observed that majority of victims were from the middle socio-economic group with 48.66%. This was followed by lower socio-economic group with 30.66% and upper class group with 18%.

Percentage of education background of hanging cases: Most of the victims had the education qualification of high school and college level with 47.33%. This is followed by illiterate group with 24.66% cases after that primary with 18.66% cases and then graduate with 2.66%. rest of the victims were unknown 2.66% cases.

Occupation status of hanging cases: It was observed that most of the victims were domestic workers with 28% of the total hanging cases followed by service people with 26% (Figure 2).

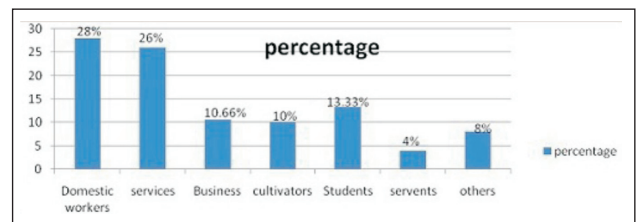


Fig. 2. Occupational statuses of the cases

Percentage of marital status: A higher incidence of hanging cases was among married individuals with 57.33%. There were 38% in single individuals as shown Figure 3.

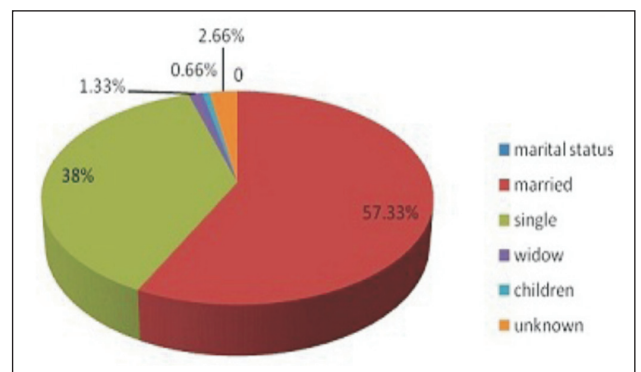


Fig. 3. Marital statuses of the cases

Religious of the hanging cases: It has been seen that the Hindus outnumbered the other religions with 45% cases. Only 8.66% hanging cases found in the Muslim religion.

Distribution of hanging victims according to location: It was seen that most of the hanging cases occurred in urban areas with percentage of 52.55%. This was followed by rural areas with 34% cases.

Place of hanging incidence: It was observed that the places of incidence of hanging cases were highest inside the house with 44.66% cases followed by on the backyard of the house 39.33% cases (Figure 4).

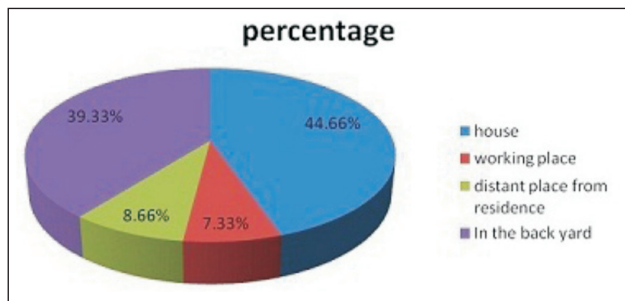


Fig. 4. Place of occurrences of the cases

Position of the knots: It was observed that majority of the knots were present behind the left ear 21.33% cases. Next commonest position was below the left mandible 18% cases (Figure 5).

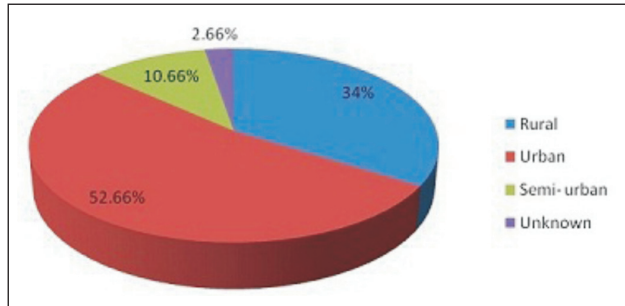


Fig. 5. Position of Knot amongst cases

Ligature materials used: In majority of the cases 56%, ropes were employed as ligature materials in hanging while nylon, dhoti, sari, bed sheet, and dupatta, electric wire were used by rest of the victims (Figure 6).

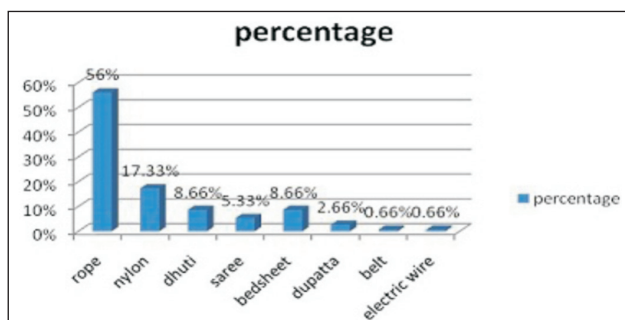


Fig. 6. Ligature materials of the cases

Level of ligature in relation to thyroid cartilage: In majority, 71.33% of the cases ligature was situated above the thyroid cartilage. In 25.33% cases ligature was present over the thyroid cartilage and there were 3.33% cases of cases of hanging where ligature was located below the level of thyroid cartilage.

DISCUSSION

The present study carried out in the department of Forensic Medicine, Gauhati Medical College during the period of 1st January 2010 -31st dec2010 has been compared with the similar studies carried out by different authors in different parts of the world in order to bring out the similarity and variation of the findings of observation.

Nature of death: In this study most of the hanging cases were suicidal in nature (99.33%). Only one case of hanging was homicidal. Homicidal hanging is extremely rare. It is difficult for a single assailant to carry it out unless the victim becomes unconscious, under intoxication, under influence of drugs, weak from illness or a child. Accidental hanging is relatively more. The finding is similar to the study by Dixon Mann (1908) in the period 1885 -1904, that majority of the deaths due to hanging are suicidal in nature. The findings are similar to Dr. Modi's observation during the period of six year, that majority of hanging cases were suicidal in nature (thirty out of thirty two cases). In one cases the victim was suspended after murder and in the other there was presumption of homicide.

Hanging and sex: Out of the total 338 cases studied 234 were male (69.2%) and 104 were female (30.8%) the male female ratio is 2.25:1. The male suicidal rate is high due to the patriarchy society of Assam the burden of the family and the social life is faced mainly by the male and there by the problems faced and the mental disharmony amongst the male is more, which leads the higher suicidal rate. In majority of the studies conducted in different European countries also the male suicidal rate is more than female, as per WHO data bank (from Platt, 1989). The present findings similar with that of Derrick J. Pounder who observed for the period 1950 to 1990 that in Britain (England & Wales), the male hanging cases were more than that of the female.

Hanging and age: The number of hanging victim is maximum (42.65%) in the age group between 21-30years and that in the age group between 31-40 was second (21.3%). Increased incidence of suicide among the young people is due to social disorganization with

the so called modern society, increase competition for jobs with a resultant increase in failure of some youth relatively declined income among young people, deteriorating neighborhood, unemployment, failure in love affairs, maternal and family disharmony.

This finding similar to that of Derrick J. Pounder who observed during the period of 1979-1990 in Britain that percentage from individual age group was 91.9% in the age group 15-24 and 0.7% in the age group 25-34 years. The finding also tale with that of M.A Elfawal who observed that in death due to hanging in the Saudi Arabia the highest frequency was in 30-39 age groups (54%).

Hanging and Education: Most of the victims has educational qualification of high school and college level with 159.9(47.33%) followed by the illiterate group with 83 cases (24.66%).The higher incidence of suicide among the school and college groups is mostly due to the mental disharmony resulting from failure in examination and increased competition for better performance and also failure in love affairs which is most common in this age group. Competition for job and employment also one of the major anxiety factor for them. Again poverty increases the number of incidence of suicidal hanging. The world's most affluent places, like Japan, have the highest suicide rates. In India Kerala has highest suicide rate.

Occupation and Hanging: It was observed that most of the victims were domestic workers which numbers 94(28%) of the total hanging cases .This is followed by service holders 88(26%), students 45(13.33%) etc, businessmen with 10.66%, cultivators with 10% etc.

The finding are similar to the M A Elfawal et al who observed in the Dam man Forensic centre (Saudi Arabia) during the period January 1998 to December 1998 , that there 61cases of hanging of all forms. The majority of the cases were suicidal (59cases) Most of the victims (52 subject 85%) belong to the lower socio economic classes namely laborers and domestic workers. Paul S.F.YIP observed during the period of 1981-94 in Honking and Taiwan and 1987-94 in Beijing, that the social and political environments may be more important than the economic environment in suicide.

Marital status and hanging: It is observed from study that higher number of hanging cases were married individuals 57.33%. There were 38% of single individuals followed by widows and single spouse with 1.33% and lastly children with 0.66% cases.

The present study is similar to Poundurai and Jaykar 1980 who observed in Madras that the majority of females who committed suicide were married 62.5% whereas in male there was no significant relationship of suicide with marriage.

Eduardo Osuna et al observed during the period of 1990-94 at the Institute of Forensic Medicine in Madrid (Spain) that 46% of the suicide were married, 40.15% widowed, 12.3% were single and 1.6% were divorced. Cooper P.N. and Milroy C.M. observed in the South Yorkshire Coroner's district during the year 1985 to 1991 that out of 128 hanging cases 69 cases were married and widowed individuals.

Socio economic condition and: hanging: Suicide rate varies amongst the different socio –economic groups. In present study middle class of people tops the list with 48.66% followed by the lower class with 30.66% and at the bottom by the upper class with 18. %, in 2.66% the socioeconomic condition of the victims was not known. It is because of the facts that the middle class of people are usually very much ambitious and most of the familial problems and anxieties are faced by this group of people and so also the rate of suicide is more among this group of people.

Religion and hanging: In the present study it is observed that the maximum number 88.66% of hanging victims are of Hindu religion. Only 8.66% cases of hanging are Muslims. In 2.66% cases the religion of victim was not known. It is because of the fact that in Guwahati city the Hindu population is more than others and hence suicide rate. According to Durkheim 1951, India is the classic example for 60th obligatory and optional altruistic suicide. A.E.Gangat LR Naidoo W. H. Wessels in South African Indians during 1982-84 also observed that the number of Hindu subjects was found to be markedly higher than Muslim subjects.

Locality and suicide: In the present study it is observed that most of the hanging incidents occurred in the urban areas with 52.66%. This was followed by rural areas with 34%, semi-urban with 10.66% and in 2.66% cases it was unknown. Suicide rate increased in the urban areas due to the fact that the population in the cities is increasing day by day due to shifting of population from the rural to the cities in search of employment, resulting in social disorganization and hence the suicide rate.

The present finding is supported by the observation of Norman B Bush forth et al who also observed in

Cuyahoga County, Ohio (USA) increasing suicidal rates in adolescents and young adults in the urban community.

Place of incidence: From the study that the places of incidence of hanging cases were highest inside the house 44.66% followed by in the backward with 39.33%, at the distance place from residence in 8.66% and at the working place in 7.33%. Eduardo Osuna et al observed in Madrid (Spain) during the period of 1990-1994 that most of the victims committed suicide inside the house, 11.4% where suicide in hospital, 4.6% in a retirement home, and 2.90% in other location.

Position of knot: In the present study the majority of the victims had the knot present behind the left ear, in 21.33% cases. Next common position being below left mandible in 18% cases, the least common position being below the chin in 3.33% cases. The findings are similar with those of the Dr. K. S. Narayan Reddy who observed that the knot is usually found on the right or left side of the knot, ligature usually rising behind the ear to the point of suspension.

Ligature Materials: In the present study showed that the commonly used ligature material by the victims is ropes, next is nylon. Luke (1967) also observed that the ropes used as the ligature material by majority of their cases of the hanging 66.23%.

Level of ligature mark: In the present study it was observed that in 71.33% cases the ligature was situated above the thyroid cartilage, in 25.33% cases it passed over the thyroid cartilage and in 3.33% cases it was located below the level of thyroid cartilage. C. J. Polson observed that ligature marks above the thyroid cartilage in at least 80% of hanging, at the level of the cartilage in 15% of the cases, and below the thyroid cartilage in about 5% of hanging

CONCLUSION

It is evident from the present study that hanging is one of the common forms of asphyxial deaths in Assam and a common mode of suicide among younger men belonging to the middle class section of the society who cannot cope up with the burden of stress related to the ever demanding competitive ways of life. Hence, socioeconomic, unemployment factors accounts for the higher incidence of suicide by younger section of people which requires the attention of policy makers for suitable and sincere framing of the strategies and

policies, and implementing the same in such a way that the benefits reach the deprived.

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Histopathological Study of Skin and Subcutaneous Tissues at Ligature Mark in Cases of Hanging and Strangulation

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ABSTRACT

Introduction: Deaths due to asphyxia are one of the most important causes of violent deaths amongst which hanging and strangulation are commonly encountered in day to day autopsy. The ligature mark around the victim's neck is an extremely important piece of evidence to arrive at a conclusion as to the cause of death whether hanging or strangulation, though on some rare occasions, the forensic pathologist finds it problematic to opine confirmatively about the cause and manner of death.

Objectives: The purpose of the study is know the histopathological findings of skin and subcutaneous structures of ligature mark with regard to the type of hanging and ligature strangulation.

Methodology: A cross sectional study of a total of 105 cases of hanging and ligature strangulation was conducted in the Department of Forensic Medicine and Pathology, Victoria Hospital over a period of 20 months from November 2009 to June 2011. Data was collected by histopathology of skin sample and analyzed.

Results: Of the 109 cases studied, hanging constitutes 105 cases (96%) and ligature strangulation constitutes 04 cases (4%). The microscopic study of ligature mark revealed that compression of epidermis and flattening of cells in 93 cases (88.6%) of hanging and 3cases (75%) of strangulation and Collagen condensation in 97cases (92.4%) of hanging and 3cases (75%) of strangulation.

Conclusion: The present study will be of great help in establishing the cause of death from the histopathological studies of the soft tissues of the neck as well as ante-mortem v/s postmortem aspects of such cases.

Keywords: Ligature Mark, Hanging, Ligature Strangulation, Mechanical Asphyxia, Histopathology.

INTRODUCTION

Deaths due to asphyxia are one of the most important causes of violent deaths amongst which hanging and strangulation are commonly encountered in day to day autopsy. The ligature mark around the victim's neck constitutes an extremely precious piece of evidence to arrive at a conclusion as to the cause of death whether hanging or strangulation, though on some rare occasions, the forensic pathologist finds it immensely problematic to opine confirmatively about the cause and manner of death¹.

A ligature mark may be the only evidence available in cases of asphyxial deaths due to either to hanging or strangulation. A thorough examination of the ligature mark and analysis of the information provided by it, is therefore, a must to arrive at the most probable cause of death and differentiate between hanging and strangulation. In the present scenario hanging has come to be the most common mode of suicide and at times in the absence of ligature mark or in a faint ligature it becomes very difficult as to confirm the cause of death².

A portion of the skin and deeper tissue in relation to the ligature mark should be examined microscopically for the evidence of tissue reaction, which if present indicates antemortem hanging. The absence of tissue reaction does not exclude antemortem hanging³. The microscopy of ligature mark shows usual characteristics of an abrasion, with desquamation and flattening of cells of epidermis. There may not be findings of any vital reaction if the death occurs immediately after asphyxiation⁴. This study is undertaken to highlight the importance of histopathological examination of skin and subcutaneous tissue at ligature site in cases of hanging and strangulation.

MATERIAL AND METHOD

A cross sectional study of a total of 105 cases of hanging and ligature strangulation was conducted in the Department of Forensic Medicine and Pathology,

Victoria Hospital over a period of 20 months from November 2009 to June 2011.

For bloodless dissection of the neck, first the thoraco-abdominal contents and the brain were removed before proceeding to the neck dissection. A block 12 to 20cm high was placed under the shoulders to allow the head to fall back thus the neck is extended. A portion of skin and subcutaneous tissue at ligature site were collected and preserved in 10%formalin for histopathological examination. Later they were stained with H and E stain after taking suitable sections. Data was collected by histopathology of skin sample and analyzed.

RESULTS

Of the 109 cases studied, hanging constitutes 105 cases (96%) and ligature strangulation constitutes 04 cases (4%).

Table 1 showing histopathological changes in skin and subcutaneous tissues in hanging and strangulation.

Type of Asphyxial death			Hanging (n=105)		Strangulation(n=4)	
Tissue		Histopathological changes	Present	Absent	Present	Absent
Skin	Epidermis	Compression of epidermis	93 (88.6%)	12 (11.4%)	3(75%)	1(25%)
		Flattening of cells	93 (88.6%)	12 (11.4%)	3(75%)	1(25%)
		Epidermal separation	49 (46.7%)	56 (53.3%)	4(100%)	0(0%)
	Dermis	Collagen condensation	97 (92.4%)	8 (7.6%)	3(75%)	1(25%)
		Patency of blood vessels	41 (39%)	64 (61%)	4(100%)	0(0%)
		Haemorrhage	0 (0%)	105 (100%)	3(75%)	1(25%)
		Inflammation	3 (2.9%)	102 (97.1%)	0(0%)	4(100%)
	Deviation of adenexa	60 (57.1%)	45 (42.9%)	3(75%)	1(25%)	
SubcutaneousTissues	Congestion of blood vessels	78 (74.3%)	27 (25.7%)	4(100%)	0(0%)	
	Haemorrhage	0 (0%)	105 (100%)	3(75%)	1(25%)	
	Inflammation	2 (1.9)	103 (98.1%)	0(0%)	4(100%)	

The microscopic study of ligature mark revealed that compression of epidermis and flattening of cells in 93 cases (88.6%) of hanging and 3cases (75%) of strangulation and epidermal separation in 49 cases (46.7%) of hanging and 4cases (100%) of strangulation. Collagen condensation was observed in 97 cases (92.4%) of hanging and 3cases (75%) of strangulation.

Deviation of adenexa was present in 60 cases (57.1%) of hanging and 3cases (75%) of strangulation and patency of blood vessels in 41cases (39%) of hanging and 4cases (100%) of strangulation. Congestion of subcutaneous blood vessels was noted in 78 cases (74.3%) of hanging and 4cases (100%) of strangulation.

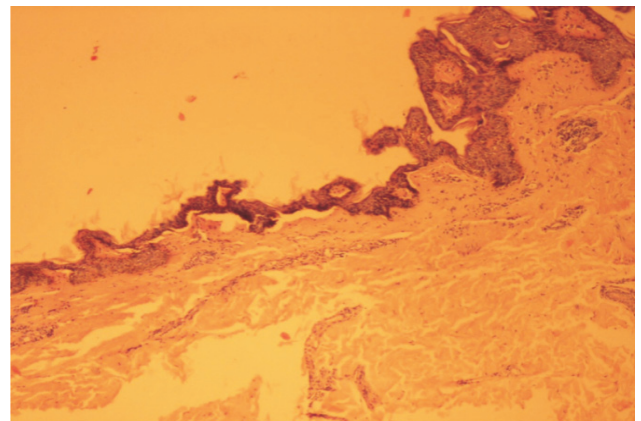


Fig. 1. Section of skin from ligature site showing flattening, compression of epidermis, epidermal separation, collagen condensation and deviation of adenexa in a case of hanging (left half of picture).(10X)

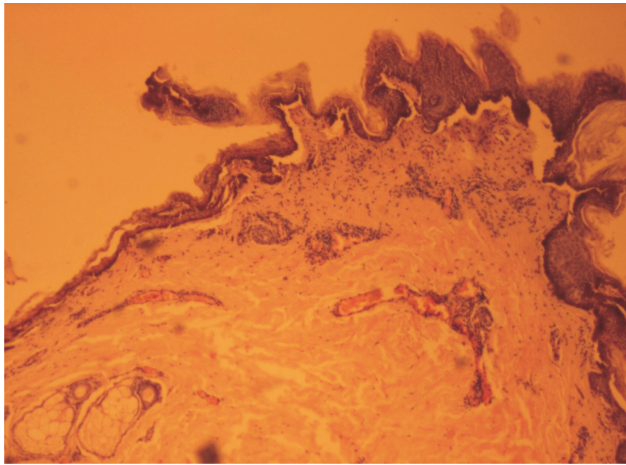


Fig 2. Section of skin from ligature site showing flattening, compression of epidermis, collagen condensation, congestion of dermal and subcutaneous blood vessels and deviation of adnexa in a case of hanging.(10X)

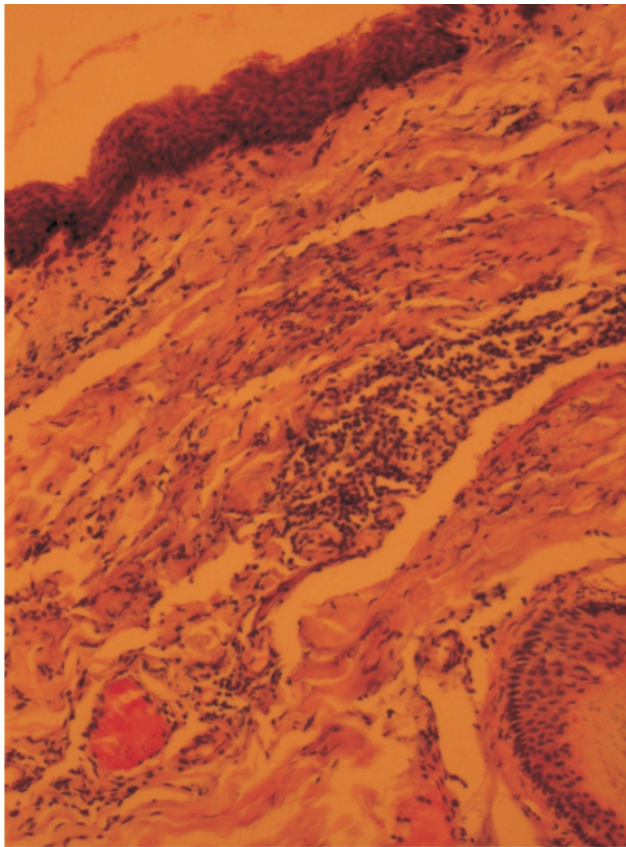


Fig. 3. Section of skin from ligature site showing inflammation in a treated case of hanging(10X).

In treated cases of hanging, dermal inflammation was observed in 3 cases (2.9%) and subcutaneous inflammation in 2 cases (1.9%). Dermal and subcutaneous haemorrhages were found in 3 cases (75%) of strangulation. In none of the cases, coagulative necrosis of cutaneous layers was observed.

DISCUSSION

In the present study, characteristic microscopic changes were observed in skin and subcutaneous tissues at ligature site in hanging and strangulation which include compression, flattening of cells, epidermal separation, collagen condensation, and patency of blood vessels, deviation of adnexa and congestion of blood vessels.

In the present study, compressive forces on the neck were evidenced by compression of epidermis and flattening of cells in 93 cases (88.6%) of hanging and 3 cases (75%) of strangulation. In contrast to this, compression was observed in 43.95% cases of hanging and 100% cases of strangulation by Yadav A and Gupta BM⁵, 67.5% cases of hanging by Chandrakant HV et al⁶ and 33.33% cases of hanging by Ingale D et al⁷

Epidermal separation was observed in 49 cases (46.7%) of hanging and 4 cases (100%) of strangulation as compared to studies by Yadav A and Gupta BM⁵ in 35.16% cases of hanging and 33.33% cases of strangulation and by Chandrakant HV et al⁶ in 10% cases of hanging.

Compression on the neck is also evidenced by collagen condensation in 97 cases (92.4%) of hanging 3 cases (75%) of strangulation as compared to 40 % cases in a study conducted by Chandrakant HV et al⁶. Deviation of adnexa was present in 60 cases (57.1%) of hanging and 3 cases (75%) of strangulation which was similar with observation of Chandrakant HV et al⁶ in 40 % cases of hanging.

Congestion of subcutaneous blood vessels was noted in 78 cases (74.3%) of hanging and 4 cases (100%) of strangulation. In contrast, congestion was observed in 52.7% cases of hanging and 100% cases of strangulation by Yadav A and Gupta BM⁵ and 85% cases of hanging by Chandrakant HV et al⁶. The presence of these microscopic findings, either alone or in various combinations are suggestive of antemortem mechanical compression of neck has taken place⁵.

In treated cases of hanging, dermal inflammation was observed in 3 cases (2.9%) and subcutaneous inflammation in 2 cases (1.9%). In contrast 32.9% cases of hanging showed cellular infiltration in subcutaneous tissues by Yadav A and Gupta BM⁵. This finding i.e infiltration of lymphocytes in subcutaneous tissues (vital reaction) suggests antemortem nature of hanging. The absence of tissue reaction does not

exclude antemortem hanging³. Dermal and subcutaneous haemorrhages were found in 3 cases (75%) of strangulation. In contrast to this, subcutaneous haemorrhages were found in 20.8% cases of hanging and 100% cases of strangulation as observed by Yadav A and Gupta BM⁵. This histopathological finding suggests that subcutaneous haemorrhages are more common in deaths due to strangulation than hanging.

CONCLUSION

This study highlights the importance of microscopic analysis of skin and subcutaneous tissue at ligature site to arrive at the cause and manner of death. It is a useful tool in faint ligature mark to arrive at the cause and manner of death.

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Sudden Death in a Young Army Personnel- A Case Report

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ABSTRACT

Sudden death, inarguably one of the most unpredictable and devastating especially when it occurs in soldiers. Death in combat is devastating, but it is an inherent risk of an occupation that calls for individuals to put their life at risk for others, more so if it happens during routine military training. Sudden death is said to occur more often in young patients, those with a family history. The mechanisms responsible for sudden death are complex and are probably not identical in all patients. Available data suggest that the most common precipitating factors of sudden death are arrhythmias.

Much attention has been paid to sudden cardiac death in young athletes leading to the implementation of tighter screening controls in many sporting activities at various levels. Less attention has been paid to this subject in young army recruits. We highlight issues regarding diagnostic testing to identify risk factors and suggest potential additions to the current screening program for detecting cardiac pathology and reducing the rates of sudden cardiac mortality in this group.

Keywords: *Physical Exercises, Hypertrophic Cardiomyopathy, Sudden Death*

INTRODUCTION

Sudden cardiac death is commonly defined as an unexpected natural death due to cardiac cause within a short time period (usually within one hour) with or without onset of symptoms and without any prior conditions that would appear fatal. Sudden cardiac death has a much higher incidence in men than women that increases with age because of high prevalence of ischemic heart disease in older ages.

The most common underlying pathologic conditions in children and adolescents are hypertrophic cardiomyopathy, myocarditis, congenital coronary artery anomalies, atherosclerotic coronary artery disease, conduction system abnormalities, mitral valve prolapse and aortic dissection.

In adults coronary atherosclerosis and acquired forms of cardiomyopathy are the most common findings of autopsies.

Ventricular tachycardia and fibrillation and less often bradycardia and asystole are responsible for sudden cardiac death. In most cases, the fatal arrhythmia is triggered by electric irritability of myocardium distant from the conduction system, induced by ischemia, electrolyte imbalance and/or other cellular abnormalities/ infiltration.

CASE DETAILS

On 27th Oct 2011 at around 6:45 am the deceased, a BSF personnel said to be undergoing their usual physical exercises at their campus, suddenly collapsed. He was shifted to hospital, where he was declared dead. No history of any past illness.

External Examination

Dead body that of a male aged 25 years measuring 5 feet and 6 inches in length, moderately built and nourished, whitish in complexion. Eyes partially opened, pupils dilated and fixed. Post mortem staining

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present over back of chest and abdomen and fixed. Rigor mortis well appreciated all over the body. fig 1



Fig. 1. Dead body of young jawan

Internal Examination

1. Skull intact, brain & meninges were intact & congested.
2. Both lungs were edematous & congested.
3. Heart weighed 492gms

On dissection, right and left ventricle wall thickness were 0.6cms and 2.5cms respectively and inter ventricular septum was 2.2cms with hypertrophy of papillary muscles, coronaries and aorta were intact. fig 2

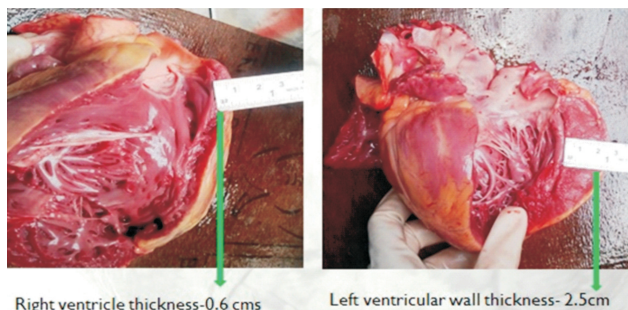


Fig. 2

4. Stomach contained about 100 ml of cream colored fluid, no unusual smell and mucosa normal.
5. Liver, spleen, kidneys, intestinal coils were intact & congested.

Heart was subjected for histopathological examination, which confirmed the presence of symmetrical thickening of interventricular septum, right and left ventricular papillary muscles hypertrophy and opined as myocardium showed hypertrophic changes with myocyte disarray. fig 3 and 4

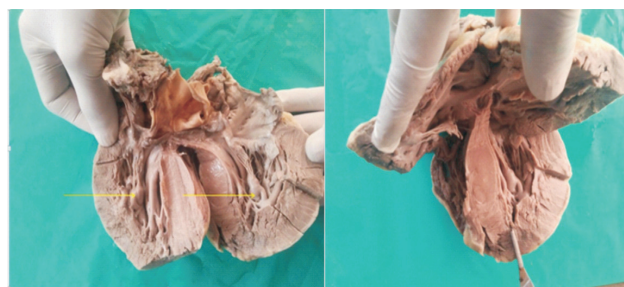


Fig 3. Hypertrophy of papillary muscle

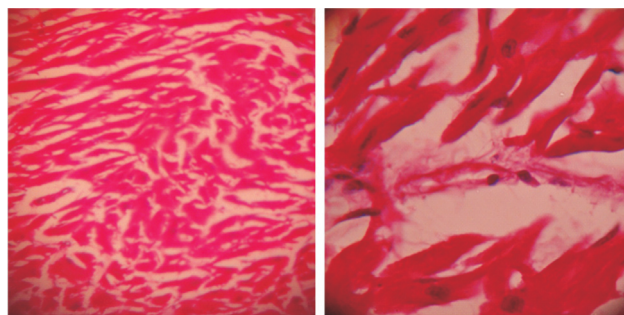


Fig. 4. A bizarre and disorganized arrangement of the cardiac muscle cells in the septum, myocyte

Cause of death

Death is due to cardiac insufficiency as a result of hypertrophic cardiomyopathy (sudden natural).

DISCUSSION

The beneficial effects of regular exercise, for the primary and secondary prevention of cardiovascular disease (CVD), are well established. However, occasionally, a young and apparently healthy individual may die suddenly during exercise or immediately afterwards due to a silent cardiovascular disorder. Such tragedies have a devastating effect on friends and family of the victim as well as the lay community who perceive a young fit person to represent the epitome of health. Young deaths often generate significant media interest that draws attention to the youth of the individual the number of potential life years lost and the counter-intuitive nature of the event. Unsurprisingly, the death of a young and fit person commonly galvanises emotionally charged discussions relating to pre-participation cardiovascular evaluation particularly since most implicated disorders can be diagnosed during life.

Death is said to be sudden or unexpected when a person not known to have been suffering from any dangerous disease, injury or poisoning is found dead

or dies within 24 hours after the onset of terminal illness(WHO).In the context of time, “sudden” is defined for most clinical and epidemiologic purposes as 1 h or less between a change in clinical status heralding the onset of the terminal clinical event and the cardiac arrest itself.

Atherosclerotic coronary disease was the most common cause of death in the over 30s. No similar analysis of sudden deaths in British military personnel exists, but the main cause of sudden cardiac death in people under 30 years in the general population in the Western world is HCM, accounting for around 50% of cases The prevalence of HCM in young adults is approximately 1 in 500.¹

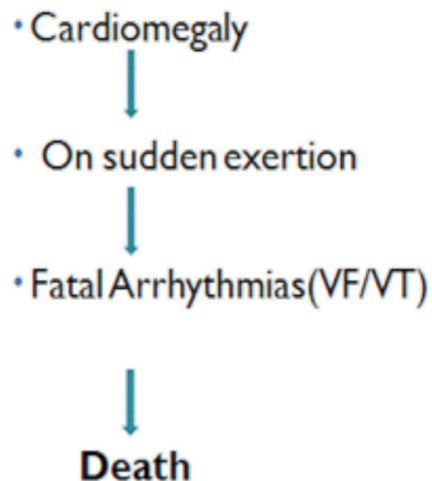
Incidence of sudden death is approximately 10% of all deaths, most commonly due to diseases of presents between the ages of 20 and 40 years. The classic pattern is disproportionate thickening of ventricular septum compared with the free wall of left ventricle ratio of 1:3(asymmetric septal hypertrophy),In about 10% of cases, the hypertrophy is symmetrical. Myofibre disarray is a highly sensitive and specific marker for HCM only when considered in a quantitative rather than a qualitative fashion. In this context, the rationale for performing an end myocardial biopsy is to rule out mimics of HCM. Hypertrophic cardiomyopathy (HCM) represents one of the less common forms of primary cardiomyopathies. The condition is being increasingly recognized in India and yet, there is little data available regarding the incidence and the rates of mortality. Researchers have critically analyzed the role of myofibre disarray as a diagnostic marker for the disease. Our aim was also to elucidate the importance of histological examination in making or ruling out the diagnosis of HCM, especially in the setting of sudden death.²

The cardiac etiology of sudden death in an autopsy - based study has been reported in 60-70% of such victim may present some prodromal symptoms like palpitation, chest pain and dyspnoea may suggest a cardiovascular etiology.³

Sudden cardiac death has a much higher incidence in men than women that increases with age because of high prevalence of ischemic heart disease in older age.The most common underlying pathologic conditions in children and adolescents are myocarditis, hypertrophic cardiomyopathy, myocarditis valvular heart disease such as mitral valve prolapse , aortic valve stenosis and congenital coronary artery disease.⁴

HCM is increasingly being recognized in India, though there is little data available regarding the incidence. Recent studies indicate that the disease is familial in 50% to 60% of cases and sporadic in the remainder⁵

Mechanism of sudden death in cardiomegaly



In most cases, the fatal arrhythmia is triggered by electric irritability of myocardium distant from the conduction system, induced by ischaemia, other cellular abnormalities or infiltration. With detailed postmortem examination, most of the time the cause of sudden cardiac death can be determined but in a few cases, the pathologist faces a great difficulty especially in the hearts which appear normal to the naked eye, limitations should be considered in all cases of sudden death associated with.⁶

Cardiac Screening and Military Service

Medical Tests for Indian Army and Indian Air force

The following are The Medical Test for Indian Army and Indian Air force

Height:

Weight:

Chest:

Eye Vision:

ENT examination

Dental Examination

Systemic investigations

Blood pressure

Blood test

Urine test

Chest x ray

Ultra sound scan

\ New recruits join the Army every year, Recruit must undergo complete physical examination, but this may not be sufficient to reveal hitherto unknown cardiac abnormalities,

The importance of the awareness of cardiac abnormalities in young people and raises questions as to the potential role of screening for these potentially lethal conditions in new recruits .

Despite the varying nature of these conditions, can be grouped them together to provide an illustration of the varying etiologies of sudden cardiac death and the difficulty this poses in detection and treatment of the conditions in the context of active military personnel.

More research needs to be undertaken on the causes of sudden cardiac death in serving military personnel, to assess the scale of the problem and evaluate the potential benefits of more stringent screening procedures, including the introduction of ECG analysis to baseline screening of military recruits. This will reduce the incidence of sudden cardiac deaths

ECG testing is a cheap and mobile screening method but is operator dependent, especially when considering rarer cardiac abnormalities; for an effective screening the ECG should be further analyzed by an experienced cardiologist. Further recommended additions to the Army's entry medical screening programme include dynamic ECG testing on recruits with known cardiac risk factors and a more detailed history of any episodes of chest pain, shortness of breath or syncope during physical exercises.

If there are uncommon and training-unrelated ECG changes the use of echocardiography and tread mill test, Considering the cost, the degree of operator dependence, time constraints and its usefulness in detecting structurally abnormalities only, can be used in specific patients where further testing is warranted

is satisfactory and would be considered as a baseline screening test in future.

Common abnormalities seen on the ECG.

Group 1: common and training-related ECG changes	Group 2: uncommon and training-unrelated ECG changes
Sinus bradycardia	T-wave inversion
First-degree AV block	ST-segment depression
Incomplete RBBB	Pathological Q-waves
Early repolarization	Left atrial enlargement
Isolated QRS voltage criteria for left ventricular hypertrophy	Left-axis deviation/left anterior hemiblock Right-axis deviation/ left posterior hemiblock
	Right ventricular hypertrophy
	Ventricular pre-excitation
	Complete LBBB or RBBB
	Long- or short-QT interval
	Brugada-like early repolarization

CONCLUSION

Sudden cardiac death during basic military training should raise concern because it implies failures at many levels: a potentially fatal cardiovascular abnormality that fails to generate symptoms or signs of the underlying disorder; the patient's failure to recognize and report unusual symptoms; the physician's failure to recognize nonspecific symptoms that may represent a serious underlying cardiovascular condition; routine screening methods that fail to detect obscure cardiovascular abnormalities; and finally, resuscitation efforts that fail to restore spontaneous circulation. However, most of these "failures" do not invoke blame; rather, they present a challenge to the medical and scientific community to prolong life by reducing the occurrence of sudden unexpected deaths.

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Source of Funding: Nil

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Blunt Chest Trauma Induced Acute Myocardial Infarction

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ABSTRACT

Acute myocardial infarction resulting from blunt trauma to chest is an infrequent but potentially lethal complication of severe trauma such as that associated with motor vehicle accident. We report a case of blunt injury to chest following a road accident leading to complete occlusion of an atherosclerotic left coronary artery causing acute myocardial infarction. A high degree of suspicion is needed to diagnose this condition. Electrocardiogram, cardiac enzymes, echocardiogram and coronary angiography are valuable tools in diagnosing this rare condition.

Keywords: Myocardial Infarction, Blunt Trauma, Accident, Atherosclerosis, Electrocardiogram

INTRODUCTION

Patients with blunt trauma to chest are commonly seen in emergency department of the hospital. Blunt trauma to chest can lead to a variety of cardiac insults ranging from Cardiac contusion, aortic injury, valvular avulsion, myocardial rupture, cardiac tamponade and myocardial infarction due to disruption of coronary circulation.^{1,2} The incidence of cardiac injury in patients with blunt trauma to chest is approximately 20%; however, in patients with severe thoracic injury or multiple injuries, the incidence of cardiac injury may be as high as 76%. We report a case of young male who had blunt chest trauma from a traffic accident resulting in an acute myocardial infarction.

CASE REPORT

A 29 year old male, pillion rider of a motor cycle presented to the emergency department with multiple injuries after being hit by a bus. On admission he was conscious, blood pressure = 120/90 mmHg, pulse

rate = 132/min, respiratory rate 18/min, oxygen saturation = 98%. Electrocardiogram showed sinus tachycardia without any evidence of ischemia. He also had fracture of left talus with other minor injuries. Patient was operated for stabilization of fracture of talus on second day of hospitalization. On fourth day of hospitalization patient developed sudden drop in oxygen saturation to 60%, pulse rate = 160/min, blood pressure = 110/90 mmHg, respiratory rate = 40/min, on auscultation of chest bilateral crepitation was heard. Chest radiograph showed signs of pulmonary edema without evidence of haemo-pneumothorax and mild cardiomegaly of left ventricular configuration. Electrocardiogram revealed ST segment elevation, two dimensional echocardiography revealed right wall motion abnormality and left ventricular systolic dysfunction with ejection fraction of 40%. Serum Cardiac troponin I level was 15ng/ml (normal 0.0-0.4 ng/ml), myoglobin >500 ng/ml (normal 10-95 ng/ml), CKMB was 25.6 ng/ml (normal 0-3 ng/ml). An hour later patient suddenly lost consciousness with no pulse and died in spite of resuscitation. On medico-legal autopsy internally, contusion of the pericardium (Fig 1a), contusion of ascending aorta of heart (Fig 1b), intimal tear in the coronary sinus of aorta with thrombus hanging from it and adhering to the ventricular wall was found (Fig 2a). The left coronary artery was 90% occluded (Fig 2b). Histopathological examination revealed atherosclerotic plaque in the left coronary artery near the junction of anterior descending and left circumflex (Fig 3a). Both the

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ventricular showed hypereosinophilic wavy fibers and neutrophilic infiltration suggestive of recent myocardial infarction (Fig 3b).

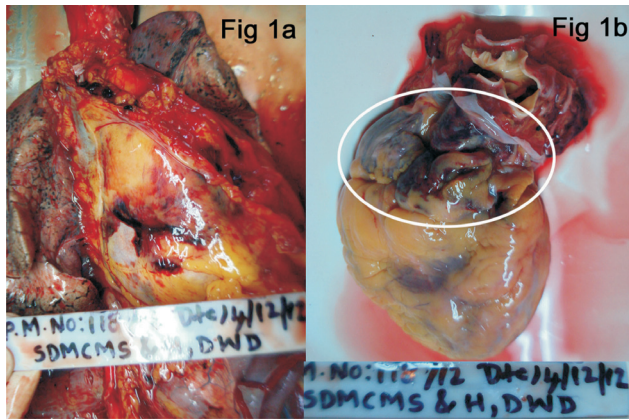


Fig. 1. Contusion of pericardium (Fig 1a). Contusion of ascending aorta of Heart (Fig 1b).

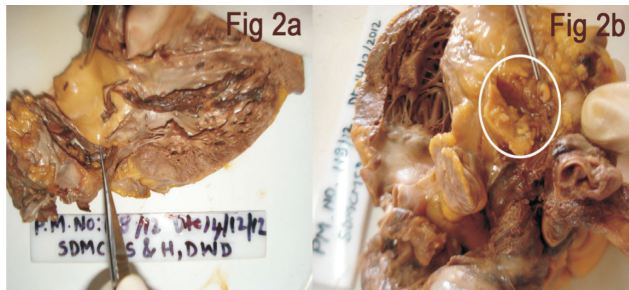


Fig. 2. Tear in aorta with thrombus extending from it and adhering to left ventricle (Fig 2a). Occluded left coronary artery (Fig 2b).

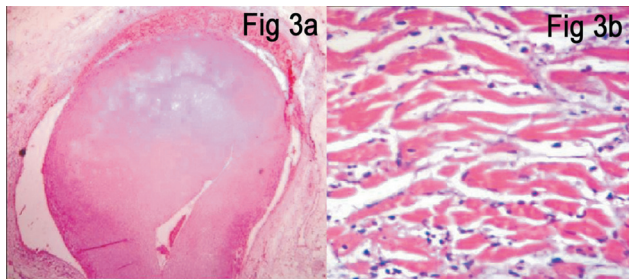


Fig. 3. Atheromatous plaque in left coronary artery (Fig 3a). Wavy fibers with neutrophilic infiltration of myocardium (Fig 3b).

DISCUSSION

Acute myocardial infarction following blunt trauma to chest is a rare complication and it can occur even after minor trauma. Motor vehicle accident is the most common cause of such myocardial infarction (64%) followed by sports injuries (17%).³ Such sports

injuries include the patient being hit in the chest with soccer ball or basket ball.^{4,5,6} In majority of cases they are associated with coronary atherosclerosis or hypercoagulable states or inborn disorders of connective tissue such as Marfan syndrome, Ehlers danols syndrome and Pseudoxanthoma elasticum.⁷ Acute myocardial infarction in trauma may be due to dislodgment and embolisation of fibrous plaques, thrombosis from direct trauma, vasospasm, Pseudoaneurysm formation after dissection of intima and rupture of vessel itself.⁸ In the present case the patient had atheromatous plaque in the left coronary artery, due to blunt trauma to the chest there was bleeding in the atheroma and dissection of the left coronary artery leading to complete blockade which resulted in myocardial infarction. An atherosclerotic artery is more like a rigid tube as it loses its elastic properties. Mechanical energy applied to this type of vessel causes rupture of the arterial wall and plaque leading to occlusion of the coronary vessel.⁹

The time lapse from injury to coronary artery occlusion may vary. Acute myocardial infarction has been reported to occur immediately and up to five weeks after trauma.^{10,11,12} The left anterior descending artery is the most frequently injured, due to its proximity to the anterior chest wall followed by the right coronary, and the circumflex artery being the least involved.^{13,14} These types of instances may arouse suspicion if the victim dies at the accident site, whether the infarction has led to road accident or the road accident has aggravated the disease and caused myocardial infarction. In present case the patient was a pillion rider and at the time of admission investigations including Electrocardiogram did not suggest myocardial infarction, therefore one can infer that chest trauma has precipitated the infarction.

CONCLUSION

Early diagnosis of myocardial infarction in a case of vehicular accident may be missed because other injuries are more evident and these may distract the physician. A high level of vigilance is required for diagnosis of cardiac trauma in patients who have suffered blunt trauma to chest. Investigation like serial electrocardiogram, cardiac enzyme echocardiogram and coronary angiography can reduce the mortality and morbidity.

Conflict of Interest: None to Declare

Source of Funding: No source of financial assistance was obtained from any individual or agency

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Ethical Clearance: Consent of victim relative taken (doesn't require ethical clearance)

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Hypertrophic Cardiomyopathy as a Cause for Sudden Death During Sexual Intercourse- A Case Report

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ABSTRACT

Sudden Natural Death means death occurring within 24 hours after the onset of symptoms due to natural cause (Disease, Old age). Its unexpectedness is important than the duration of illness. Such deaths may come to light either by- found dead, brought dead to hospital, or died in the presence of some people. Sometimes these deaths appear to be suspicious and needs to be investigated. And these Sudden Natural Deaths constitute about 10% of all the Natural Deaths.

Death during sexual intercourse is one component which constitutes about 0.6% to 0.7% of all the Sudden Natural Deaths. In this particular case, the death of newly married husband is discussed.

Keywords: *Sexual Intercourse, Sudden Death, Hypertrophic Cardiomyopathy, Heterogeneous Genetic Disease*

INTRODUCTION

Sex is essential part of life. There is so much energy, happiness; bliss is there that it "blinds" the person where he or she never thinks the future consequences associated with it including the death or rape charges.

Cases of deaths occurring during sexual intercourse have been reported often. In this paper the incidence with respect to gender, age, high risk groups, and causes of death, extra-marital relation and ways to prevent such incidences are explored.

CASE HISTORY

Sri Jagadeeshwara M Gandhi, male aged 30years came to Bangalore for *honey moon* along with his wife. On the early morning after the intercourse on 31/10/2001, he developed chest pain and breathlessness. Immediately he was shifted to St Martha's hospital where he was declared brought dead.

Autopsy was done at Victoria Hospital, Bangalore vide PM no 2397/01 dated 1/11/2001. Autopsy

revealed no external or internal injuries with length of the body being 170cms and well built. Heart was 800grams; both chicken fat and red currant jelly blood clots were present; both aortic and mitral valves were thickened; the thickness of left ventricle was 25mm and right ventricle was 8mm; both coronary ostiae were narrowed; both coronaries were patent and there was generalized hypertrophy of the heart muscle.

Opinion as to the cause of death was heart failure as a result of generalized hypertrophy of the heart with mitral stenosis and aortic sclerosis (Natural Death)

Sexual Activity and effect on Cardiovascular System

Normal sex is comparable to mild to moderate physical activity in the range of 3-4 metabolic equivalents. (METS; is equivalent of 2 flights of stairs or walking briskly for a short duration ¹

Heart rate rarely exceeds 130/minute and systolic blood pressure rarely exceeds 170/mm of Hg^(2, 3, and 4) in normotensive individuals.

Some patients' particularly older people may have difficulty in reaching orgasm for medical or emotional reasons. In attempting to achieve a climax it is possible that such individuals may exert themselves to a degree of exhaustion with relatively greater demand on their cardiovascular system.

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Sexual Activity and Cardiovascular Risk

The following risks are noted

- 1) Angina
- 2) Myocardial Infarction
- 3) Ventricular arrhythmias/ Death

Coital Angina

Angina that occurs minutes or hours after sexual activity represents <5% of all the angina attacks. If a patient can achieve an energy expenditure of ≥ 3 metabolic equivalents without demonstrating ischemia during exercise testing then the risk for ischemia during sexual activity is low.

Myocardial Infarction

Sexual activity was associated with 50-60 years males which consisted of 50-75% males with 2.7 increased relative risk of MI than with not engaged in sex⁵

Sedentary individuals have relative risk of 3.0 whereas physically active individuals 1.2⁶

Sexual activity is the cause of <1% all acute Mis⁶

For the individuals with previous MI the annual risk of re-infarction or death is estimated to be 10% (or as low as 3% if the individual has good exercise tolerance.

Ventricular arrhythmias / Death

Autopsy reports reported 0.6-0.7% of all sudden death related to sexual activity.

Of the subjects who died during coitus 82% to 93% were men, majority were having (75%) extramarital sexual activity in most cases with a younger partner in an unfamiliar setting and after excessive food and alcohol consumption.

Review of literature

Hypertrophic Cardiomyopathy (HCM)

Is a primary disease of the myocardium in which a portion of the myocardium is hypertrophied without any obvious cause^{7, 8, 9, 10, 11, and 12} it is leading cause of death in young adults¹³. Hypertrophic cardiomyopathy is frequently asymptomatic until sudden cardiac death, and for this reason some suggest routinely screening certain population for this disease¹⁴.

With HCM, the sarcomeres (contractile elements) in the heart increase in size, which result in the heart

increase in size, which results in thickening of the heart muscle. HCM also causes disruptions of the electrical functions of the heart. HCM is most commonly due to mutation in one of 9 sarcomeric genes that results in mutated protein in the sarcomere, the primary component of the myocyte (the muscle cell of the heart).

The prevalence of HCM is about 0.2 to 0.5% of the general population.

Signs and Symptoms: The clinical course is variable. Many patients are asymptomatic or mildly symptomatic. The symptoms of HCM include dyspnea (shortness of breath), chest pain (angina), uncomfortable awareness of the heart beat (palpitations), fatigue, fainting and sudden death.

Dyspnea is largely due to increased stiffness of the left ventricle, which impairs filling of the ventricles and leads to elevated pressure in left ventricle and left atrium.

Major risk factors for sudden death include prior history of cardiac arrest or ventricular fibrillation spontaneous sustained ventricular tachycardia, family history of premature sudden death, unexplained syncope, LV thickness greater than 30 mm, abnormal exercise blood pressure and non-sustained ventricular tachycardia¹⁵.

Genetics

Familial hypertrophic cardiomyopathy is inherited as an autosomal dominant trait and is attributed to mutations in one of a number of the sarcomere proteins.

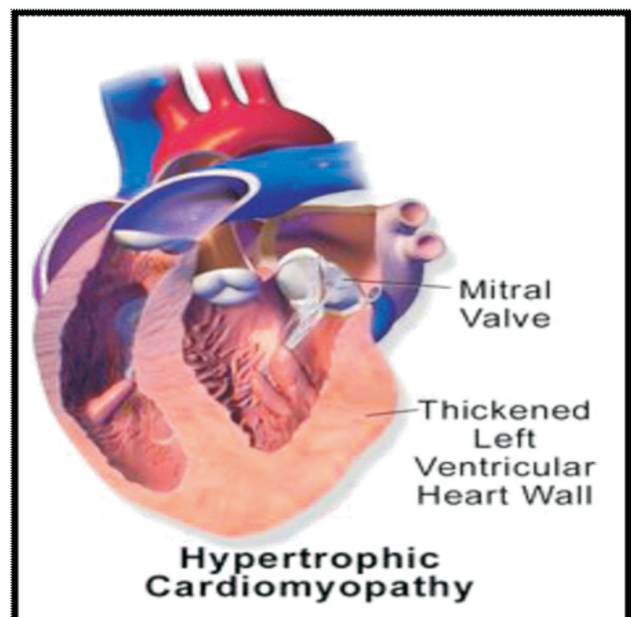


Fig. 1. Illustrated photo from Wikipedia

Pathophysiology: Individuals with HCM have some degree of left ventricular hypertrophy inter ventricular septum hypertrophy¹⁶. This is in contrast to concentric hypertrophy seen in aortic stenosis or hypertension. About 2/3 of individuals with HCM have asymmetric septal hypertrophy.

About 25% of individuals with HCM demonstrate an obstruction to out flow of blood from the left ventricle during rest. In as much as 70% of patients however obstruction can be provoked under certain conditions. This is known as dynamic outflow obstruction because the degree of obstruction is variable and is dependent on the loading conditions (ventricular filling and arterial pressure) and contractile state of the left ventricle.

Myocardial hypertrophy and extra cellular fibrosis predispose to left ventricular stiffness which in concert with compromised cellular energetics and abnormal calcium handling lead to diastolic dysfunction manifested as dyspnea and exercise intolerance.

The altered structure of the coronary vessels and increased diastolic pressure (reduced blood supply) together with the hypertrophy and the outflow that obstruction (increased demand) cause myocardial ischemia that is manifested as angina and may be responsible for the triggering of ventricular arrhythmias.

In about 30% of patients there are abnormal to increase systolic blood pressure during exercise. This is attributed to exacerbated cardiac inhibitory reflexes initiated by increased myocardial wall stress and to elevated levels of vasodilating substances.

Screening

Although HCM may be asymptomatic, affected individuals may present with symptoms ranging from mild to critical heart failure and sudden cardiac death at any point from early childhood to seniority^{17 and 18}

HCM can be detected with echocardiogram with 80%+ accuracy, which can be preceded by screening with an electrocardiogram (ECG) to test for heart abnormalities.

Cardiac Magnetic Resonance imaging CMR, considered the gold standard for determining the physical properties of the left ventricular wall, can serve as an alternative screening tool when an electrocardiogram provides inconclusive results¹⁷. For example, the identification of segmental lateral ventricular hypertrophy cannot be accomplished with

echocardiography alone. Also, left ventricular hypertrophy may be absent in children under 13 years of age. This undermines the result of pre-adolescent echocardiograms¹⁸

Diagnosis

A diagnosis of hypertrophic cardiomyopathy is based upon a number of features of the disease process. While there is use of echocardiography cardiac catheterization, or cardiac MRI in the diagnosis of the disease other important factors include ECG and genetic test findings¹⁹ and if there is family history of HCM or unexplained sudden death in otherwise healthy individuals.

CONCLUSION

HCM is a genetic disease (autosomal dominant), almost asymptomatic till young adult age, may manifest with dyspnea, angina, myocardial infarction, palpitations, and sudden death. It runs in families. By ECG, Echocardiography, MRI of heart, Exercise test, and clinical examination can detect the condition. High risk groups like unexplained sudden death history in the families, heart symptoms, and athletes should be routinely screened and followed up for better life.

RECOMMENDATION

During postmortem examination special care should be taken especially to weigh the heart, measure the thickness of the left ventricle, right ventricle, inter ventricular septum (Proximal 2/3 of the septum more thickened), and look for thick aortic and mitral valve thickening and calcification of chorda tendinae and any abnormalities. For confirmation the heart should be sent for histopathology examination. Once diagnosed measures can be taken for the screening of the family members

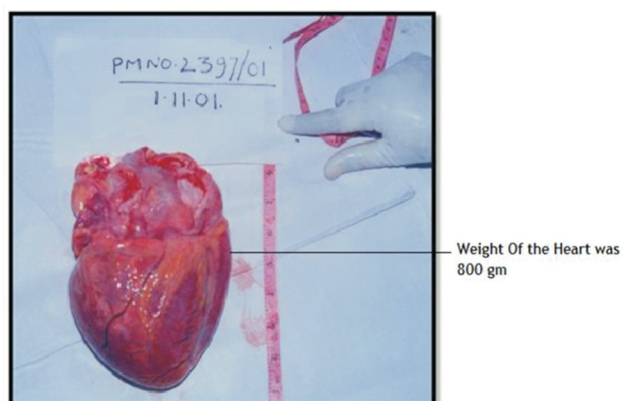


Fig. 2. Heart weighing 800gm

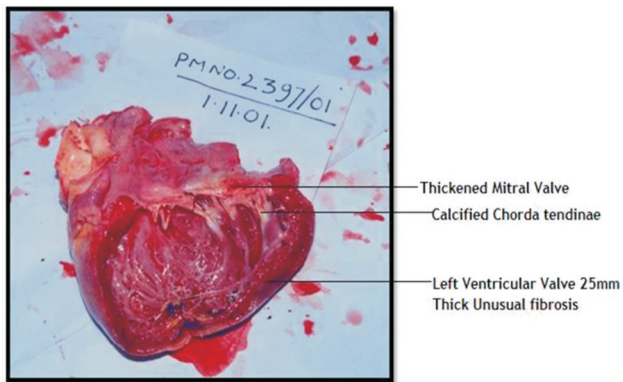


Fig. 3. Dissected Heart showing thickened mitral valve, calcified chorda tendinae & 25 mm thick left ventricle with “unusual fibrosis”

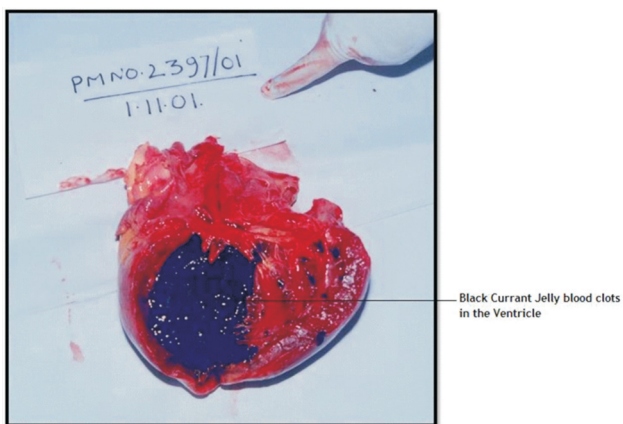


Fig. 4. Showing black currant jelly blood clots

ACKNOWLEDGEMENT

I am hearty thankful to Professor K W D Ravichandar, Professor S B Patil, Professor K H Manjunath and Professor PK Devdas, Dr. Nissar Ahmad for their encouragement guidance and support from the initial to the final level, enabled me to develop an understanding of the subject, at the Department of Forensic Medicine, Bengaluru Medical College, Bengaluru.

Lastly, I offer my gratitude to my colleagues Dr. Rajendra, Dr. Manish, Dr. Pramod Bagali, Dr. Rudramuthy, and mortuary staff at Victoria Hospital Bangalore for their help during the study.

Conflict of Interest: An Autopsy study of Sudden Natural Deaths in Victoria and Bowring Hospitals & Lady Curzon Hospital attached to Bangalore Medical College was my primary goal of study during my post-graduation course. The study was aimed at- which systems are commonly involved, whether cardiovascular or respiratory system, or other systems: most common causes for sudden death, system wise;

prevalence with respect to age, sex. This, being a sudden natural death case, came incidentally and attracted my mind to explore the details of sudden deaths during sexual intercourse due to cardiac causes.

Source of Funding: Government of Karnataka through Medical Education Department.

Ethical Clearance: The ethical clearance was taken prior to the study from the Institution’s Ethical Committee (Bengaluru Medical College Ethical Committee)

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A Carotid Body and Carotid Sinus Presents in Both Side of the Neck

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ABSTRACT

The carotid body is a small mass of tissue inside the carotid bifurcation that reacts to the body's level of oxygen. In humans being the carotid sinus is a slight dilatation of the upper part of the common carotid and the adjacent part of the internal carotid artery. The carotid body is a small gland like structure placed on the deep surface of the carotid bifurcation; it may see twisting the arteries round and cleaning between them¹. Carotid body tumors usually are painless and slow growing; they may cause a compression syndrome those results in symptoms such as dysphagia.

Keywords: Carotid Sinus and Carotid Body, Nerve Supplies Glossopharyngeal Nerve, Vagus and Sympathetic

INTRODUCTION

The carotid body is a chemoreceptor located in the adventitia of the bifurcation of the common carotid artery. A Chemoreceptor function of carotid body is monitors the blood's pH, pCO₂, and pO₂ and thereby modulates cardiovascular and respiratory function primarily through sympathetic tone. When the carotid body senses acidemia, hypercapnea, or hypoxia, autonomic firing leads to increased blood pressure, heart rate, and respiratory rate. The function of the carotid body is complemented by other chemoreceptors, most notably the aortic body located in the aortic arch. Carotid body is located in the bifurcation of the common carotid artery. Average size of carotid body is 3-5 mm in diameter and average weight is 12 mg. Blood supply to carotid body is from external carotid through Mayer's ligament (provides attachment to carotids) Innervations of carotid body is Hering's nerve (aka carotid sinus nerve), a branch of the glossopharyngeal (CN IX), originating 1.5 cm distal to jugular foramen. It has composed of two receptor cell types: Chief cells (Type I): derived from neural crest, release ACh, ATP, dopamine in response to activation & Sustentacular cells (Type II): supporting cells

The carotid sinus is a baroreceptor that senses changes in systemic blood pressure and is located in

the adventitia of the carotid bulb of the internal carotid artery. Due to its location the carotid sinus is an intimately related but distinct organ from the carotid body. Innervations of carotid sinus are same as carotid body (Hering's nerve, aka carotid sinus nerve, a branch of CN IX). The function of the carotid sinus can be affected by carotid body tumor resection. Carotid sinus syndrome (syncopal episodes due to inadvertent triggering of the carotid sinus) is pathology of the carotid sinus; in addition, carotid massage triggers the carotid sinus pathway (increased pressure on carotid sinus due to massage '!' sends signal to decrease systemic BP).

Right common carotid arises from the baciocephalic trunk and the left arises from the arch of the aorta. It is enclosed in the carotid sheath. The carotid sinus is a slight dilatation of the upper part of the common carotid and adjacent part of the internal carotid artery. The carotid body is a small gland like structure placed on the deep surface of the carotid bifurcation².

ANATOMY

The anterior cervical region of the neck contains the common carotid artery, which produces the pulse palpated at the side of the neck.

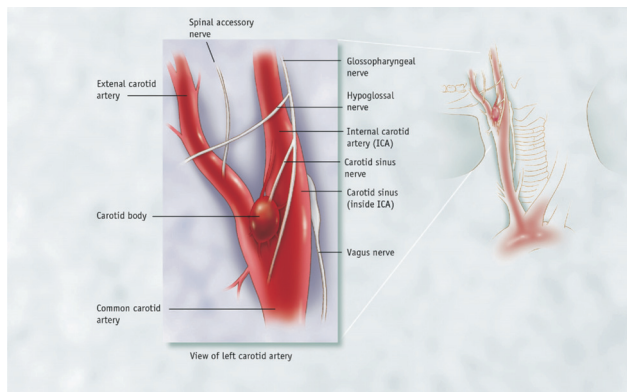
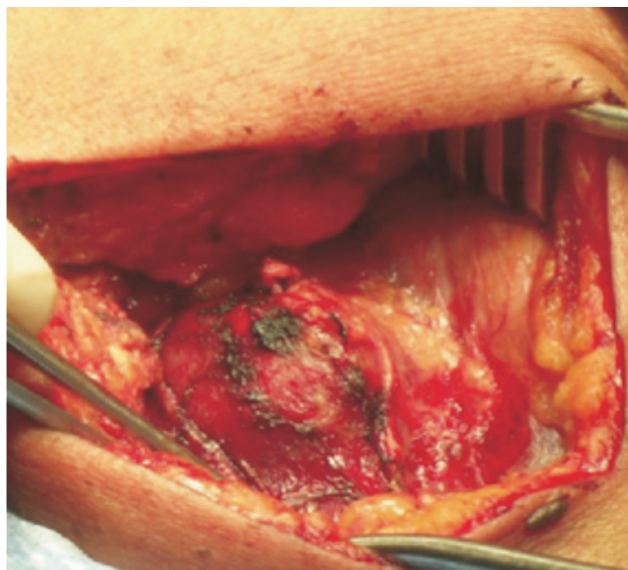


Fig. 1. (Diagram showing a left-sided view of the anatomy of the carotid structures)

The common carotid artery divides into two smaller vessels—the internal and external carotid—forming a structure known as the carotid triangle³. In the carotid triangle are two important structures: the carotid sinus and the carotid body³. The carotid sinus are located inside the proximal internal carotid artery. It is a baroreceptor that responds to fluctuations in arterial blood pressure³. The carotid body is a small mass of tissue (i.e., approximately 3 mm by 5 mm in diameter) inside the common carotid artery bifurcation, close to the carotid sinus. It was first identified in 1743 by Albrecht von Haller, a Swiss anatomist and physiologist⁴. The carotid body is a chemoreceptor that responds to low blood oxygen levels by increasing respiration, heart rate, and blood pressure³.

MATERIALS AND METHOD

Following figure showing dissection of the soft tissue of neck - exposed the carotid body



SURGICAL RESECTION

The surgeon obtains surgical exposure via an oblique incision along the anterior border of the sternocleidomastoid muscle, although larger tumors may require a Y-shaped incision⁵.

The present dissection of the head and neck during routine dissection of 60 year male cadaver variation in the common carotid artery bifurcation external and internal carotid artery. The two carotid bodies are reddish brown ellipsoid and lies near carotids sinus in the neck. Each in 6 mm in height and 3mm in width and lies between the start of its branches being attached to adventitia miniglomera with diameter of 600mm. Each glomus is innervated by glossopharyngeal carotid branches, including the carotid sinus nerve and by a plexus of glossopharyngeal, vagal and sympathetic components. Its abundant blood supply is derived from the adjacent external carotid rami.

Structure and function: The carotid glomus is an arterial chemoreceptor.

OBSERVATION AND RESULTS

The carotid sinus has a very sensory innervations; the receptor, which lie among the collagen fibers of the tunica adventitia, are sensitive to stretching like those of the cardio-aortic nerve. In fact, the carotid – aortic and the carotid sinus nerve should be regard as two afferents of one regulating mechanism for preventing any undue rise of blood pressure and for avoiding an excessive load being taken by the heart.

The carotid body contains numerous sinusoidal capillaries which being the blood in to close contact with gloma cells richly supplied with afferent nerve fibers which join the carotid sinus nerve. The nerve endings are sensitive to alteration in the composition of the blood of the sinusoids and are, therefore called chemoceptor. Similar chemoceptor tissue is found at various positions on or near the arch of the aorta.

DISCUSSTION

Histology of carotid body and carotid sinus

Histology of these baroreceptor areas and found it similar to that of the carotid sinus.

In each area myelinated fibers ramify in the adventitia of the vessel.

At this sites there is generally less muscle and sometimes less elastic in the media and the collagen fibers of the adventitia are in the of finer fibers that are intricately interwoven.

Acknowledgement: Nil.

Ethical Clearance: Informed consent was taken.

Source of Funding: Self.

Conflict of Interest: Nil.

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Is there any Sexual Dimorphism among Metopic Suture

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ABSTRACT

The knowledge of the anatomy of the metopic suture is important because its permanence can be mistaken for a cranial fracture in radiological images. Possible existence of sexual dimorphism may aid to the identification.

Objectives: This study was undertaken to evaluate the possible existence of sexual dimorphism in metopic suture in south Indian adult skulls.

Method: One hundred and eighty dry human adult skulls of known sex (n=88 female, n=92 male) available from the department of S. N. Medical College, Bagalkot were included in the study. Each skull was observed for metopic suture, location (complete, incomplete - upper part, upper middle, lower middle and lower part) and also the shape of metopic suture (linear, V-shaped, double line).

Results: Complete metopic suture was seen 5(2.77%) of skulls of which 3(3.26%) were male and 2(2.27%) were female. Incomplete metopic suture was seen in 65(36.11%) of skulls of which 30 (32.60%) were male and 35(39.77%) were female. No significant sexual dimorphism was observed in incidence of complete and incomplete metopic suture (P = 0.677 and 0.247 respectively). Among the shape of metopic suture, linear type predominated (16.66%) then followed by double type (14.44%) and least being V-shaped (5.0%). Linear type predominated in male skulls (18.47%) while double line type predominated in female skulls (20.45%). Statistical significance observed in double line type with P value of 0.046.

Conclusion: As a conclusion, there is no statistically significant sexual dimorphism in the incidence of both complete and incomplete metopic suture in the present study. Statistical significance is observed in double line type of metopic suture (p=0.046).

Keywords: Metopic Suture, Metopism, Sexual Dimorphism, Adult Skulls

INTRODUCTION

The metopic suture is found between the tubers of the frontal bone. It can be complete (metopism) or incomplete. It is also called as interfrontal suture¹ or median frontal suture². The time of physiological closure of the metopic suture varies from birth to 8 years of age. Widely accepted closing time is approximated at 2 years of age³. The fusion of the metopic suture commences at the nasion, proceeds superiorly in progressive fashion, and terminates at the anterior fontanelle⁴. The persistence of the interfrontal or metopic suture has reported frequencies ranging from 1 to 12% of skulls⁵.

The knowledge of the anatomy of the metopic suture is important because its permanence can be mistaken for a cranial fracture in radiological images⁶ or even for the sagittal suture⁷. It is also important for paleodemography and forensic medicine⁸.

Persistence of a complete or incomplete frontal (metopic) suture may be associated with a syndrome involving several variations of the visceral cranium and the phalanges. Failure of ossification in a broad and elongated area in the region of the frontal suture has been shown to be associated with a partial or complete absence of the clavicle⁵.

The presence of metopic suture is attributed to various causes like abnormal growth of cranial bones, Atavism, Mechanical causes, Hormonal dysfunction, Influence of gender and at present the most accepted cause being the genetic influence⁶.

Various authors have studied the incidence and morphology of metopic suture in various regions of the world. Few authors have quoted regarding the sexual dimorphism in metopic suture^{6,9-10}. The present study is carried out to evaluate the sexual dimorphism in metopic suture in south Indian adult human skulls which will aid to the literature.

MATERIAL AND METHOD

Well preserved 180 (Female =88, Male = 92) dry human adult skulls of known sex available in the Department of Anatomy, S. N. Medical College, Bagalkot were included in the study.

Metopic suture studied for its presence, location and type

- Presence calculated differently in male and female skulls
- The location is studied as follows:

Complete (Figure no. 1)

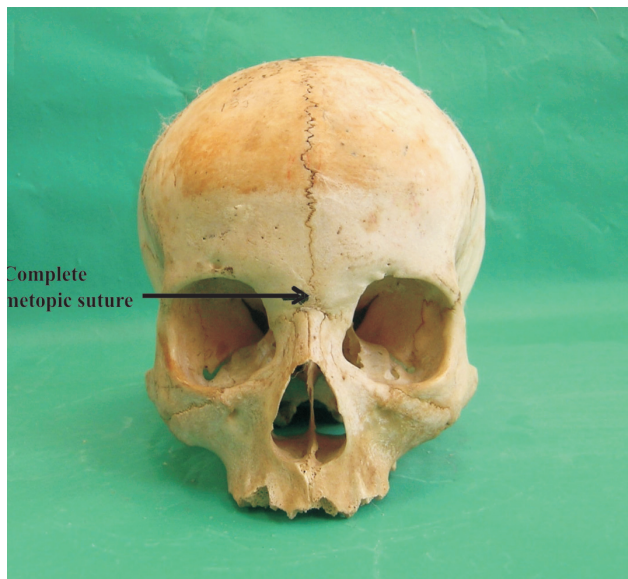


Fig. 1. Complete metopic suture

Incomplete - Upper part, Middle upper part, Middle lower part and Lower part

- The type in incomplete suture as: (Figure no.2)

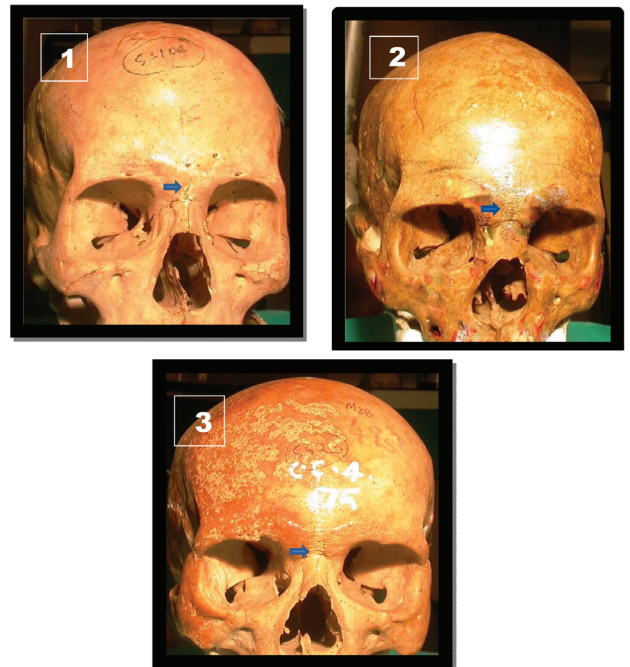


Fig. 2. Shows the shape of incomplete metopic suture in the lower part

Linear, V- Shaped and Double type

Statistical tests applied to test for the sexual dimorphism with respect to presence, extent and shape of metopic suture.

- Descriptive statistical analysis with significance level assessed at 5% level of significance
- Mann Whitney U test has been used to find the significance of difference of variables on the ordered data set between male and female groups.
- Statistical software used - SPSS 15.0, Microsoft word and Excel to generate the tables.

RESULTS

Table I: Overall incidence and extent of metopic suture in male and female skulls

Extent	Male (n=92, 51.11%)	Female (n=88, 48.88%)	Total (n=180)
Complete	3(3.26%)	2(2.27%)	5(2.77%)
Incomplete	30(32.60%)	35(39.77%)	65(36.11%)
Upper part	—	—	—
Upper Middle	—	—	—
Lower Middle	—	—	—
Lower part	30(32.60%)	35(39.77%)	65(36.11%)

As it is evident from the above table, incomplete type of metopic suture was found in the lower part only in both male and female skulls.

Table 2: Incidence of different types of metopic suture in male and female skulls.

Extent	Male (n=92, 51.11%)	Female (n=88, 48.88%)	Total (n=180)	P value
Complete	3(3.26%)	2(2.27%)	5(2.77%)	0.677
Incomplete	30(32.60%)	35(39.77%)	65(36.11%)	0.247
Linear	17(18.47%)	13(14.77%)	30(16.66%)	0.351
V-Shaped	3(3.26%)	6(6.81%)	9(5%)	0.498
Double line	8(8.69%)	18(20.45%)	26(14.44%)	0.046**

Complete metopic suture was seen 5(2.77%) of skulls of which 3(3.26%) were male and 2(2.27%) were female. Incomplete metopic suture was seen in 65(36.11%) of skulls of which 30 (32.60%) were male and 35(39.77%) were female. No significant sexual dimorphism was observed in incidence of complete and incomplete metopic suture ($P = 0.677$ and 0.247 respectively). Linear type predominated (16.66%) then followed by double type (14.44%) and least being V-shaped (5.0%). Linear type predominated in male skulls (18.47%) while double line type predominated in female skulls (20.45%). Statistical significance observed in double line type with P value of 0.046.

DISCUSSION

Metopic suture is partially or totally persisting suture extending from the nasion to the anterior angle of the bregma³. It is also called as median frontal suture¹ or Interfrontal suture² usually present between two superciliary arches. Widely accepted closing time of this suture is approximated at 2 years of age³. Incidence of metopic suture has reported frequencies from 1 to 12% of skulls⁵.

According to Ossenberg¹¹, groups practicing cranial deformation not only have a higher incidence of wormian bones, but also in general have a slower rate of suture closure and metopism is more common in crania with an Inca bone than in crania without. According to the studies of del Sol et al⁶, metopism can be related to varied causes, such as: abnormal growth of the cranial bones, pathologic metopism triggered by hydrocephalus, growth interruption, hereditary specific factors, sexual influence, heredity, atavism, stenocrotaphia, plagiocephaly, scaphocephaly, mechanical causes and hormonal dysfunction. The genetic influence is currently the factor most accepted by the scientific community.

Although it is rare to find this suture in adults, its presence is not considered pathological. However, premature fusion of the metopic suture results in trigonocephaly and it has been calculated that this

craniosynostosis stands at 400 per 1,000,000 births in humans¹².

The persistence of metopic suture is important because its permanence can be mistaken for a cranial fracture in radiological images⁶ or even for the sagittal suture⁷.

With increasing incidence of road traffic accidents, natural calamities and violence the possible existence of sexual dimorphism in metopic suture can aid in identification. Thus this study conducted to know the sexual dimorphism in metopic suture.

Sexual dimorphism in metopic suture

Del Sol M. et al⁶ studied 400 skulls of adult individuals of both sexes (135 female and 265 male) in Brazil. They reported 11 skulls (2.75%) with metopism, in that 4 were female and 7 were male skulls and incomplete metopic suture was present in 115 skulls (28.75%) of these 27 were female and 88 were male skulls. The shape of the metopic suture was primarily linear (64.35%).

Baaten PPIJ et al⁹, studied the incidence of metopism in Lebanese population. The study was carried out on 968 skull X-rays to determine the incidence of the metopic suture in the Lebanese population. Metopism was reported in 0.82% of cases. Incidence was relatively higher in male skulls (1.84%) than in female skulls (1.62%). The incomplete metopic suture was seen in 0.93% of cases. . Incidence was relatively higher in male skulls (1.84%) than in female skulls (1.62%).

Castilho SMA et al¹⁰ studied 71 dry skulls of adult Brazilian subjects of both sexes (43 males and 28 females), with ages ranging from twenty five to eighty years from Brazil. They observed that the occurrence of metopism was seen in 7.04% (05/71) skulls, of which 80% (4/5) were female and only 20% (1/5) male and the incomplete metopic suture in 32.39% skulls (23/71), with higher frequency in female skulls, 60.86% (14/23) when compared male skulls that reached 31.13% (9/23).

In present study, metopism was observed in 5 skulls (2.77%) with incidence of 3 (3.26%) in male skulls and 2 (2.27%) in female skulls. No significant sexual dimorphism was seen ($P=0.677$). The incidence of incomplete metopic suture was seen in 65 skulls (36.11%) of which 35 skulls (39.77%) were females and 30 skulls (32.60%) were males. No significant sexual dimorphism was seen ($P=0.247$). Linear type

predominated in male skulls (18.47%) while double line type predominated in female skulls (20.45%). Statistical significance observed in double line type ($P=0.046$).

CONCLUSION

There is no statistically significant sexual dimorphism in the incidence of both complete and incomplete metopic suture in the present study. With respect to shape of incomplete metopic suture, statistical significance is observed in double line type of metopic suture ($p=0.046$).

Conflict of Interest: Nil

Source of Support: Nil

Ethical Clearance: Obtained ethical clearance from the institutional ethical review board.

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Unilateral Duplication of Ureter

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ABSTRACT

Duplication of ureter may be partial or complete. In partial duplication proximally separated two limbs join distally to form one ureter before entering the urinary bladder. Complete duplication where two ureters remain separated through out the course with separate openings in the urinary bladder is less common. Complete duplication of ureter occurs in 0.2% of live births. The prevalence of partial duplication found on urograms is 0.6%.

During routine dissection of 20 cadavers for 1st yr MBBS students, duplication of ureter was observed in a 45yr male cadaver on right side. Both the ureters were arising separately from the renal pelvis of right kidney one below the other. Their course was found to be usual, upper ureter united with lower ureter distally in a "Y" shape manner. They were having single opening in the urinary bladder without any associated abnormality. On the left side single ureter was found with a normal course and opening in the urinary bladder.

Most patients of ureteric duplication are asymptomatic and detected incidentally on imaging study. Symptomatic patient usually have complete ureteric duplication in which the ureter are prone to developing ureteropelvic obstruction, increased incidence of hydronephrosis and pyelonephritis. The possibility of duplication of ureter should always be borne in mind in children having urinary tract infection. High degree of suspicion should be considered during X-ray investigation.

Keywords: *Bifid Ureter, Complete Or Partial, Urogram*

INTRODUCTION

Duplicated collecting system can be defined as renal units containing two pyelocaliceal systems that are associated with a single ureter or with double ureters. The two ureters empty separately into the bladder or fuse to form a single ureteral orifice. Duplex collecting systems can be unilateral or bilateral and can be associated with a variety of congenital genitourinary tract abnormalities. Most patients are asymptomatic, with genitourinary tract abnormalities being detected incidentally on imaging studies performed for other reasons. Symptomatic patients usually have complete ureteric duplication in which

the ureters are prone to developing obstruction, reflex and infection. Duplication of ureter is one of the most common congenital malformations of the urinary tract found in 0.9% of a series of autopsies.

Duplication of ureter might be complete or incomplete. According to Glassberg et al¹ incomplete duplication of ureter is termed as bifid ureter. By Alan J. et al² in the book of urology Campbell autopsy series shows incidence of duplication was reported in 342 out of 51,880 individuals. Amongst these 85% (293) were U/L and 15% (53) were B/L, around 30% were complete. According to recent studies of Russel et al³ on an average, 3% excretory urograms show unilateral duplication on routine examination. Presence of bifid ureter is often seen to be associated with congenital hydronephrosis by Angulo et al⁴. Present case report of unilateral bifid ureter was associated with no other congenital anomalies. And the individuals might have been asymptomatic in life. However, this case is of immense interest to academicians and clinicians.

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Pathophysiology

The ureteric bud arises from mesonephric duct around the 5th week of intra uterine life. The ureteric bud grows and penetrates the metanephric tissue and subsequently forms renal pelvis, which on division gives rise to major and minor calyces. Thus, the collecting system including ureter, pelvis, major and minor calyces originate from the ureteric bud. By Moore and Persaud⁵ Embryological basis of duplex kidney might be due to bifurcation of single ureteral bud before bifurcation of the ampulla that results into a bifid pelvis or a bifid ureter. If two ureteral buds arise from the wolffian duct, a duplex kidney with complete ureteral duplication results. The ureteral bud that is associated with the future lower pole separates first from the wolffian duct, and the orifice progresses superiorly and laterally as a result of the urogenital sinus's growth. The common excretory duct, with the remaining ureter still attached, is taken up into the urogenital sinus. The orifice of the ureter that drains the upper pole opens medial and inferior to the orifice that drains the lower pole. This relationship is so consistent that it has been termed the Weigert-Mayer law. A duplex kidney may be drained by a single ureter or by two ureters. The two ureters can unite to form a single ureter or they can drain separately.

CASE REPORT

In routine dissection of 20 cadavers in the department of Anatomy, a rare case of unilateral bifid of ureter was detected on the right side of a male cadaver aged 45 years.

In the bifid ureter both the ureter were arising separately from the renal pelvis of right kidney one below the other (Fig-1). The two limbs of the ureter had their respective pelvis coming out as separate entities from the hilum of the kidney. The pelvis of the upper limb had its exit at the upper end of the hilus and that of the lower limb at the lower limit of the hilus. Their course was found to be usual upper ureter united with lower ureter at 14.5 cm proximal to the bladder wall (Fig-2). The opening of the ureter into the bladder did not show any abnormality. Examination of other thoracic, abdominal and pelvic viscera and other structures revealed no other gross morphological abnormality. On other hand, the left side ureter was found to be normal in course and opening in the urinary bladder. The knowledge about this type of duplications is important to the clinicians,

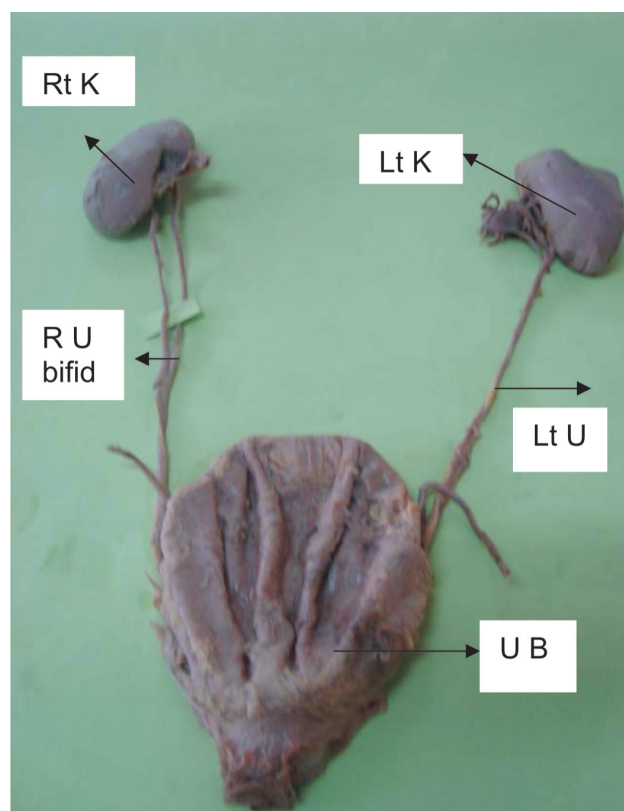


Fig. 1. Extra Vesical Bifid Ureter

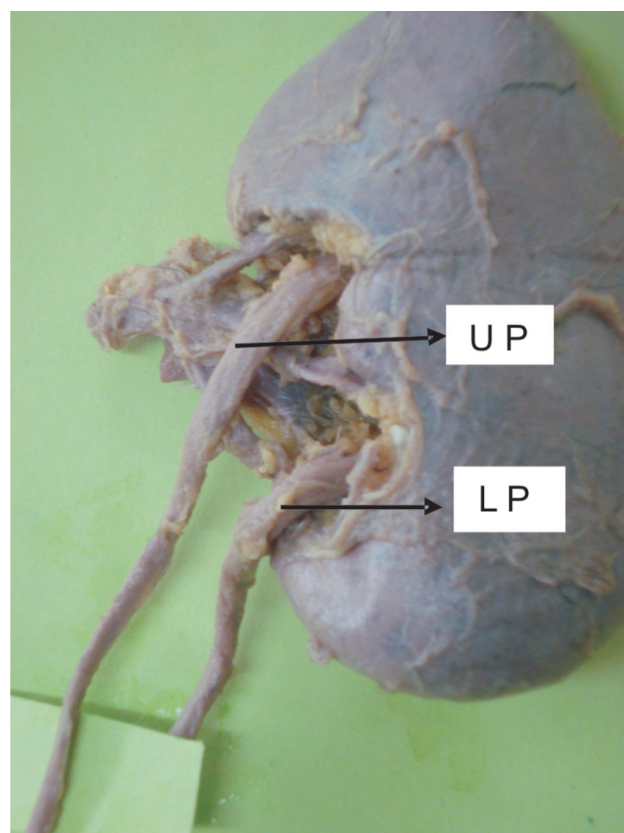


Fig. 2. Upper & Lower Pole of Bifid Ureter (Posterior Aspect)

DISCUSSION

Duplicated collecting system is the most common upper urinary tract anomaly. Bifid ureter has been detected in the past in association with various congenital anomalies. But in the present case, the unilateral incomplete bifid ureter of the right side was associated with no other abnormality.

Complete duplication of ureters occurs in 0.2% of live birth. The prevalence of partial duplication found on urograms is 0.6% by Dahnest et al⁶. No race predilection has been found. The presence of double ureters appears to be twice as common in females by Khan et al⁷. A duplex collecting system is a developmental anomaly, and patient age at the presentation varies according to the type of abnormality. Patients with duplex kidney are usually asymptomatic and are diagnosed as an incidental finding on imaging studies performed for other reasons. Symptomatic patients may present with vesicourethral reflex, recurrent UTI with resultant parenchymal scarring, ureteropelvic junctional obstruction (Horst and Smith⁸, hydronephrosis which may be severe enough to cause a palpable mass and hypertension. In females ectopic insertion of ureter will present with urinary incontinence (Lee et al⁹ & Whitmore and Schellhammer¹⁰. Rarely in the elderly population might duplex ureter be complicated by transitional cell carcinoma (Dudak and Antun¹¹. By the study of Jeong Hyun Park¹² in gynecologic surgery the incidence of ureteral injury was significantly higher in cases having risk factors (congenital anomalies) than in cases without risk factors. Patients with undiagnosed injuries can have a highly variable course that causes diagnostic delay, resulting in additional hospitalization that is associated with substantial morbidity and commonly results in medico legal litigations.

So knowledge about the congenital anomalies of ureter is important in medico legal cases.

Acknowledgement: The authors are thankful to all the persons (cadavers) whose body is used for dissection and upgrading our knowledge.

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Ethical Clearance: Ethics committee approval was obtained for this study.

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Estimation of Stature from Index Fingers Length in Davangere District

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ABSTRACT

Estimation of stature holds a special place in the field of forensic medicine and forensic anthropology. This study was designed to investigate the ability of estimating stature from index finger length. The study was carried out by taking the measurement of index fingers and body height of 250 medical students (125 males and 125 females) of 18 to 25 years of age. The study was carried out in department of forensic medicine and toxicology at SSIMS & RC Davangere, Karnataka state, India. Obtained data was analysed statistically to establish the relationship between a person's index finger and stature. From given data mean, SEE, correlation coefficient(r). Regression equation and 'P' values were obtained. A moderate correlation was observed between index finger length and height of a person which is statistically highly significant. The present study would be useful for anthropologists and forensic experts.

Keywords: Forensic Anthropology, Stature, Human Identification, Finger Length

INTRODUCTION

Identification of an individual has assumed importance in almost all spheres of life. In certain situations, such as putrefied, mutilated, or extensively charred body, conventional indicators and routine methods of identification fail to yield results. The situation is worsened when only mutilated and fragmentary remains are available for examination which is not uncommon in today's world due to mass disasters both natural and manmade e.g. earth quakes, cyclones, tsunamis, flood, terror attacks, bomb blasts, accidents, wars and plane crashes etc. Estimating the stature of a person from such fragmented remains forms an important tool of identification in such circumstances.

Kerley¹ states that every body part bears a more or less constant relationship with stature. Simmons et al² derived formulae to calculate stature with good results,

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even when only parts of the bone are available. Bhatnagar et al³ used different hand dimensions to predict the stature of an individual in different populations. It is shown in earlier studies that various hand measurements tend to differ in various ethnic groups⁴. Consequently, the formulae designed to estimate stature from various anatomical dimensions in one population do not apply to another^{5,6}. Many studies are done to calculate stature from foot length, limb lengths, long bones, but there are only few studies on hand and finger lengths, we are taking index finger length to calculate stature of a person. It will be helpful in conditions in which only hand or part of hand is available for identification of a person.

India is a vast country with varied geographical conditions and stature varies with race, sex, and geographical locations as quoted above. Therefore, our study examines the relationship of the index finger length with stature in and around Davangere district. This study may prove useful in conditions where only part of hand is brought for post-mortem examination.

MATERIAL AND METHOD

The present study was carried out in the

department of forensic medicine and toxicology at SSIMS & RC Davangere. A total of 250 subjects were included in the study, out of which 125 males and 125 females within age group of 18 to 25 years. The subjects included in study were healthy individuals free from any apparent skeleton deformity.

Anthropometric measurements of the index fingers were taken independently on left and right side of each individual. Besides the above measurements, stature of each subject was also recorded. All measurements were taken in well lighted room. The measurements were taken by using standard anthropometric instruments in centimetres to the nearest millimetre in following manner.⁷

Anthropometric Measurement

Index finger length – It is the distance from the tip of index finger to the proximal crease of the index finger.

Instruments : Venire Calliper.

Technique: The measurement was taken in standing position with stabilization of hand on table. The calliper was horizontally placed along the ventral surface of the left hand. The fixed part of the outer jaw

of the calliper was applied to the proximal crease of index finger and the mobile part of the calliper was approximated to the tip of the index finger and measurement was taken. In the same way measurement of the index finger of the right hand were taken.

Stature: It is the vertical distance between the point vertex and the heel touching the floor (ground surface).

Technique: The subject was made to stand in erect posture against the wall with the feet axis parallel or slightly divergent and the head balance on neck and the measurement was taken.

The data was collected, analysed and subjected to statistical analysis using statistical package for social sciences (SPSS) to know the correlation of the stature with the index finger length. The reliability of estimation of stature from the lengths of index finger was determined with the help of 'p' value, SEE, r, r Square and regression equations.

RESULTS

The present study focused on estimation of stature from the length of the index finger.

Table No. 1. Showing Mean, Standard Deviation and "P" value of both right and left index finger and height in males and females.

Parameters	Males			Female		
	Mean	SD	P* Value, sig	Mean	SD	P* Value, sig
RIFL	7.23	0.39	P<0.001 HS	6.68	0.43	P<0.001 HS
LIFL	7.28	0.43	P<0.001 HS	6.72	0.45	P<0.001 HS
Height	171.89	6.66	P<0.001 HS	158.73	5.56	P<0.001 HS

Table No. 2. Showing Correlation Coefficient and Standard Error of Estimation of right and left index finger in both males and females.

Parameter	Males			Female		
	R	R square	SEE	R	R square	SEE
RIFL	0.34	0.11	6.1	0.54	0.29	4.6
LIFL	0.36	0.13	6.0	0.50	0.25	4.8

Table No. 3: Depicting Regression Equation in both males and females from right and left index finger.

Parameter	Males	Females
	Regression equation	Regression equation
RIFL	Height = 129.84+5.81 (RIFL)	Height = 111.32+7.10 (RIFL)
LIFL	Height =131.60+5.60 (LIFL)	Height = 116.90+6.22 (LIFL)

Regression equation: stature= value of constant (a) + regression coefficient (b) x index finger length.

Males: $Y_1 = 129.84 + 5.81(\text{RIFL})$, $Y_2 = 131.60 + 5.60(\text{LIFL})$.

Females: $X_1 = 111.32 + 7.10(\text{RIFL})$, $X_2 = 116.9 + 6.22(\text{LIFL})$.

Regression equation with range of height

Males: $Y_3 = 129.84 + 5.81(\text{RIFL}) \pm 12.2$ $Y_4 = 131.60 + 5.60 (\text{LIFL}) \pm 12.$

Females: $X_3 = 111.32 + 7.10(\text{RIFL}) \pm 9.2.$ $X_4 = 116.90 + 6.22(\text{LIFL}) \pm 9.6.$

Where Y_1 & Y_2 = Height in males. Y_3 & Y_4 = Average height in males. X_1 & X_2 = Height in females.

X_3 & X_4 = Average height in females. RIFL = Right index finger length. LIFL = Left index finger length.

DISCUSSION

The identification of commingled mutilated remain is a challenge to forensic experts and hence, a need of studies on estimation of stature from various body parts in different population groups. Such studies can help in narrowing down the pool of possible victim matches in cases of identification from dismembered remains.

The present study show that estimation of stature from the index finger is highly significant ($p < 0.001$) in both males and females so it can be used for estimation of stature of a person. The values of 'r' Square in males and females with r Square = 0.11 of RIF in males being the lowest and r Square = 0.29 for RIF in females being the highest value, depicts that estimation of height from the RIF in females is more significant than males. Standard error of estimation SEE = 6.1 for RIF, SEE = 6.0 for LIF in males, SEE= 4.6 RIF & SEE = 4.8 LIF in case of females. This indicates RIF in case of females is better predictor of height as compared to LIF and is highly significant where as in case of males it is left index finger which gives better prediction of height than right index finger length. Considering all parameter it is in case of females where index finger length gives better prediction of stature estimation as compared to males.

A study was done by Krishan K⁸ et al on stature from IFL and RFL which shows larger significance in males than females, with higher significance for IFL than RFL which is contradictory to our study showing higher significance in females.

A study done by Rastogi⁹ et al on 500 subjects from Manipal North and South Indian population, showed higher significance in males as compared to females, which is contradictory to our study showing higher significance in females.

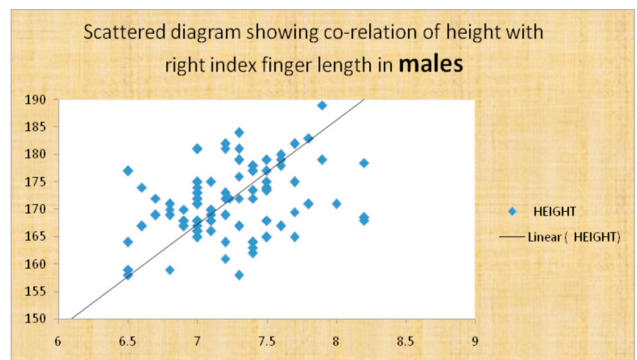
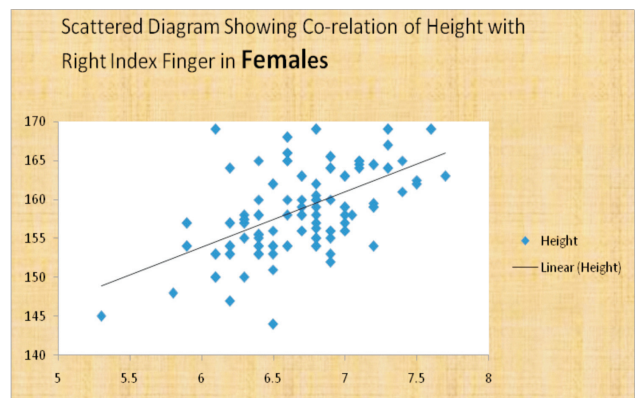
CONCLUSION

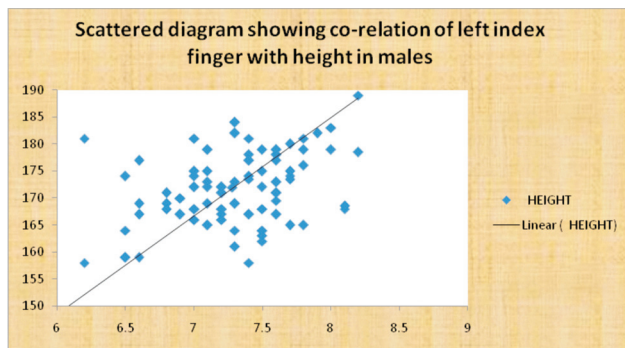
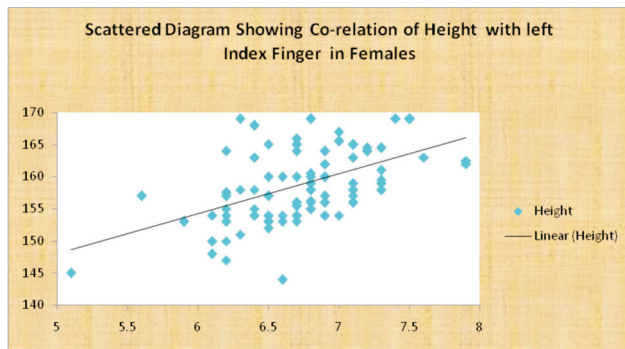
Estimation of stature forms an important parameter to reach to the partial identification of an unidentified

body and dismembered remains. The results of the present study indicate that the index finger length can be efficiently used for estimation of stature. Most authors have underlined the need for population-specific stature estimation formulae. In this study we derived a separate regression equation to estimate stature from index finger length for Davangere region.

This study revealed that the IFL can be used with high significant values for estimation of stature in South Indian population even if only an amputated hand is found and other body parts are unavailable. The results of this study are however, applicable only when an intact index finger is examined. Such studies can help in narrowing down the pool of possible victim matches in cases of identification from dismembered remains.

DIAGRAMS





Acknowledgment: Department of Forensic Medicine, SSIMS & RC, Davangere.

Conflict of Interest: None

Ethical Clearance: Ethical clearance was obtained from the Institutional Ethical Committee.

Source of Support: Department of Forensic Medicine, S.S.Institute of Medical Sciences and Research Centre, Davangere. The corresponding author confirms that he had full access to all the data in the study and had final responsibility for the decision to submit for publication.

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